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7. Project Development

This chapter outlines the development from initial idea to final concept, including ideation, prototyping, key design decisions, and the integration of technical and marketing elements.

Introduction

This chapter describes the development from idea to concept and aims to provide insight into the creation of the final design. It begins with the problem statement and the initial ideation phase, in which the first directions and starting points are explored. This is followed by a discussion of the brainstorming sessions surrounding the core concept, with attention to the water system and smart technologies.

The focus then shifts to the prototyping phase, where the key concepts are further developed, tested, and substantiated. This section addresses not only the choices that were made, but also the considerations underlying those decisions. In addition, attention is given to the development of marketing materials, such as the flyer and the logo.

Finally, this process leads to the final design, including a model, an analysis of manufacturability, the software systems, and the associated smart packaging.

Design Question

The Smart Pot is needed because it uniquely bridges this gap by linking screen-time behavior to the health of a real plant. This creates a tangible feedback loop that makes digital habits more visible, meaningful, and emotionally engaging. Unlike existing solutions, it introduces real-world consequences and rewards, which strengthens behavior change through lived experience rather than abstract digital feedback.

Therefore, a new product is required because current solutions are either too abstract (digital-only) or too limited in scope (plant-only), while there is a clear need for a hybrid system that integrates behavioral psychology, IoT technology, and physical interaction to promote sustainable digital habits and well-being.

Now that the “why” is clear, the “how” comes next. Since achieving a perfect design within a single system is complex, the overall problem was divided into several subproblems to make the development more structured and manageable. These subproblems will be solved one by one until a final design is reached

Ideation

Results from the first brainstom and design meeting

During the design process, the team started with a general meeting to discuss initial ideas for a solution. After this, a brainstorming session was held, resulting in several possible sketches. These sketches were later used as inspiration for the final design.

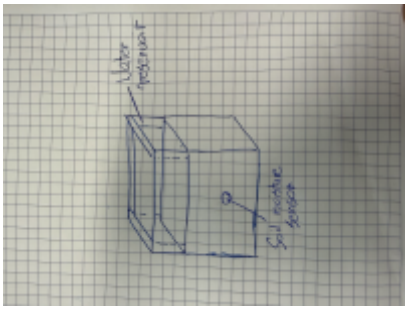

Figure 1: sketch brainstorm 1

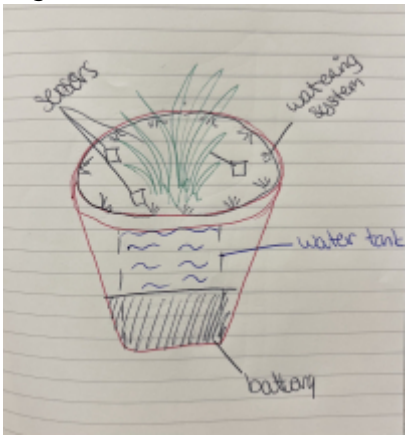

Figure 2: sketch brainstorm 2

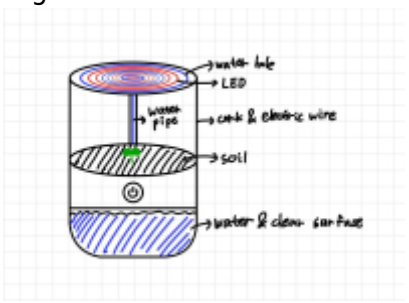

Figure 3: sketch brainstorm 3

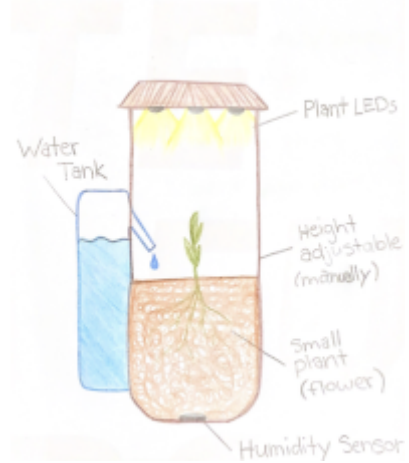

Figure 4: sketch brainstorm 4

1. Form and aesthetics

Design Process

To determine the form of the product, it is important to first understand the functional requirements that the shape needs to support. The design process starts with the water tank, as it is the core component of the system. Because the tank operates using gravity, it must include a clear lowest

point where water naturally collects and flows from. This makes the tank shape critical, as it directly influences how well the system functions.

At the same time, this creates a design challenge. A gravity-based tank can result in an asymmetrical form, which may affect the overall stability of the product. To address this, the weight of the pot needs to be carefully balanced so that it remains stable in everyday use. Once the tank is designed, the rest of the product is built around it. This includes creating a separate and protected space for sensitive electronics, ensuring they are not exposed to water.

In addition, the design must account for practical use. There needs to be a clear and accessible way to refill the water and nutrients, as well as a system that allows excess water to drain in case of overwatering. Altogether, the final form of the product is shaped by these functional requirements, balancing stability, safety, and usability with a clean and cohesive design.

Designing the water tank

Electronics involved

An important component within the water tank is the solenoid valve, which controls the water flow. This element must be seamlessly integrated into the tank design so that it functions reliably without disrupting the overall structure or usability. It should be positioned in a way that supports efficient water distribution. For this project, a 1/2 inch valve will be used.

The valve must be placed horizontally to ensure consistent and reliable operation. In a horizontal position, water can flow evenly through the valve without being affected by gravity in a way that could cause uneven pressure or incomplete opening and closing. This orientation also helps prevent air pockets from forming inside the valve, which could disrupt water flow or reduce efficiency. Additionally, placing the valve horizontally improves durability, as it reduces unnecessary stress on internal components and connections, helping to maintain a stable and leak-free system over time.

Shape studies

For the ideation of the water tank, a shape study and brainstorming session was carried out. The focus was on finding a form that is both practical and visually appealing. Different shapes were explored to ensure efficient water flow, proper integration of components such as the valve, and overall stability of the product. At the same time, attention was given to aesthetics, aiming for a design that fits naturally into a home environment and feels clean and well-balanced. Figure 5 …

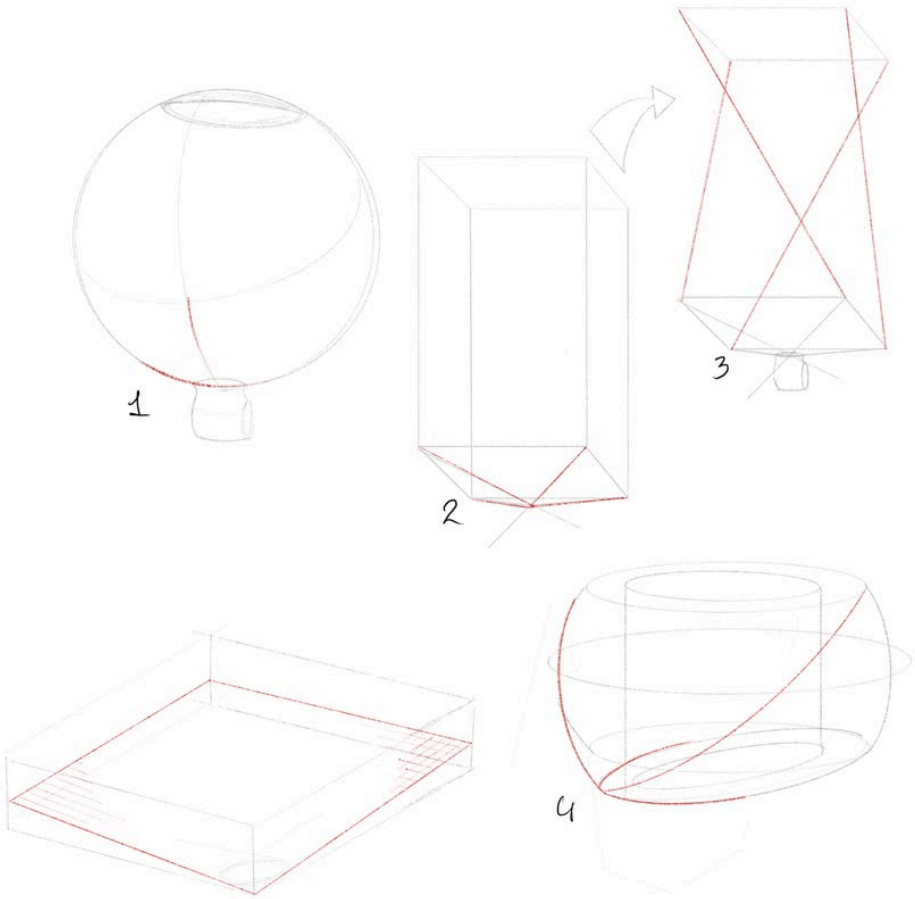

Figure 5: shape studies

Shape number 4 shows the most promising direction for gravity-based water flow, as the tank is designed to wrap around the pot. This allows the water to naturally move toward the lowest point, improving distribution and efficiency. Although this results in an asymmetrical form at the bottom, it still maintains overall stability. With only minor adjustments, this shape can also accommodate the electronic components, making it a strong balance between functionality and integration.

Final design of the watertank

For the final design, several key aspects had to be considered. The optimal water volume was defined to ensure efficient use, resulting in a tank capacity of a little over 1 liter. At the same time, the system’s gravity and overall stability were carefully balanced, which led to a corner-shaped design.

In addition, the product needed to support easy integration of the valve, as well as simple access for refilling and cleaning the tank. To achieve this, a tilted bottom was added to guide the water toward a single point, including an opening in the tank. In the final 3D model, a corner piece will be incorporated to allow the valve to be mounted horizontally, ensuring reliable operation and proper water flow. Figure 6 … (explain the contents of the figure)

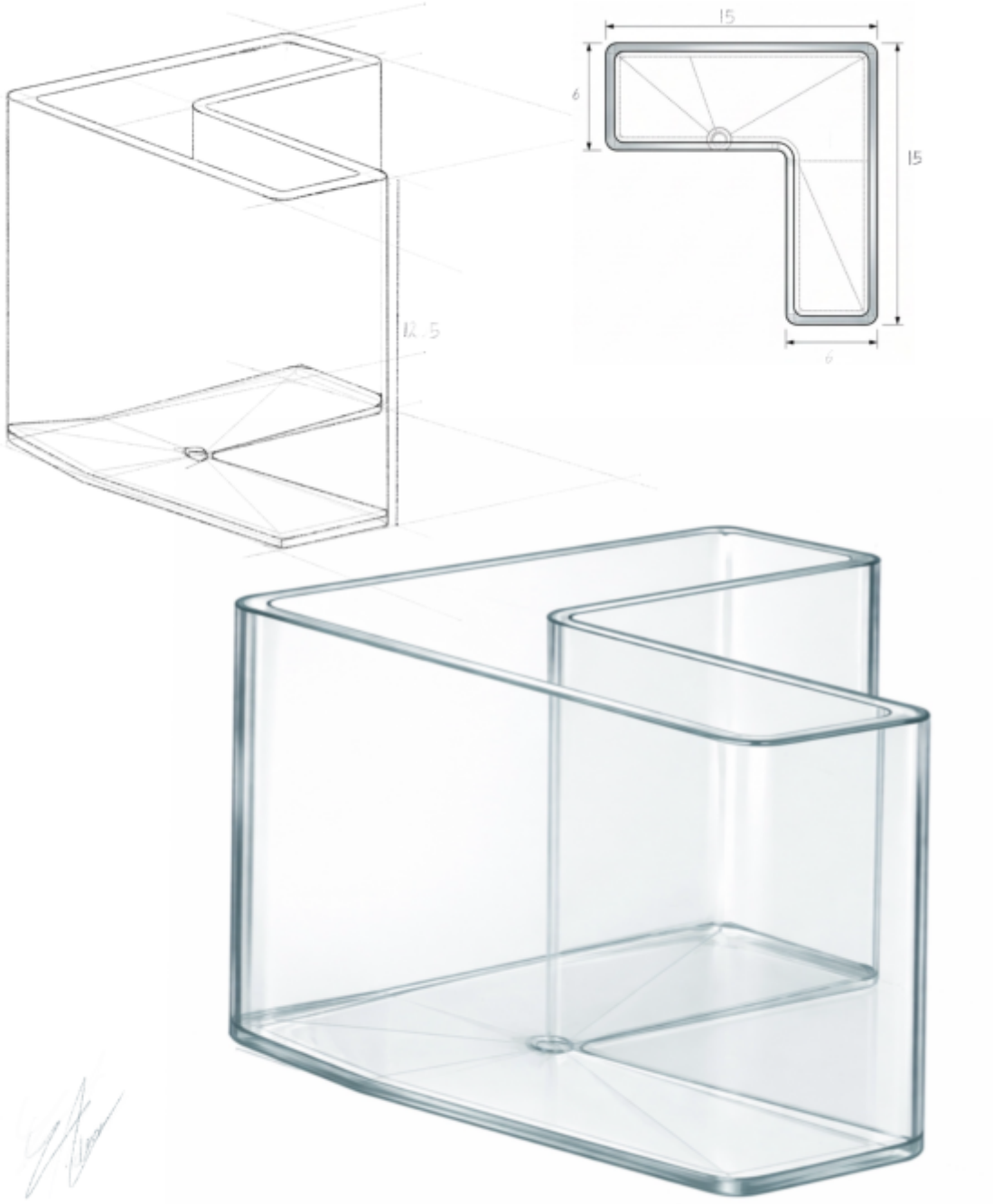

Figure 6: sketch watertank

Final design of the pot

After the design of the watertank the rest of the pot was designed. Figure 7 ... (explain the contents of the figure)

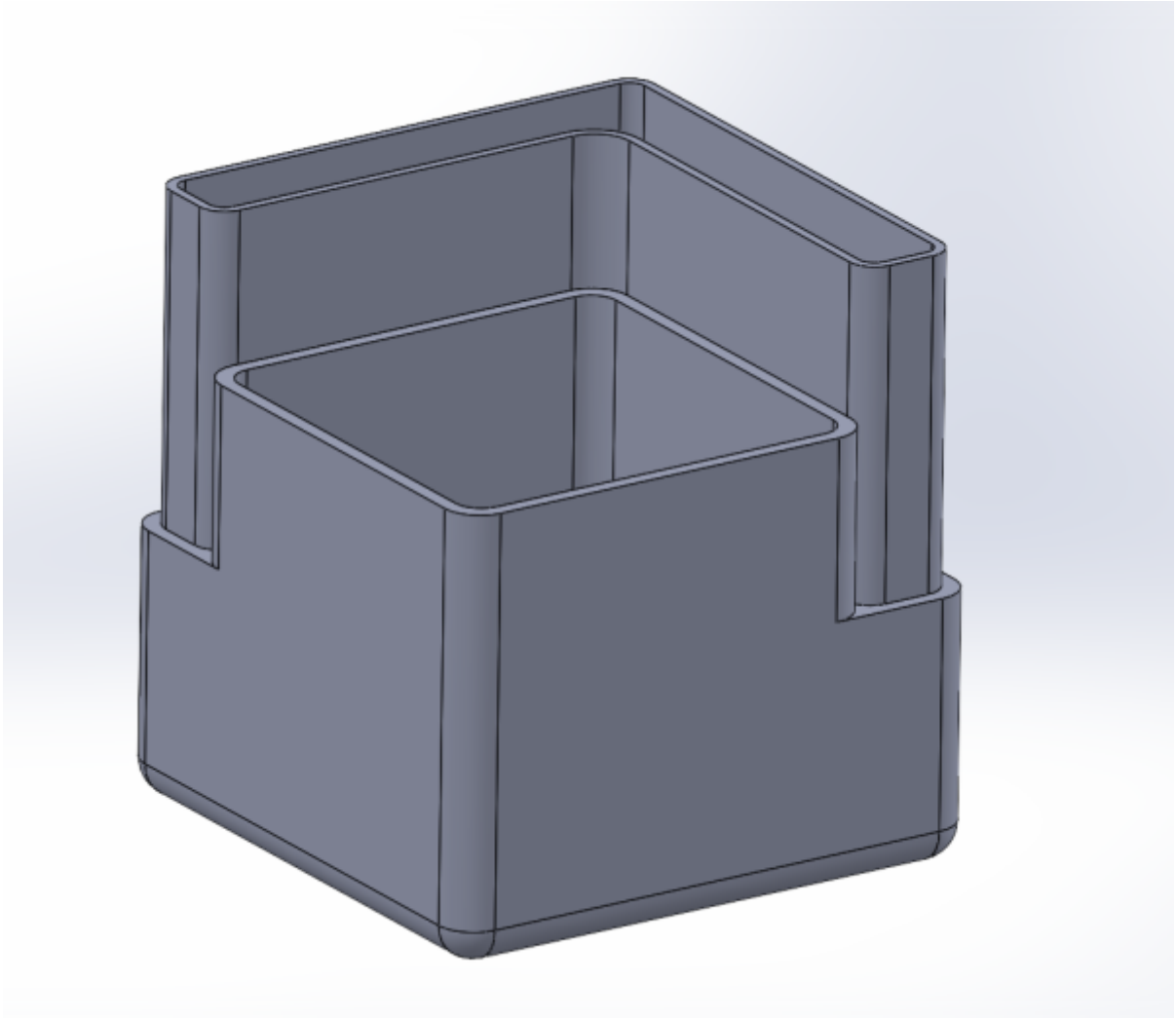

Figure 7: solidworks 1

Figure 8 ... (explain the contents of the figure)

Figure 8: render 1

2. Product cross-sections

To ideate the internal layout of the product, a simple sketch (Figure 9) was first created to explore the placement of components. This concept was then further developed and refined into a detailed SolidWorks model.

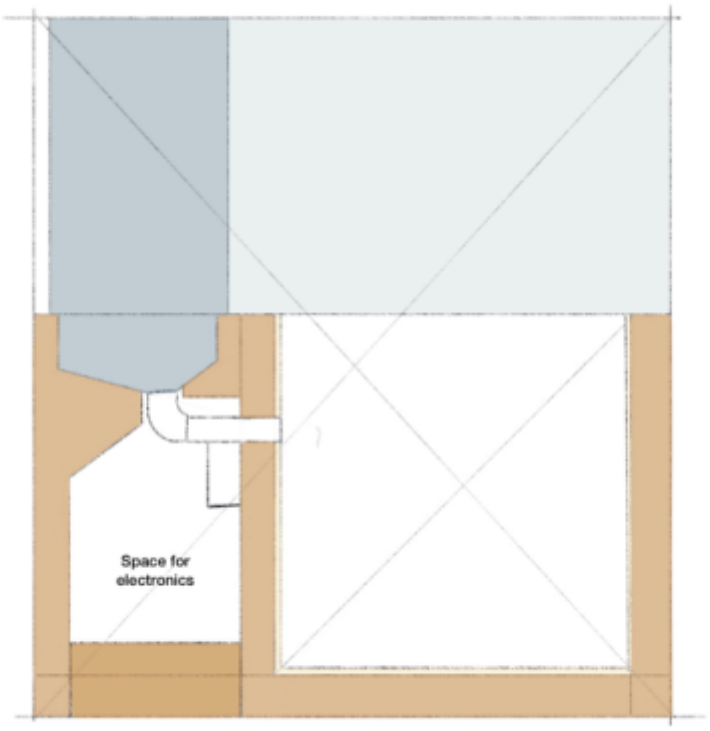

Figure 9: Simple sketch of internal layout

Concept

This chapter presents the final design of the Smart Pot, including the finalized sketch and the SolidWorks model that forms the basis of the concept. The final design is the result of multiple iterations, where initial ideas were refined into a coherent and functional product.

The design sketch illustrates the overall form, proportions, and key features of the product, providing a clear visual representation of the concept. This sketch was then translated into a detailed SolidWorks model, where the design was further developed with accurate dimensions, component integration, and construction details.

Together, the sketch and the 3D model demonstrate how the conceptual ideas were transformed into a technically feasible and well-structured product.

Design

Figure 10 ... (explain contents of figure)

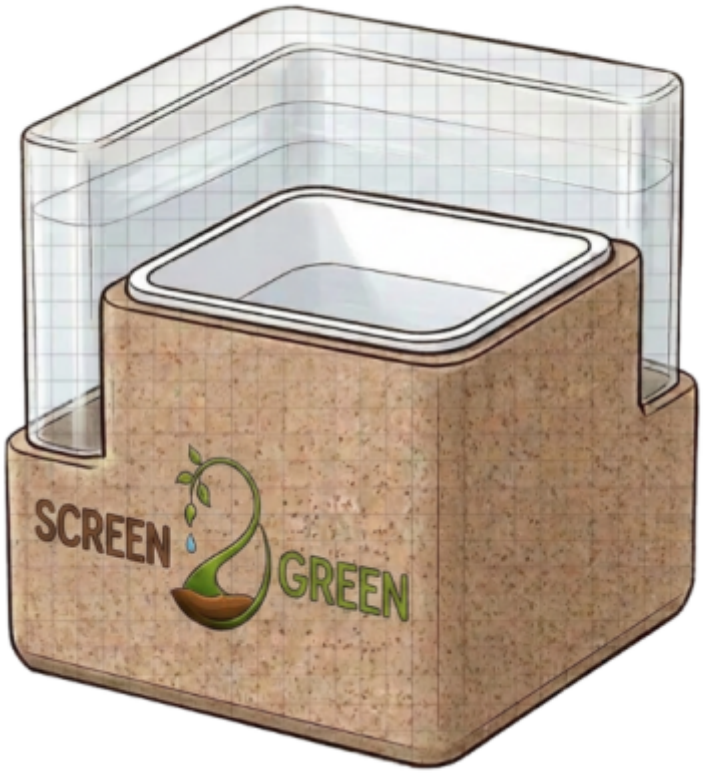

Figure 10: Final sketch

Figure 11 ... (explain contents of figure)

Figure 11: Final render

Logo and flyer design

First present the logo rationale, the colour palette, add a figure, etc. Figure 11 ... (explain contents of figure)

Figure 12: Screen2Green flyer

Structure

The product is built around a clear and layered structure, where each part has a specific function while contributing to the overall design.

At the top, the plant is placed in a removable inner pot that contains the growing medium, such as clay pellets. This inner pot is 3D printed in white PET, ensuring it is fully waterproof and suitable for long-term contact with water. It supports healthy plant growth while allowing easy access for maintenance or replacement.

Surrounding this inner pot is a transparent shell, which functions as the water tank. This tank is also 3D printed in clear PET, making it waterproof while allowing the user to easily monitor the water level. Its transparency visually connects the plant to the system that supports its growth.

The outer structure is made from cork, giving the product a natural and warm appearance. Cork was chosen not only for its aesthetic qualities, but also because it is locally manufactured in Porto, supporting sustainable and regional production.

The base of the product houses the main technical components, including the water control system, electronics, and valve. These are kept separated and protected from direct contact with water. Within this section, there is also space for a sensor to monitor system conditions, as well as a charging port for powering the device. The wider cork base ensures stability by supporting the weight of the tank and the plant.

Overall, the structure combines plant growth, water storage, materials, and technical functionality into one compact and well-integrated design.

Figure 13 ... (explain contents of figure)

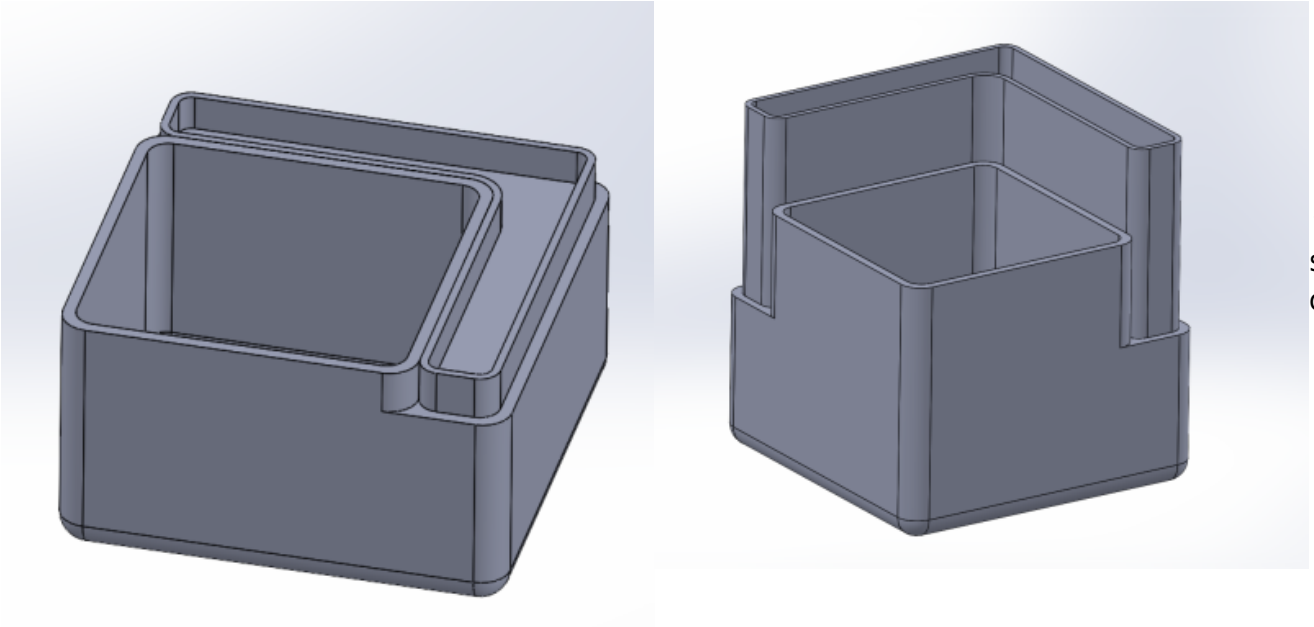

Figure 13: Views of the structure

After the components are ordered, the team will take a closer look at the connections required to integrate the electrical systems into the SolidWorks model. This includes ensuring proper placement, wiring paths, and compatibility between components.

Following this, the complete assembly will be divided into individual parts. Based on these, technical drawings and molds will be created to support the manufacturing and assembly process.

(*ii*) material selection; (*iii*) detailed drawings; (*iv*) 3D model with load and stress analysis; (*v*) colour palette.

Smart System

Software

Describe in detail the: (*i*) use cases or user stories for the smart device and app; (*ii*) selection of development platforms and software components (use tables to compare the different options); (*iii*) component diagram.

Packaging

Present and explain the: (*i*) initial packaging drafts; (*ii*) detailed drawings; (*iii*) 3D model with load and stress analysis, if applicable.

Prototype

Refer main changes in relation to the designed solution.

Structure

Detail and explain any changes made in relation to the designed solution, including structural downscaling, different materials, parts, etc.

Hardware

Figure 14 presents a block diagram for Screen2Green pot. At the core is an ESP32 board that is working as “brain” of the whole system connecting it with sensors and watering system. Soil moisture sensor gives information through the microcontroller when opening the valve is needed. Additional sensors like temperature one are appearing on the screen of the app user.

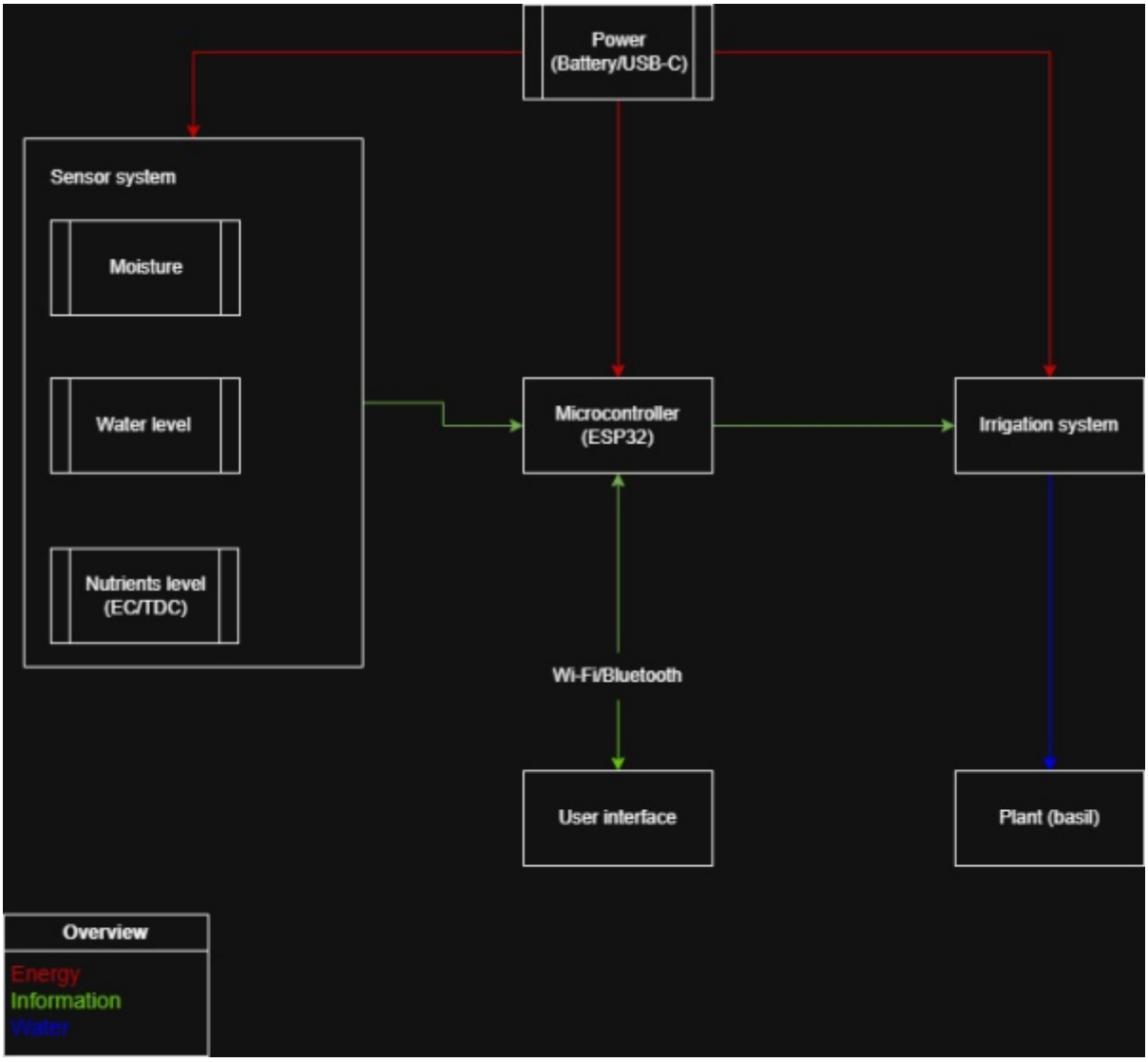

Figure 14: Blackbox_diagram

The electrical system presented in Figure 15 starts with a 12VDC power source connected through a DC jack to provide the high voltage required for the mechanical irrigation hardware - relay module. A buck converter is used because the microcontroller operates on 5V and requires a significantly lower voltage than the main power line to prevent component damage. The soil moisture and temperature sensors are working on 3.3V provided by the ESP32 pins to maintain safe logic levels and ensure accurate data collection from the plant environment. A 4.7k resistor is included for the temperature sensor to ensure signal pull up stability which is necessary for clear digital communication. A relay module is present to act as an electronic switch, because the ESP32 can only output low power signals and cannot directly drive the high current 12VDC solenoid valve. The solenoid valve is the component responsible for releasing water from the tank through a gravity flow mechanism. A diode is installed for protection to prevent from spikes and avoid damaging the relay or microcontroller when the valve shuts off.

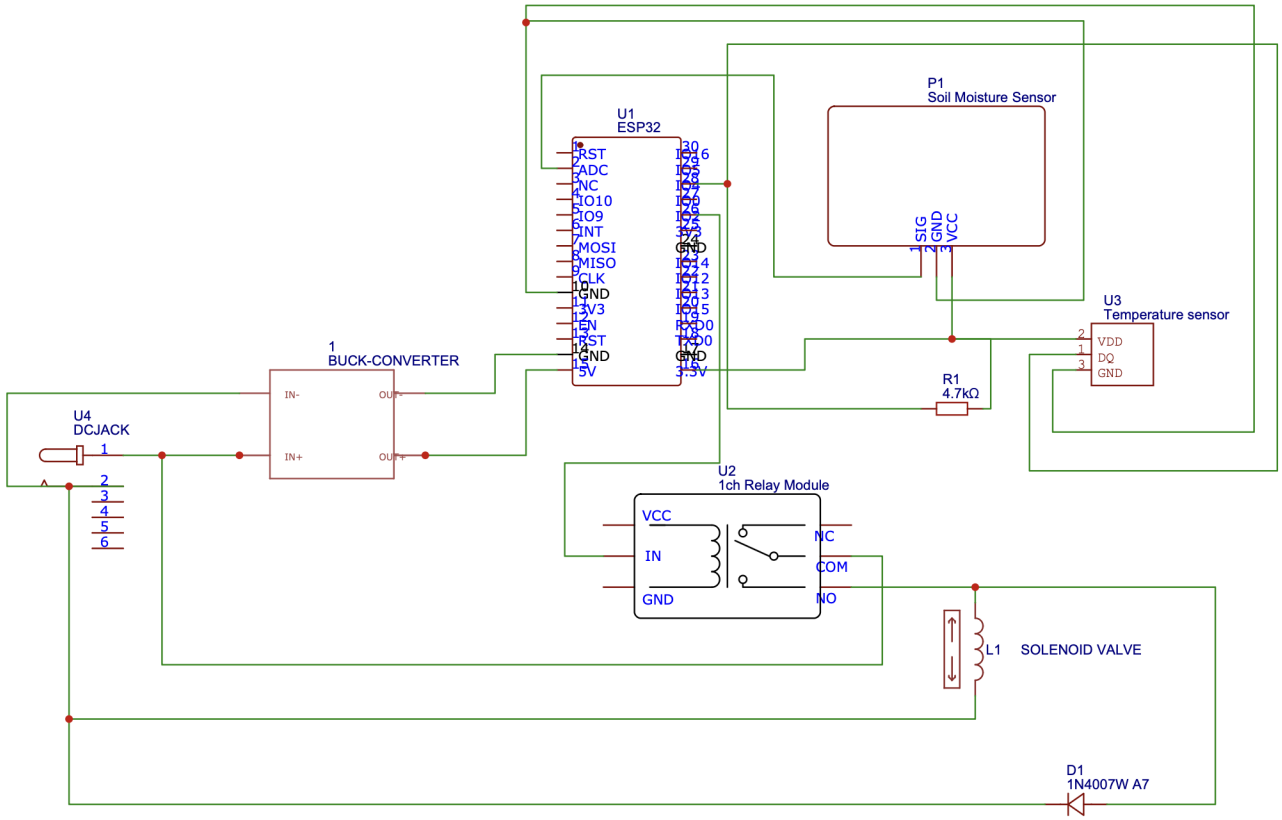

Figure 15: Electrical Schematic

Table 1 lists each hardware component with a direct link to a local Portuguese provider to guarantee that every part is verified for regional availability and technical compatibility. Values are maximum or peak values.

Table 1: Components list

Component	Product link	Voltage (V)	Current (mA)	Power (W)
Power Supply 12VDC 2A	https://mauser.pt/035-2829/fonte-de-alimentacao-12vdc-2-0a-24w-5-5x2-1mm	12	2000	24
Solenoid Valve 12VDC	https://mauser.pt/096-8157/electrovalvula-solenoide-12vdc-450ma-g1-2-nc	12	450	5.4
Buck Converter (Step-Down)	https://mauser.pt/096-8732/modulo-mini-conversor-step-down-uin-4-5-28v-uout-0-8-20v-3a-lm2596s-mp2307dn	12	3000	15.00
ESP32	https://mauser.pt/096-8744/modulo-esp32-wroom-nodemcu-wifi-cp2102	5	240	1.2
Relay Module	https://mauser.pt/096-4673/whadda-wpm406-modulo-de-1-rele-5v-compativel-com-arduino	5	70	0.35
Capacitive Soil Moisture Sensor	https://mauser.pt/096-7465/seeed-modulo-grove-sensor-de-humidade-capacitivo-resistente-a-corrosao	3.3	5	0.0165
Temperature Sensor	https://mauser.pt/096-8756/ds18b20-sensor-de-temperatura-100cm	3.3	1.5	0.005
Diode	https://mauser.pt/007-0209/diodo-rectificador-1000v-1a-1n4007	1000		1000
DC Jack Terminal 2-Pin	https://mauser.pt/011-2116/ficha-dc-femea-5-5x2-1mm-bloco-terminal-2pin-c-parafusos-2-pecas	12		5000

Table 2 presents the power table for the system to show the specific voltage and current values required to maintain safety under both normal and maximum load. These numbers are necessary to confirm that the 12VDC source provides enough energy to operate the ESP32 and the solenoid valve simultaneously without failing.

Table 2: Power Table

Equipment	Voltage [V]	I_normal [A]	I_max [A]	P_normal [W]	P_max [W]
Solenoid Valve 12VDC	12	0	0.45	0	5.4
ESP32 Development Board	5	0.08	0.24	0.4	1.2
Relay Module (1-ch)	5	0.005	0.075	0.025	0.375
Capacitive Soil Moisture Sensor	3.3	0.005	0.005	0.0165	0.0165
Temperature Sensor (DS18B20)	3.3	0.001	0.0015	0.0033	0.0049
Buck Converter (Internal Loss)	12	0.01	0.02	0.12	0.24
TOTAL		0.101	0.7915	0.5648	7.2364

Software

This project consists of a hardware product, being the growth pod, and an application. This app's intention is to help users improve their productivity and allow for quick monitoring on the plant and the growth pod.

The concept

Using the app, the user can temporarily remove any form of distraction. Whether it's in the form of notifications, or in the form of opening regular apps, the user won't be able to access these when in a focus session. A focus session is a period of time that the user sets manually using the app that helps them to focus on things outside of the screen. When the user respects the focus session and stays away from the phone for the set amount of time, the plant will continue to grow flawlessly. However, when the user decides to violate this session and end the time prematurely, this will get communicated with the growth pod and the plant's growth will get hindered. The user will be able to change certain settings to allow the usage of certain applications. This idea was brought forward to allow users who need social media for work purposes to still be able to use the app.

Secondly, the user can share their progress in an open community space within the application. In this space, users can share the growth of their plant or their personal growth in productivity. This idea is made to strengthen the user's motivation and increase their productivity even further.

Thirdly, the user will get even more motivation due to generated texts of affirmation and phrases that remind the user of their goal and ground them.

Finally, the application will give the user exercises to minimize their screen time even further. An example is to tell the user to walk a certain amount of steps outside, which will be monitored and checked in realtime.

The design

Before developing, the developer of the team created a high-fidelity wireframe to base the project on. The design of this wireframe is inspired by Liven, Forest and minimalist phone. This wireframe was also used to initiate user testing and to get feedback on the design choices and user flow. Below are listed the pages and the motivation behind the design of each page, as well as how the user testing had impact on it.

Figure 16 is a screenshot of the app’s initial onboarding and authentication screen shown when the

user opens the application for the first time. It prompts the user to either create a new account or log in with an existing one, giving an early preview of the app's visual design language. The registration process is intentionally minimal, requiring only a name, email address, and password. No external authentication services such as Google Sign-In are integrated, ensuring a fully consistent and self-contained authentication interface aligned with the overall app design. The design emphasizes simplicity and consistency, requiring only essential user information (name, email, and password) and avoiding third-party authentication services to maintain a unified user experience.

Figure 16: Authentication screen

Firstly, the app uses a mix of neutral colors and green. Depending on the chosen theme, the user will see the app in a mix of white and green or black and green. Green is proven to calm the mind and

make a person more relaxed. Secondly, this color is linked to nature. **[1]** These 2 factors make it a perfect choice for this certain project. It is suggested that green boosts health and motivation, but this doesn't have grounded proof.

Secondly, the app uses round edges. It's proven that the roundness of a corner is linked to the brightness of that same corner **[2]**. This means that the sharper a corner is, the brighter the human eye perceives it. Brightness is then linked to the amount of neurons that get spiked when looking at it, meaning that the roundness of a corner affects the focus of a user. Rounder edges are more relaxing to the brain, they allow the user to focus more on the content of the app.

Figure 17 is a screenshot of the app interface showing the post-login setup screen where users are prompted to connect their account to a growth pod for the first time. Each growth pod is provided with a unique QR code and a corresponding alphanumeric code. The application allows users to activate their device camera to scan the QR code, automatically linking the growth pod to their account. Alternatively, if scanning is not possible, users can manually enter the alphanumeric code as a backup method to complete the connection process. This post-login connection screen allows users to link their accounts to a growth pod using either a QR code scan or a manual alphanumeric code entry as an alternative pairing method.

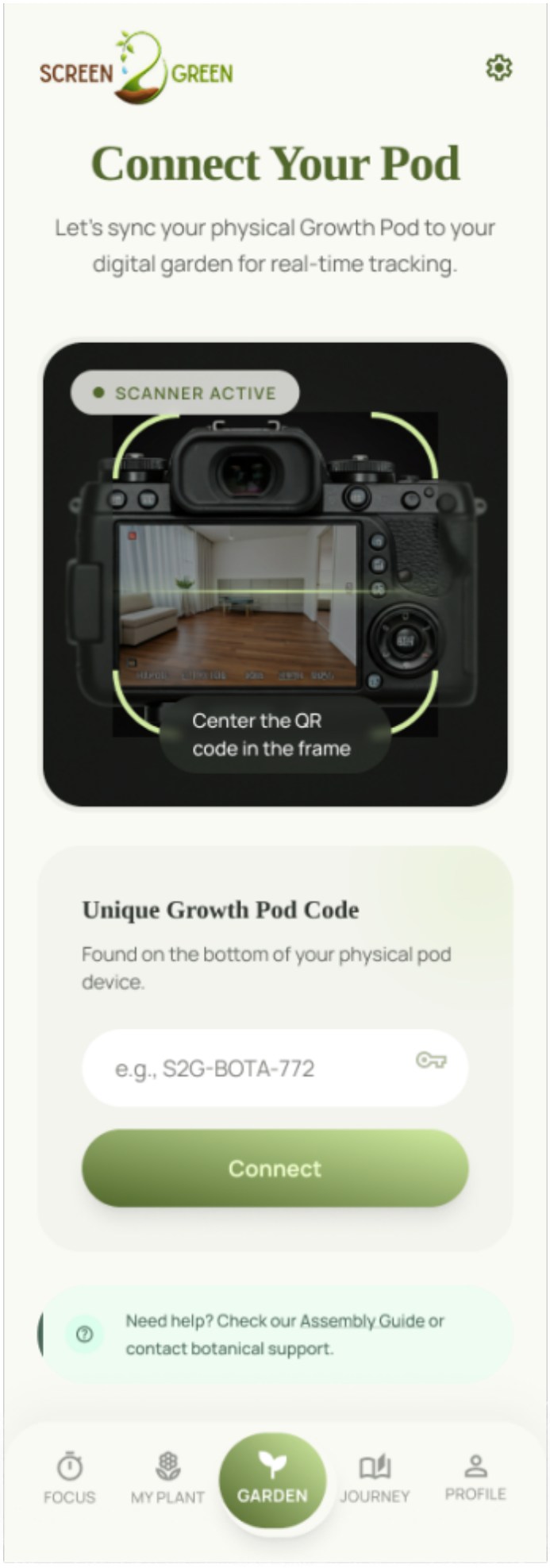
SCREEN 2 GREEN
Connect Your Pod
Let's sync your physical Growth Pod to your digital garden for real-time tracking.
SCANNER ACTIVE
Center the QR code in the frame
Unique Growth Pod Code
Found on the bottom of your physical pod device.
e.g., S2G-BOTA-772
Connect
Need help? Check our Assembly Guide or contact botanical support.
FOCUS
MY PLANT
GARDEN
JOURNEY
PROFILE

Figure 17: Post-login connection screen

The app will show a cog wheel at the top right of the screen. This cog wheel will stay on this location through the entire user flow and will only contain a select amount of settings that the user can change using toggle switches. Examples are switching between light and dark mode and toggling a high color contrast.

Figure 18 is a screenshot of the app interface showing the plant status page that users are redirected to after successfully connecting their account to a growth pod. This page functions as a central monitoring dashboard where users can view both the growth pod details and the plant currently growing inside it. Key plant and system statistics are displayed in small information blocks arranged in a grid layout, allowing users to quickly understand the most important data at a glance without needing to scroll. This plant monitoring dashboard displays the status of the growth pod and plant in a compact grid of key statistics for quick overview and easy readability.

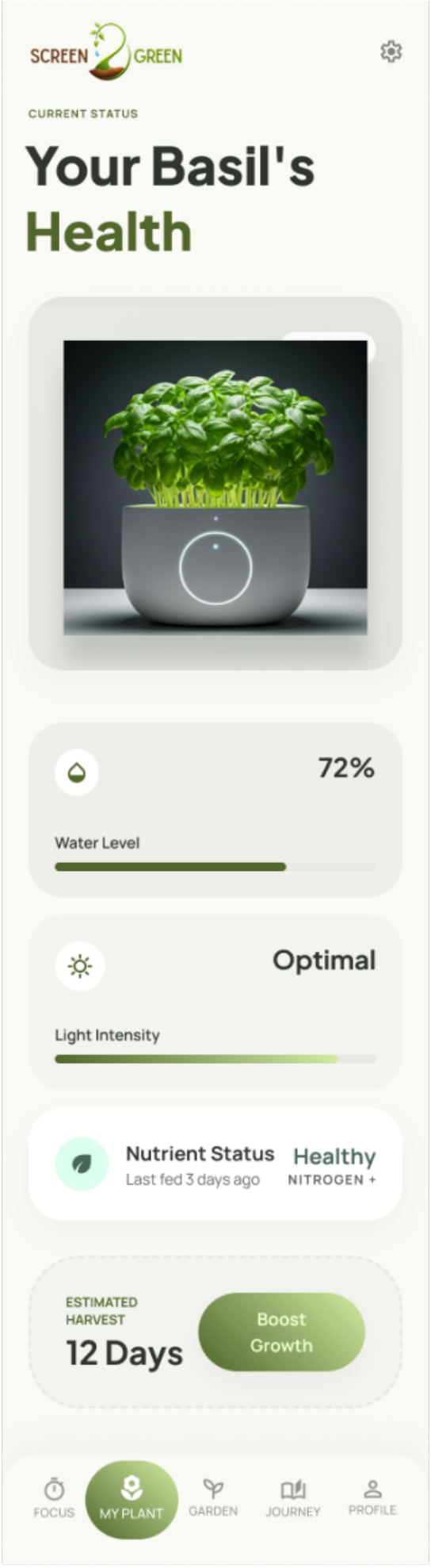
SCREEN 2 GREEN
CURRENT STATUS
Your Basil's Health
72%
Water Level
Optimal
Light Intensity
Nutrient Status
Last fed 3 days ago
Healthy
NITROGEN +
ESTIMATED HARVEST
12 Days
Boost Growth
FOCUS
MY PLANT
GARDEN
JOURNEY
PROFILE

Figure 18: Plant monitoring dashboard

Figure 19 is a screenshot of the app interface showing the focus session page, which is designed to be the primary feature used by the user. This page allows users to configure and start a focused work session for a selected duration, during which distracting applications and notifications are blocked. The list of blocked distractions can be customized by the user to allow exceptions for apps that may be required for work or study purposes, such as certain social media platforms. Users can choose between a single uninterrupted focus session or a structured focus approach using the Pomodoro technique, which alternates between focus and rest intervals.

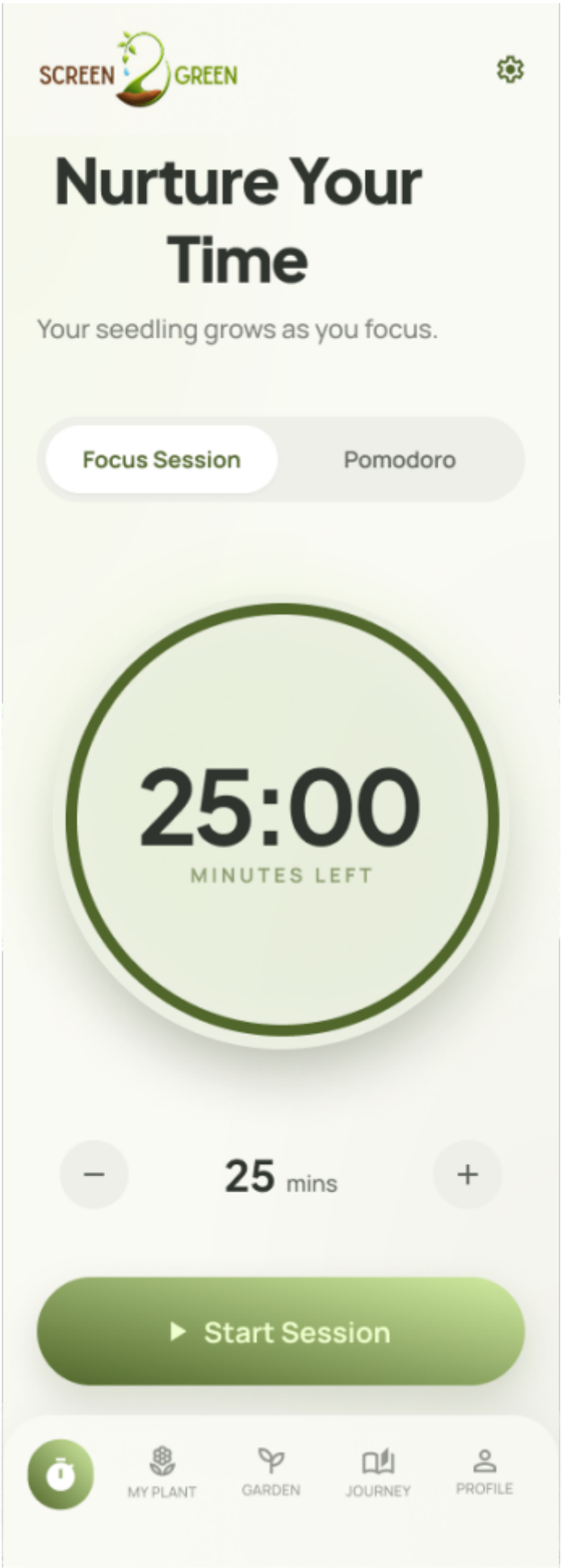
SCREEN GREEN
Nurture Your Time
Your seedling grows as you focus.
Focus Session
Pomodoro
25:00
MINUTES LEFT
25 mins
Start Session
MY PLANT
GARDEN
JOURNEY
PROFILE

Figure 19: This figure shows the focus session screen, where users can configure timed focus sessions, manage distraction blocking rules, and optionally use the Pomodoro technique for structured work and rest intervals.

When the user starts a focus session, they won't get any notifications and they won't be able to open their blocked apps. In order to lift these restrictions, the user will need to finish the focus session or end it prematurely. Ending it prematurely will result in hindering the growth of the user's plant. The button to end a session prematurely will be less visible. The reasoning behind this choice is the following.

- Seeing a bright button with negative text on it could possibly affect the user's motivation to stay off the screen.
- By being slightly less visible, the user will need to search for it actively. This time of search could stop users from having an impulsive desire to check certain applications.

Starting a focus session will generate an affirmative phrase that is also intended to keep the user motivated. This phrase will stay the same throughout the entire session and the user will not be able to regenerate it. This decision was made to avoid that the user wil get distracted by constantly regenerating this phrase.

Figure 20 is a screenshot of the timer page when a session has been started. Like mentioned before, this page has a minimal amount of elements to avoid any distractions.

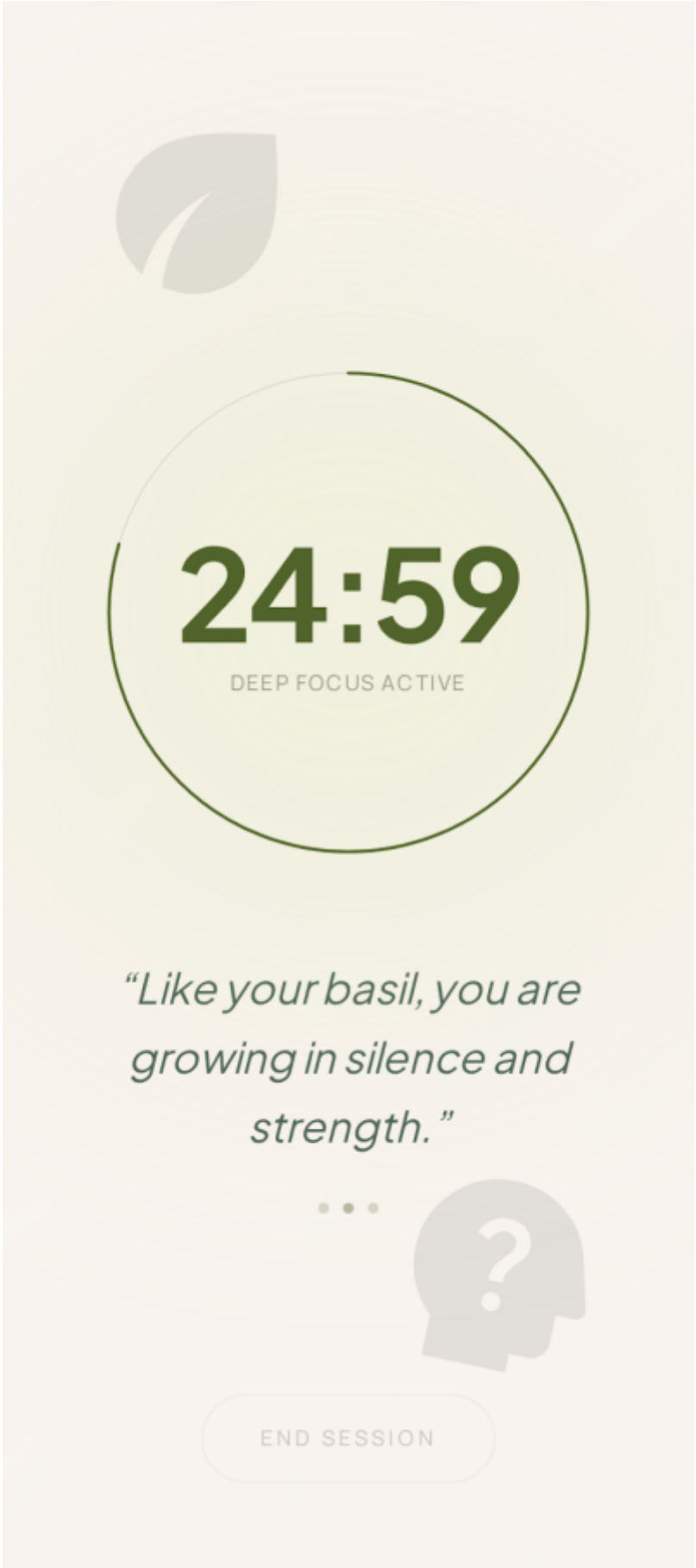

Figure 20: This figure shows the active focus session screen, featuring only the remaining time, a generated motivational phrase, and an option to end the session early in order to maintain a distraction-free user experience.

Figure 21 is a screenshot of the app interface showing the user’s focus history page. This page is

designed to motivate the user and visualise their progress over time. First, it displays the user's focusing streak together with a generated motivational phrase. Second, it shows the total amount of time the user has spent growing their plant since the initial download, which is also visualised across multiple days in a graph to highlight the user's most productive periods. Third, the page includes a text input block where the user can log how they feel. This feature is included because writing things down can provide clarity and improve productivity and motivation **[3]**.


SCREEN 2 GREEN
DAILY GROWTH
You are growing as steady as your basil.
Your focus streak has reached 4 days. Like a seedling finding its light, your consistency is opening new leaves.
Thriving Sanctuary
TOTAL FOCUS TIME
142h
ACTIVITY SUMMARY
MON TUE WED THU FRI SAT SUN
Today's Thoughts
What's on your mind? Set a goal or reflect on your growth...
Plant Thought
FOCUS MY PLANT GARDEN JOURNEY PROFILE

Figure 21: This figure shows the focus history page, including the user's streak with a motivational phrase, total accumulated focus time displayed both numerically and in a graph, and a journaling section where users can record their thoughts and feelings to support motivation and reflection.

Figure 22 is a screenshot of the app interface showing the profile page. This page serves two main purposes. Firstly, it provides access to all application settings for the user. Secondly, it allows the user to manage and edit their list of blocked applications. Lastly, the page includes an option for the user to log out of the application.

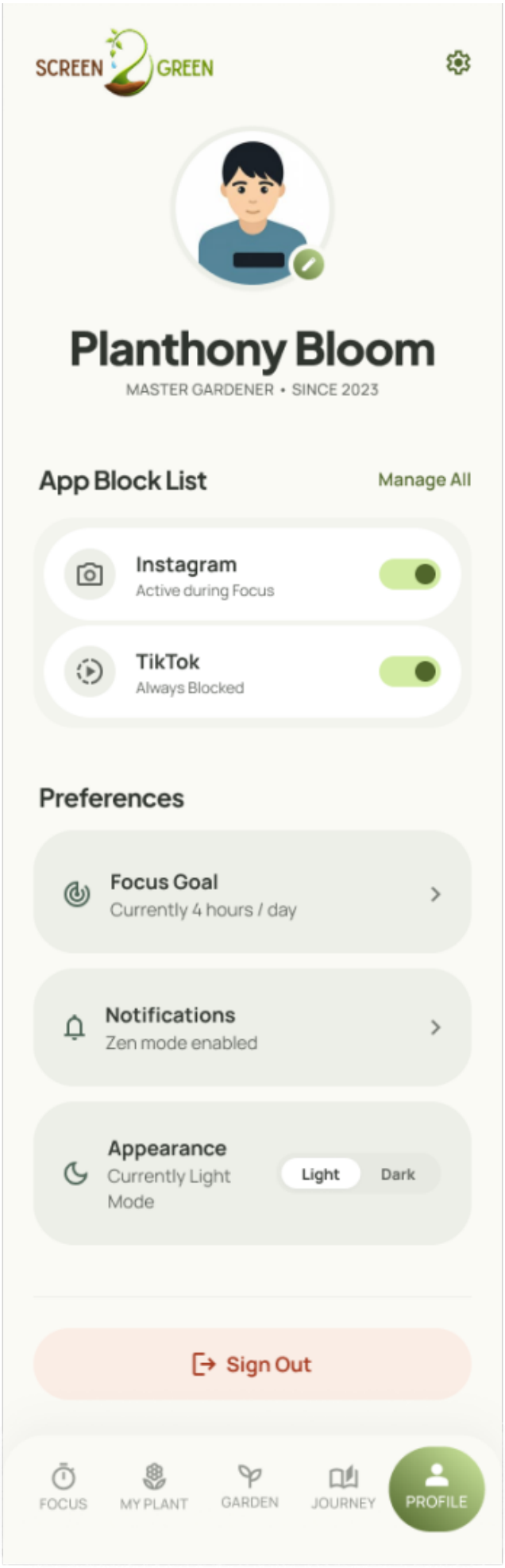
SCREEN 2 GREEN
Planthony Bloom
MASTER GARDENER • SINCE 2023
App Block List
Manage All
Instagram
Active during Focus
TikTok
Always Blocked
Preferences
Focus Goal
Currently 4 hours / day
Notifications
Zen mode enabled
Appearance
Currently Light Mode
Light
Dark
Sign Out
FOCUS
MY PLANT
GARDEN
JOURNEY
PROFILE

Figure 22: This figure shows the profile page, where users can access settings, manage their blocked applications list, and log out of the application.

Figure 23 is a screenshot of the app interface showing the community garden page where users can share their plant progress with other users. This page allows users to post a picture of their plant or their progress accompanied by a caption, and also lets users view posts shared by others. Unlike typical social platforms, this community does not include any interactive features such as likes or comments. This design choice is intentional, as any form of interaction could distract the user or negatively affect their mental state.

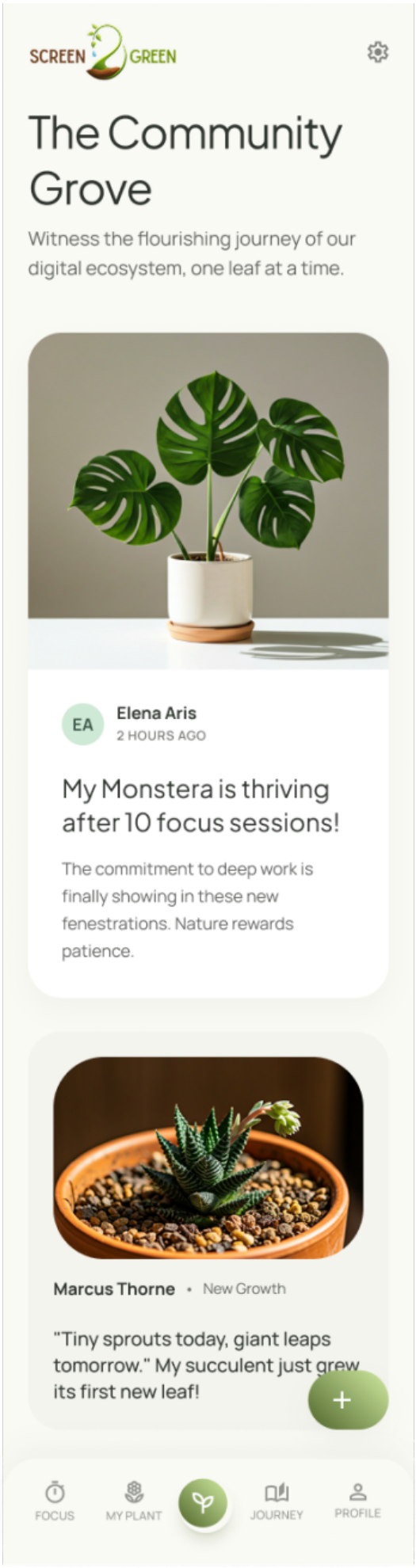
SCREEN 2 GREEN
The Community Grove
Witness the flourishing journey of our digital ecosystem, one leaf at a time.
EA
Elena Aris
2 HOURS AGO
My Monstera is thriving after 10 focus sessions!
The commitment to deep work is finally showing in these new fenestrations. Nature rewards patience.
Marcus Thorne • New Growth
"Tiny sprouts today, giant leaps tomorrow." My succulent just grew its first new leaf!
FOCUS
MY PLANT
JOURNEY
PROFILE

Figure 23: This figure shows the community garden page, where users can share and view plant progress posts without interaction features such as likes or comments to avoid distraction and negative psychological impact.

As mentioned before, this wireframe was used in user testing. A total of 3 users were tested by completing each of the following 4 tasks.

- Sign up and connect to your growth pod
- Start a focus session and end it manually
- Check your plant's status
- Change the setting to turn off notifications
- Check your history of focus sessions

The results were the following.

- The users had slight difficulty finding the button to end the focus session, one of the users had more difficulties finding it.
- One of the users found it difficult to connect to a growth pod.
- All of the users couldn't read the generated text on the timer page.

All of these points have been refactored and this feedback has been implemented in the current state of the wireframe. Below are the comparisons between certain pages before and after user testing.

First, the pod connection page. Figure 24 illustrates the difference between 2 versions of the page on the app where the user connects the app to a growth pod. The left picture shows the version before user testing, the right showing the version after user testing and feedback.

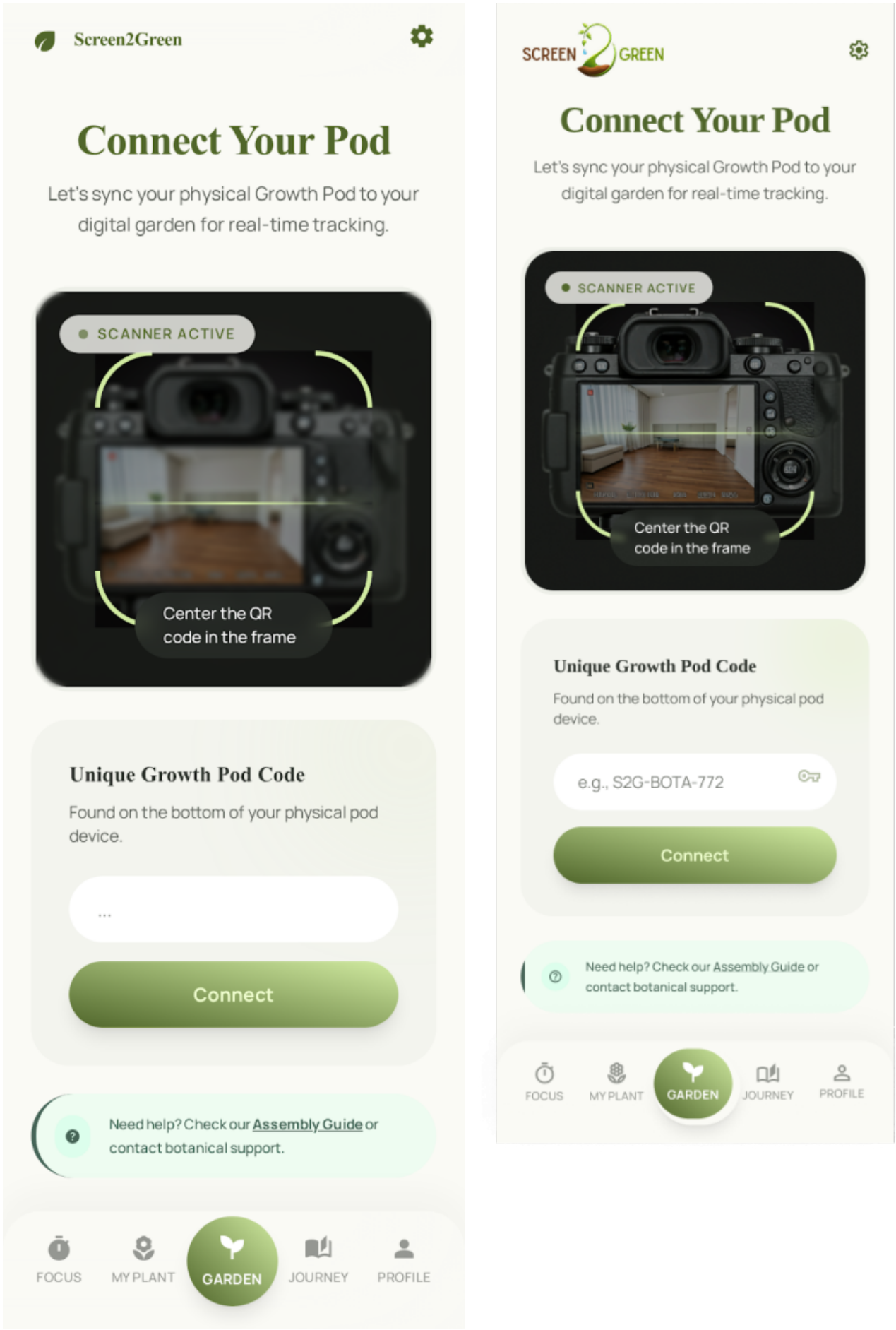

Figure 24: Comparison of the pod connection page before and after user testing

Second, the active timer page. Figure 25 illustrates the difference between 2 versions of the page on the app where the user's focus timer is actively running. The left picture shows the version before user testing, the right showing the version after user testing and feedback.

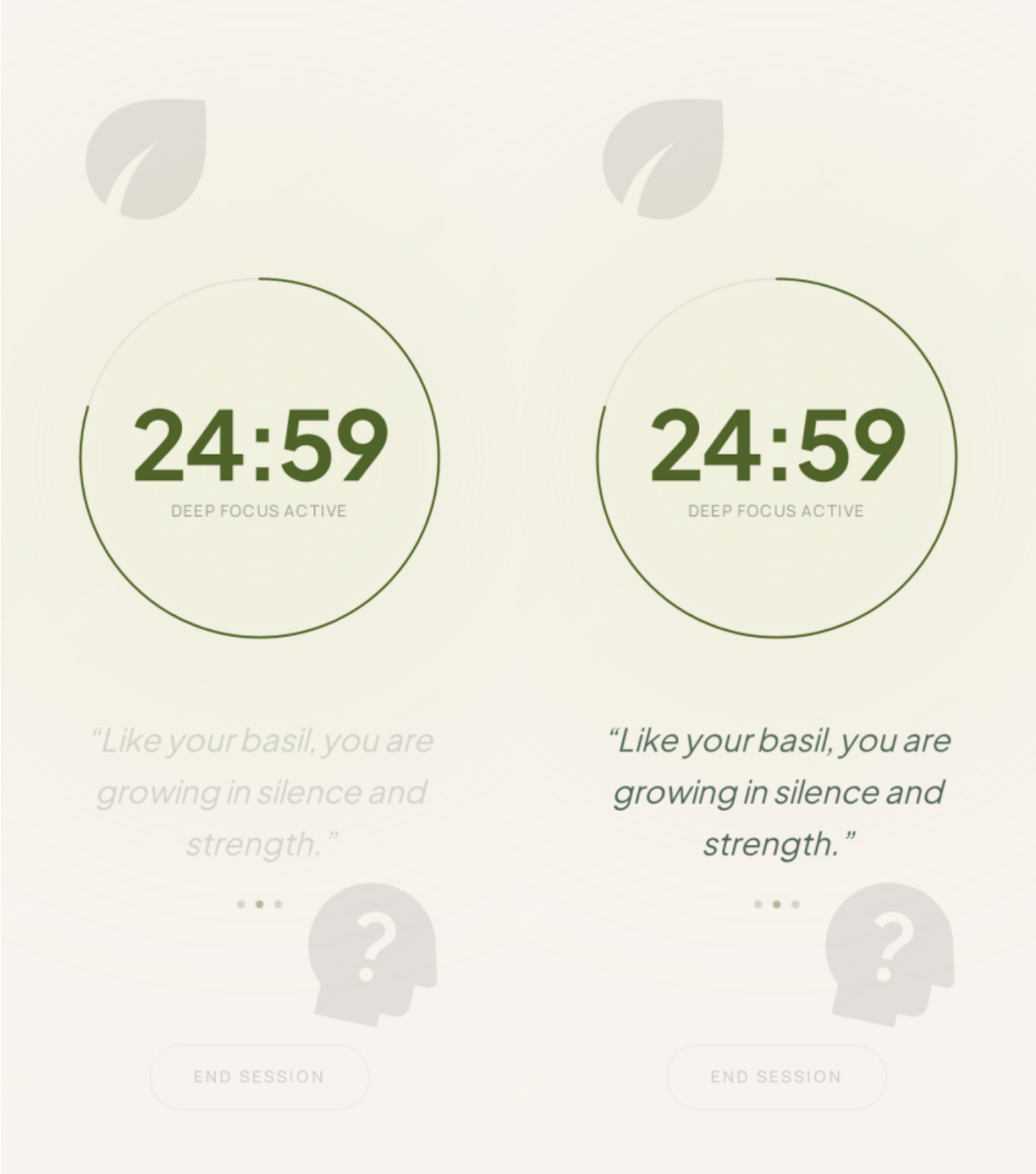

Figure 25: Comparison of the active timer page before and after user testing

The choice of software

Originally, the chosen software was a mix of Ionic Vue, Capacitor and Google Firebase. Ionic Vue is a

framework that allows developers to build app-like user interfaces using HTML, CSS and Javascript. Capacitor is a transformation layer that translates Ionic code into native code like Kotlin for android. Lastly, Firebase is a cloud-based back end service that allows developers to create a document-based database and to implement authentication, both without needing to create and host their own back end.

This software however has its limitations. All of the following have been experienced personally by the team members.

- Ionic Vue, being made in Javascript, makes apps very taxing on the phone's battery life. Since Javascript was made for computers, it makes it more difficult to run on smaller devices in the same optimized way.
- Ionic Vue is heaviliy dependent on APIs that communicate with the phone's native components. This middle-layer makes compliation even slower, leading to slower performance when the app grows bigger.
- Querying deeply nested data in Firebase is very difficult and requires longer segments of code which in turn slow down the phone even more.
- Firebase has had multiple outages over the past 2 years, making it unreliable **[4]**.

Because of these reasons, the app will be developed using Flutter and Supabase instead.

Firstly, Flutter gets directly compiled to native machine code which reduces compile time and overhead. Flutter also renders its own UI without the need of a web view layer. This leads to quicker rendering of elements and smoother animations.

Secondly, Supabase is built using PostgreSQL, meaning it's easier and faster to query deeply nested data. Since the app will save and update metrics and other statistics regarding the plant and the pot, having fast queries is essential.

Thirdly, both Flutter and Supabase are both open-source, meaning developers have a smoother developing experience and can focus on creating and realizing ideas rather than struggling with it.

In summary, these new choices of software will provide more performance, scalability, energy efficiency and developer efficiency. Since the user will keep their phone open on the focus screen, the battery can't suffer under the chosen architecture.

Tests & Results

Hardware tests

Perform the hardware tests specified in Tests. These results are usually presented in the form of tables with two columns: Functionality and Test Result (Pass/Fail).

Software tests

Software tests comprise: (i) functional tests regarding the identified use cases / user stories; (ii) performance tests regarding exchanged data volume, load and runtime (these tests are usually repeated 10 times to determine the average and standard deviation results); (iii) usability tests according to the System Usability Scale.

Summary

Provide here the conclusions of this chapter and make the bridge to the next chapter.

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[1] Kendra Cherry, 2025. Color Psychology: Does Green Affect Mood?. *Verywell Mind*.
[2] Mohamad Eltazy, 2023. Why Round Corners Are More Efficient for Human Consumption. *Medium*.
[3] Scot Krueger, 2024. The Benefits of Writing Things Down. *Medium*.
[4] Firebase, 2026. Firebase Status Page. *Firebase*.