

Faculty of Engineering of the University of Porto



Eco-Neighbours

Join the Green Challenge: Compete, Connect, Conserve!

Report

Human-Computer Interaction (IPC)

Class 5, Group 2

Alicja Finger- up202402494@up.pt

Bernardo Costa- up202207579@up.pt

Diana Nunes- up202208247@up.pt

Teresa Mascarenhas- up202206828@up.pt

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i. Introduction

As part of the Human-Computer Interaction 2024-2025 unit, we are tasked with developing a new user interface (UI) for a mobile/web application. Therefore, in Phase II, the focus is on designing a low-fidelity prototype and evaluating its usability through heuristic evaluations.

The goal of this phase is to define three main tasks and usability requirements, create a lo-fi prototype to illustrate key functionalities, and perform heuristic evaluations to identify areas for improvement. Through the development process, we aim to create an interface that seamlessly combines essential power management features with intuitive user interaction patterns.

2. Project Overview

Eco-Neighbors is an interactive, gamified app that promotes eco-friendly habits and community engagement. Users participate in fun challenges to reduce energy consumption, recycle, and conserve water while competing for titles like "Most Sustainable Home." The app fosters collaboration by enabling neighbors to share eco-tips and ideas, making sustainability a shared, rewarding experience.

2.1. Functionalities and Tasks

This section highlights the three chosen functionalities of the Eco-Neighbors app and their tasks, evaluated using usability criteria:

- **Efficacy:** Accuracy of task completion with minimal errors.
- **Efficiency:** Time or steps required to complete a task.
- **Satisfaction:** User experience ratings to ensure ease and enjoyment.

The tables below detail each functionality, its tasks, and usability requirements.

1. Compare Energy Usage with Neighbors or Similar Households

	Functionality	The app will allow users to compare their energy usage with that of their neighbors or households in a similar context (e.g., within a chosen radius).
	Task	The user selects a dropdown option to view the energy consumption statistics of households within a specified radius or that are similar to theirs in terms of size, location, etc.
Usability Requirement	Efficacy	No more than 2 errors on average during task completion.
	Efficiency	The task should be completed within approximately 3 minutes.
	Satisfaction	The user should rate satisfaction at an average of 4 out of 5.

2. Set and Track Personalized Energy-Saving Goals

	Functionality	Users will be able to set personalized energy-saving goals, either by selecting from pre-defined goals or by creating their own. They will also be able to track their progress.		
	Tasks	1. The user selects an energy-saving goal from a list of recommendations provided by the app.	2. The user sets a custom energy-saving goal, such as reducing monthly energy consumption by a specific percentage.	3. The user scrolls through the app to view their progress on all active energy-saving goals.
Usability Requirement	Efficacy	No more than 1 error on average.	No more than 8 errors on average.	An average of 1 error.
	Efficiency	The task should take under 2 minutes.	The task should take around 6 minutes.	The task should be completed in under 2 minutes.
	Satisfaction	The user should rate satisfaction at 4 out of 5.	The user should rate satisfaction at 4 out of 5.	The user should rate satisfaction at 5 out of 5.

3. Participate in Neighborhood-Wide Energy-Saving Challenges

	Functionality	The app will allow users to participate in neighborhood-wide energy-saving challenges, where users can join and contribute to communal sustainability efforts..
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	Task	The user clicks on a “participate” button to join a community energy-saving challenge.
Usability Requirement	Efficacy	No more than 2 errors on average.
	Efficiency	The task should be completed in under 3 minutes.
	Satisfaction	The user should rate satisfaction at 5 out of 5.

3. Prototype’s Wireflow

3.1. Prototype- Task 1

Compare Energy Usage with Neighbors or Similar Households

The user selects an option from a dropdown menu to view energy consumption statistics of similar households or those within a specified radius. This allows them to compare their energy usage with nearby homes and make more informed decisions about their consumption.

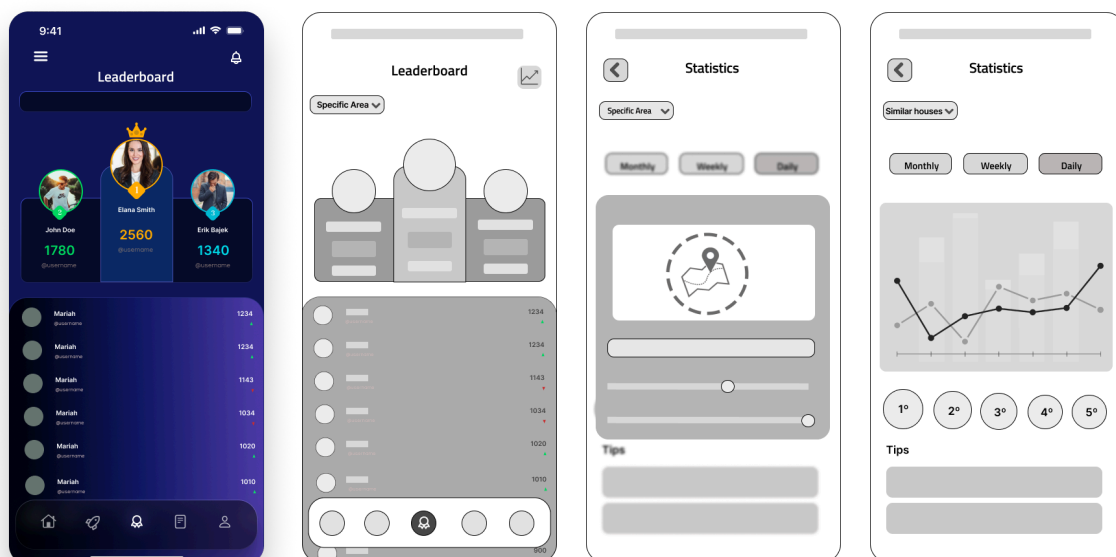


Figure 1- Leaderboard

3.2. Prototype- Task 2

Set and Track Personalized Energy-Saving Goals

The user selects from a list of energy-saving goals recommended by the app, which are tailored to their energy consumption patterns and preferences. These recommendations are designed to be achievable and impactful, providing users with clear starting points to reduce their energy usage.

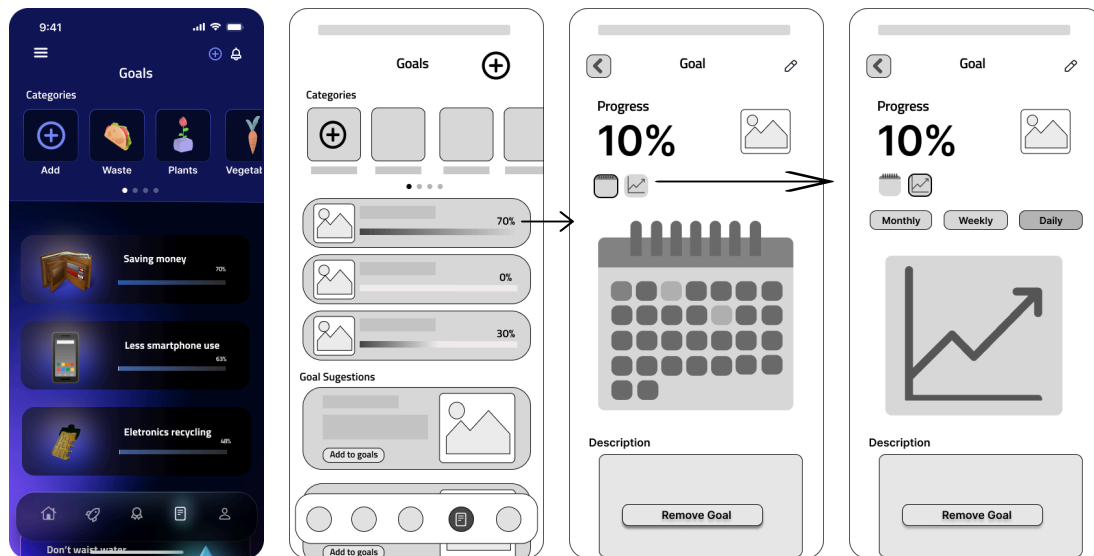


Figure 2- Goal visualization

The user manually inputs their own personalized energy-saving goals, allowing for greater flexibility and customization. This feature is ideal for users with specific objectives that may not align with the app's pre-defined recommendations.

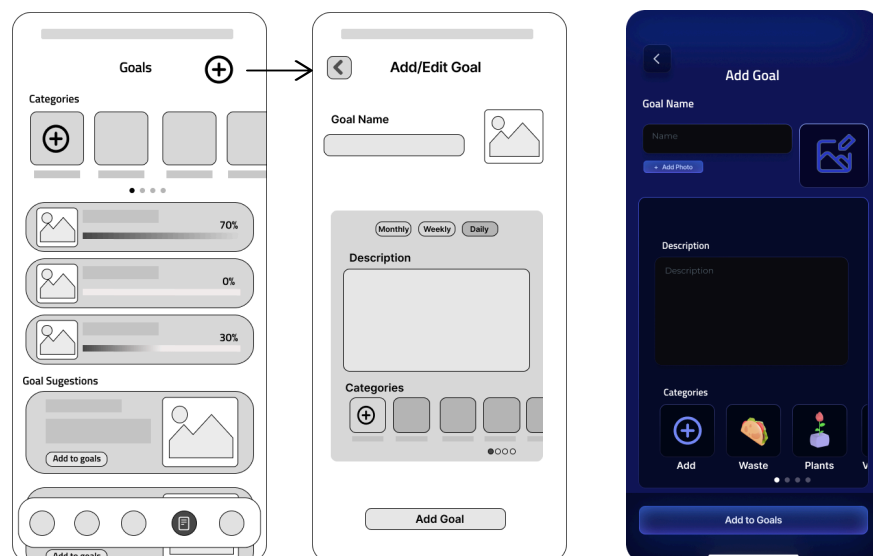


Figure 3- Add/Edit Goal

The user can add categories to organize their goals and easily scroll through the app to view the progress of each goal. This allows for better tracking and management, providing a clear overview of achievements and areas for improvement.

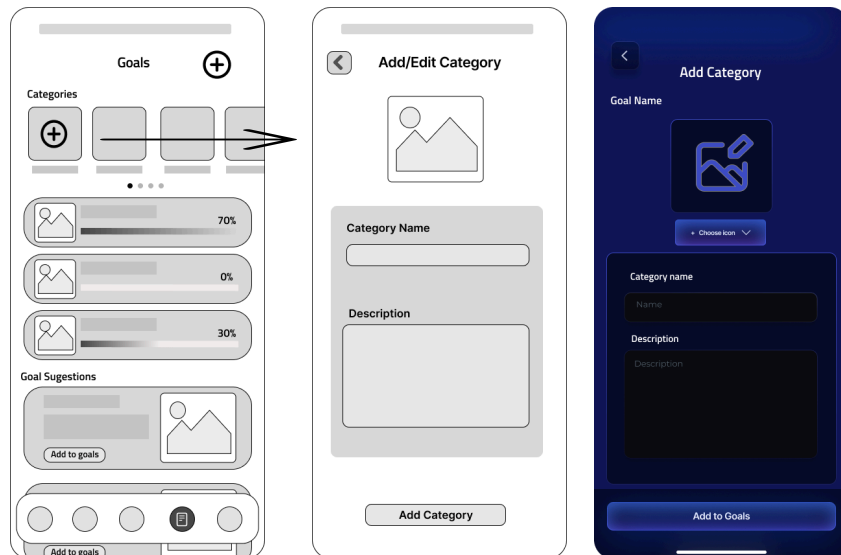


Figure 4- Add Category

3.3. Prototype- Task 3

Participate in Neighborhood-Wide Energy-Saving Challenges

The user clicks on a "Participate" button to join neighborhood-wide energy-saving challenges. By doing so, they become part of a community initiative to reduce energy consumption. After joining, the user can view challenge details, track their contributions, and see the neighborhood's collective progress, fostering engagement and collaboration.

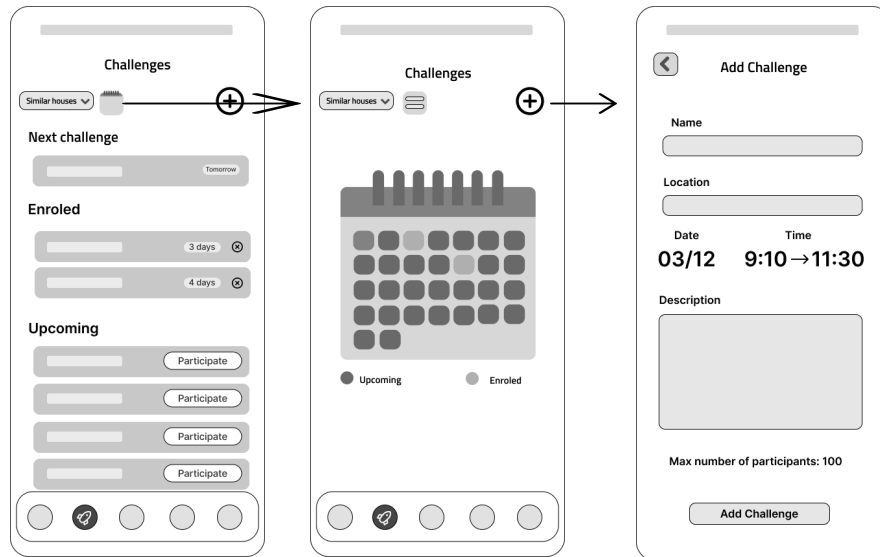


Figure 5- Create a Challenge

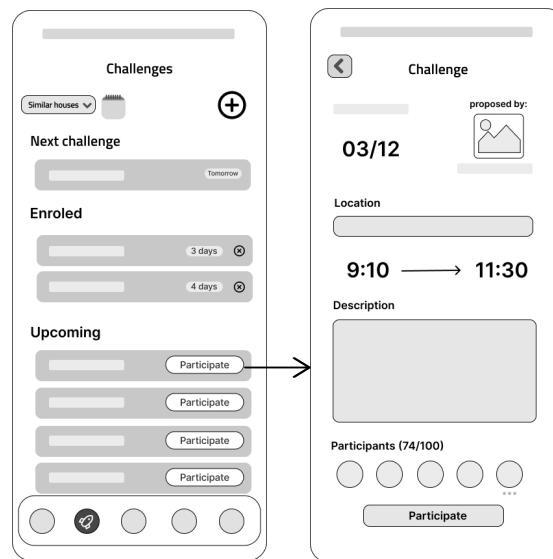
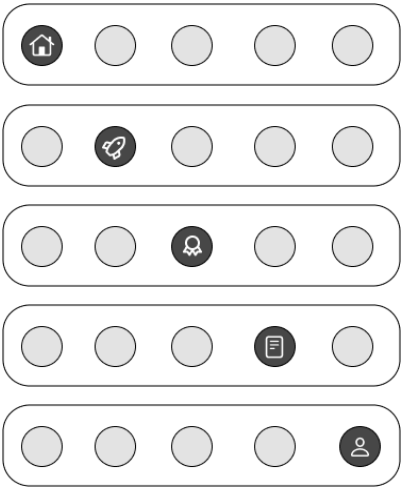
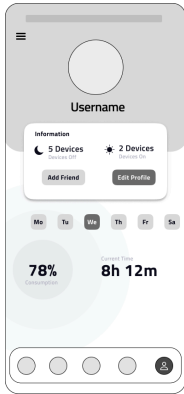
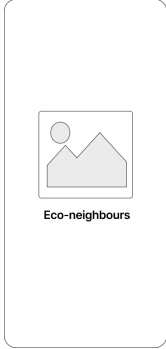


Figure 6- Participate on a Challenge

4. Heuristic Evaluation Results

Based on the received evaluations, some usability issues were highlighted, with each problem associated with one or more heuristics and a severity rating. Some issues, however, stemmed from misunderstandings of the wireframe nature of the prototype, so these points will be clarified. Any issues considered significant for usability will be addressed during the design refinement phase, rather than being dismissed as misunderstandings.

Issue	Clarification
Monochromatic Application (Visually Confusing)	The evaluation mentioned the app being visually confusing due to its monochromatic design. However, it is important to note that wireframes are typically designed with minimal colors and simple visual elements to focus on layout and functionality, not final visual design. The lack of color was intentional for this stage, which may have led to confusion.
<p>Navigation Icons from the Footer Menu Are Only Visible if You Are on That Page</p> 	<p>This issue relates to the footer navigation menu's behavior, where icons are only visible when users are on the specific page associated with them. However, this may be a misinterpretation of the wireframe design. In the wireframe, interactive icons were intentionally left out on some pages to focus on key tasks.</p>
Many Static Buttons (No Interactions, Error Popups, or Warning Popups)	<p>The evaluation mentions static buttons such as "Add Friend" and "Edit Profile," which do not trigger interactions, error popups, or warnings. However, this is consistent with the wireframe prototype's limitations. Only the core interactions related to the app's main functionalities (e.g., energy-saving tasks) were clickable, while other less-relevant buttons (such as in the profile) were not clickable in this early stage of the design.</p> 
Navigation Confusion Due to Elements Without Text or Icons	In wireframes, elements are often represented with minimal labeling to emphasize structure and layout. Full

	labels and icons will be added in later design phases.
Missing splash screen showing the app's name or logo, which could hinder brand awareness and the initial user experience	<p>The wireframe did include a splash screen; however, the simplicity of the wireframes and the focus on functionality may have caused confusion. We plan to make the splash screen more prominent in future iterations, ensuring it effectively introduces the app to new users.</p> 
The order of time periods (daily, weekly, monthly, yearly) in the statistics section was confusing	Aspect to improve
Footer Navigation Icons with No Labels	Aspect to improve

The average severity of all the issues is approximately **1.83**. This suggests that most issues are moderate in severity, with some lower-impact issues.

The most common and important heuristics identified from the evaluations were:

- Visibility of System Status (#1): Users need clear feedback about the app's status, such as interactive buttons and well-organized information.
- Match Between System and the Real World (#2): Use familiar language and structures. Navigation icons should be labeled, and information should follow a logical order.
- Error Prevention (#5): The system should prevent errors by offering clear feedback and ensuring button functionality is easy to understand.

5. Corrections to perform in Phase 3

Based on the evaluations received, the following key corrections will be made in Phase 3 to enhance usability:

Navigation and Labeling: Labels will be added to the bottom navigation icons, and the time periods in the statistics section will be reordered for clarity (Daily, Weekly, Monthly, Yearly).

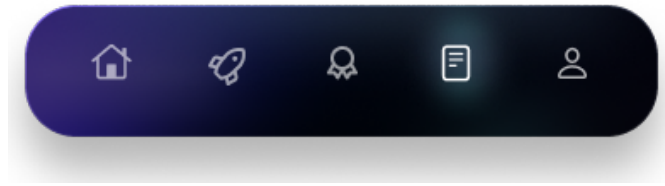


Figure 7- Tab bar- Before

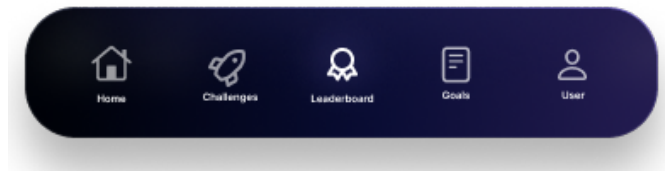


Figure 8- Tab bar- After

Simplify Interaction: Ambiguous elements will be clarified with text labels or tooltips, making the app easier to navigate and understand.

6. Wireflow Extra Features

On the homepage, users can control their appliances or entire rooms by turning them on or off. They can also manage energy usage limits for each room and view detailed consumption statistics for individual appliances or rooms.

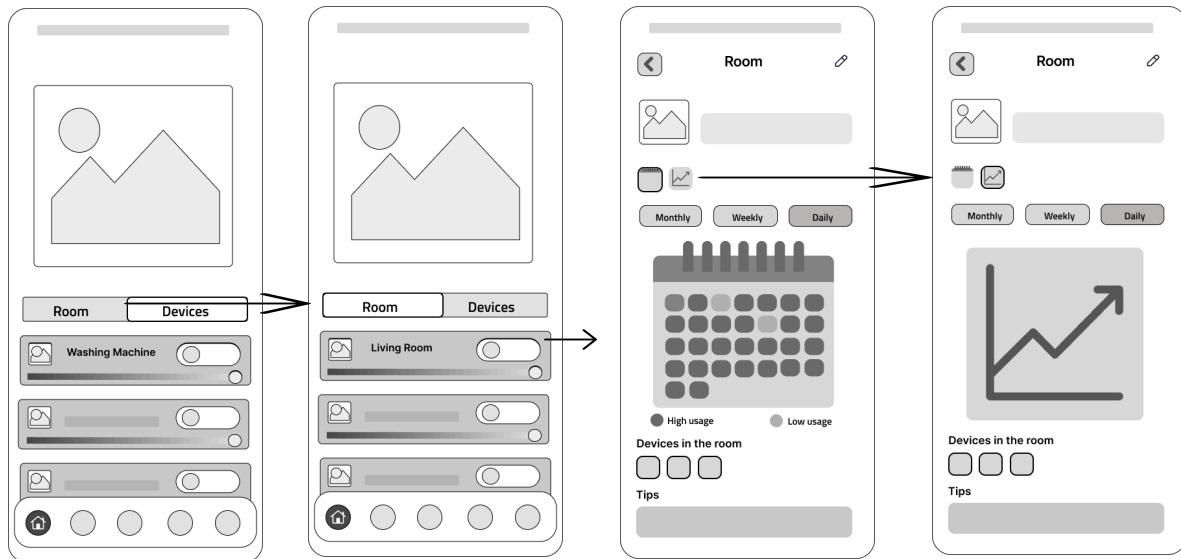


Figure 9- Homepage and room page

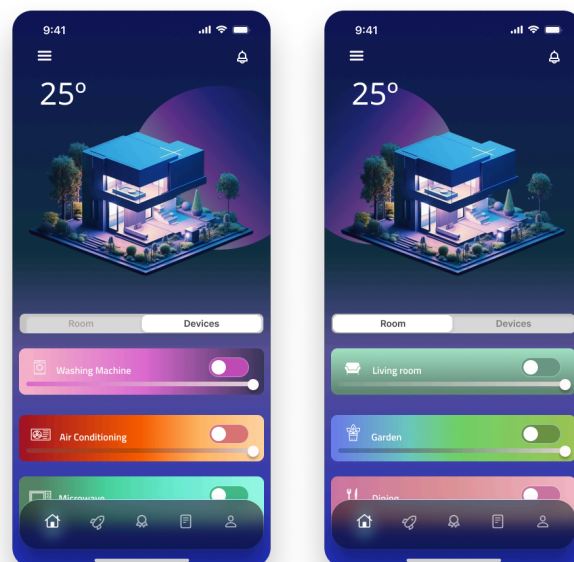


Figure 9- Homepage-> Hi-fi Prototype

7. Annexes

7.1. Heuristic Evaluation Report sent to Group 3

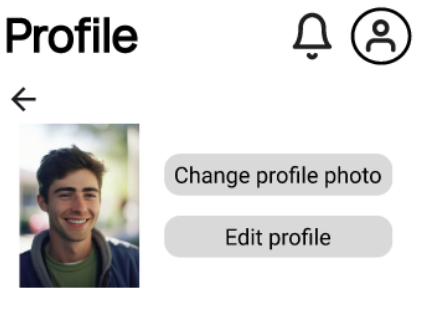
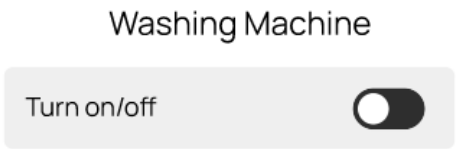
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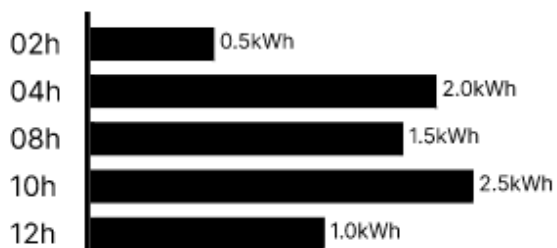

Heuristic Evaluation Report

Class Nr.: LEIC05 - 14-11-2024 - Bruno Cunha

Group evaluated: 03 - Sinergia

By group: 02

Problem #	Issue (include screenshot)	Heuristic(s)	Severity (1-4)
1	<p>“Change profile photo” could be the same option as “Edit profile”. That would lead to improved user efficiency and reduce visual load and error since, in this energy-conscious app, profiles are not the main focus and therefore frequent profile photo changes are unlikely.</p> 	8	1
2	<p>Turn on/off is counter-intuitive. Users are more used to “on” being a darker color and to the right, where “off” is to the left and lighter. Here it appears to be the opposite.</p> 	2	2

	<p>Washing Machine</p> <p>Turn on/off </p>		
3	<p>“Delete Account” should have additional confirmation that the user does in fact want to delete their account. If an user error occurs their account will be lost with no chance for recovery.</p> <p>Notifications <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF</p> <p>Delete Account <input checked="" type="button" value="DELETE"/></p>	5, 9	4
4	 <p>It's missing “06h” breaking the natural and logical order of the hours of the day. It may also be unnatural and counter-intuitive to start the day at “02h” and skip the odd hours.</p>	2	1
5	<p>The font size disparity between titles and body text, along with insufficient emphasis on clickable items, reduces visibility and makes it harder to distinguish interactive elements from informational content, affecting the clarity of the information.</p> 	1, 4	1

	(For example “Day”, “Week” ... has the same text size and thickness as the kWh, where kWh is only informational and their difference in size to the title is quite significant.)		
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7.2. Heuristic Evaluation Report sent to Group 2

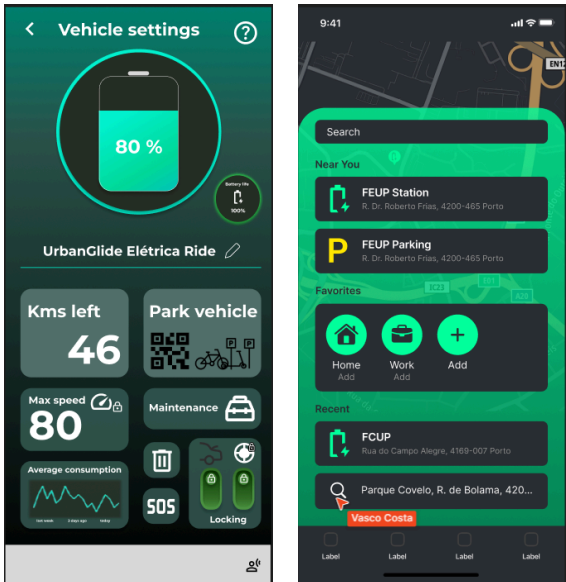
HCI Winter Semester 2024 - 2025



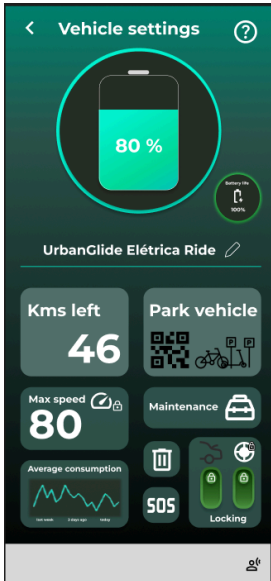
Heuristic Evaluation Report

Class Nr.: LEIC05 - 14-11-2024 - Bruno Cunha

Group evaluated: 04 - Zeno

By group: 02

Problem #	Issue (include screenshot)	Heuristic(s)	Severity (1-4)
1	<p>Lack of consistency in color palette and font style across the interface, causing visual and cognitive dissonance.</p> 	4	1

2	<p>Frames and icons lack clear visual cues indicating if they are clickable or merely informational, leading to user confusion.</p> 	6, 1	3
3	<p>Insufficient documentation or guidance on how to use the application, resulting in a steep learning curve for users.</p>	10	3
4	<p>The help icon's destination is unclear; it is unknown where users will be taken or what type of assistance they will receive.</p> 	9, 1	3
5	<p>The vehicle page is overloaded with information, creating a cluttered layout that overwhelms users.</p> 	8, 5	2

7.3. Heuristic Evaluation Report made by Group 1



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Heuristic Evaluation Report

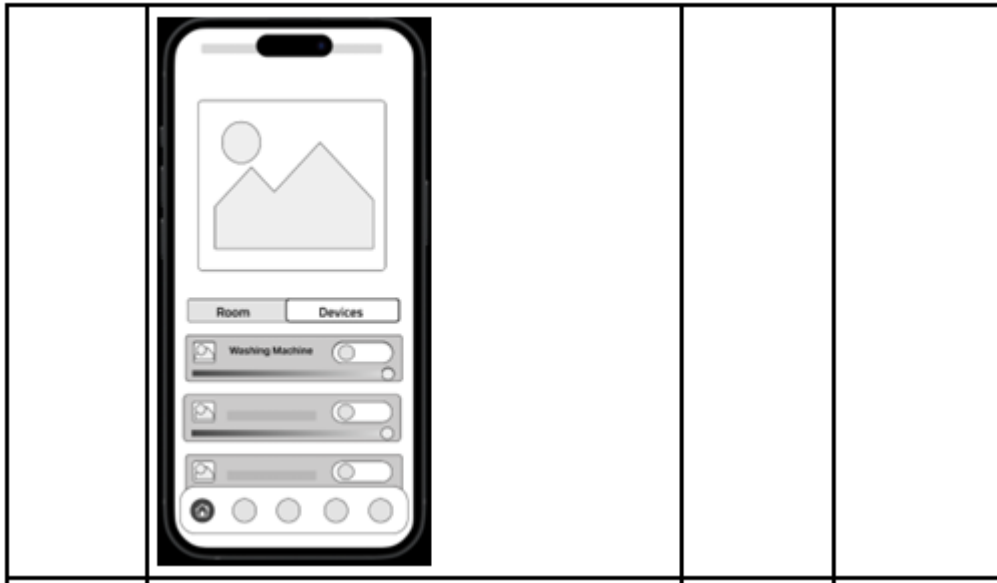
Class Nr.: LEIC0506 – 14.11.24 - TeacherName

Group evaluated: 02 – Eco-neighbours

By group: 07

Problem #	Issue (include screenshot)	Heuristic(s)	Severity (1-4)
1	<p>Monochromatic application. Visually confusing.</p> 	8	3
2	<p>Navigation icons from the footer's menu are only visible if you are on that page.</p> 	6, 7	1
3	<p>Many of the buttons are static on pages such as the one below. They do not produce interactions, error popups, or warning popups. For this example:</p> <ul style="list-style-type: none">• Add Friend• Edit Profile• Days of the Week <p>Are purely static.</p>	5, 9	2

			
4	<p>Navigating through the app is confusing since there are too many elements with no text or icons. A beginner user could have difficulty performing a task when he doesn't know where each feature is.</p> 	10	2
5	<p>Many elements do not have text, which complicates understanding what they are supposed to do or mean. (Likely due to mockup style, but not properly explained or mentioned during presentation).</p>	8	1



7.4. Heuristic Evaluation Report made by Group 7

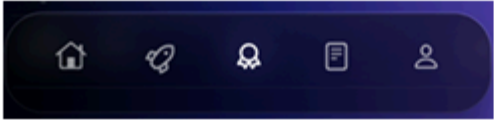
HCI Winter Semester 2024 - 2025

Heuristic Evaluation Report

Class Nr.: LEIC05 - 14/11/2024 - Bruno Miguel Almeida Cunha

Group evaluated: 03 - Eco-neighbours

By group: 01

Problem #	Issue (include screenshot)	Heuristic(s)	Severity (1-4)
1	<p>Because the bottom navigation bar simply has icons and no labels, it might be challenging for users who are not accustomed with the program to grasp its features right once. Users are forced to play with each symbol in order to grasp its purpose due to the lack of labeling, which can be inconvenient and less effective.</p> 	4	1
2	<p>The time periods (monthly, weekly, and daily) are listed in the statistics section in a different order than what would be obvious to consumers. "Daily, weekly, monthly, yearly" would be the required structure in order to follow a natural evolution and its scrollable to the right. Confusion and navigational difficulties might result from the existing arrangement.</p>	2	1
3	<p>There is no first splash screen for the application that displays the name or logo. For new users, who might not know which application they have accessed, this could lessen the initial experience and impede instant brand awareness.</p>	8	1