

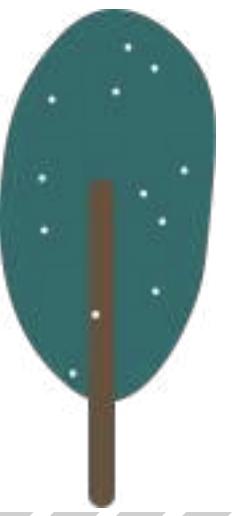
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ChinYing Chu

# PORTFOLIO

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Industrial design



# Hi, I'm Chu!

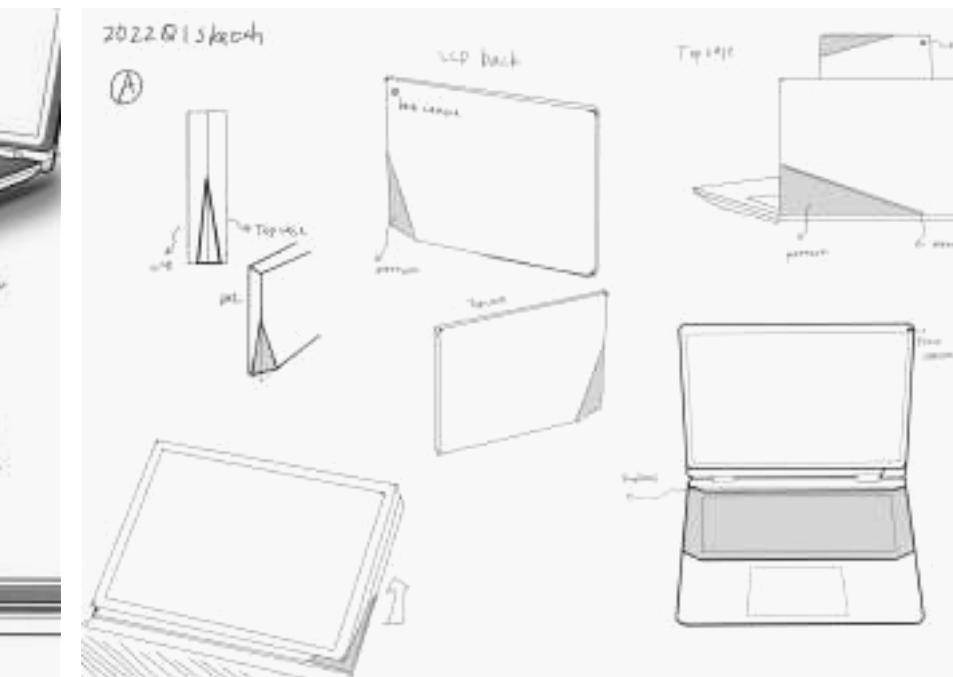
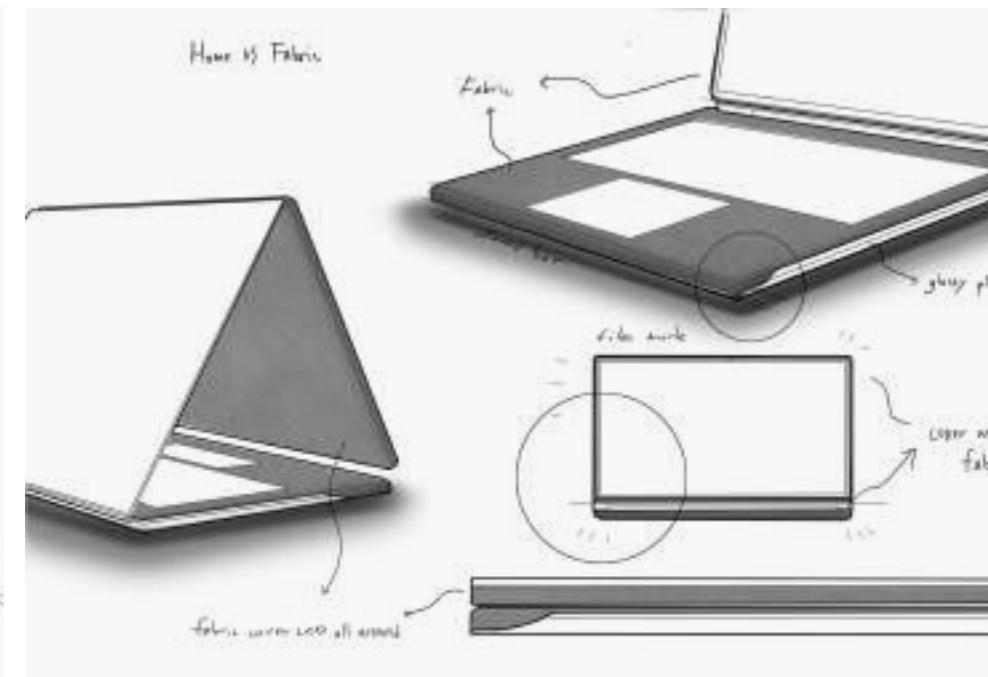
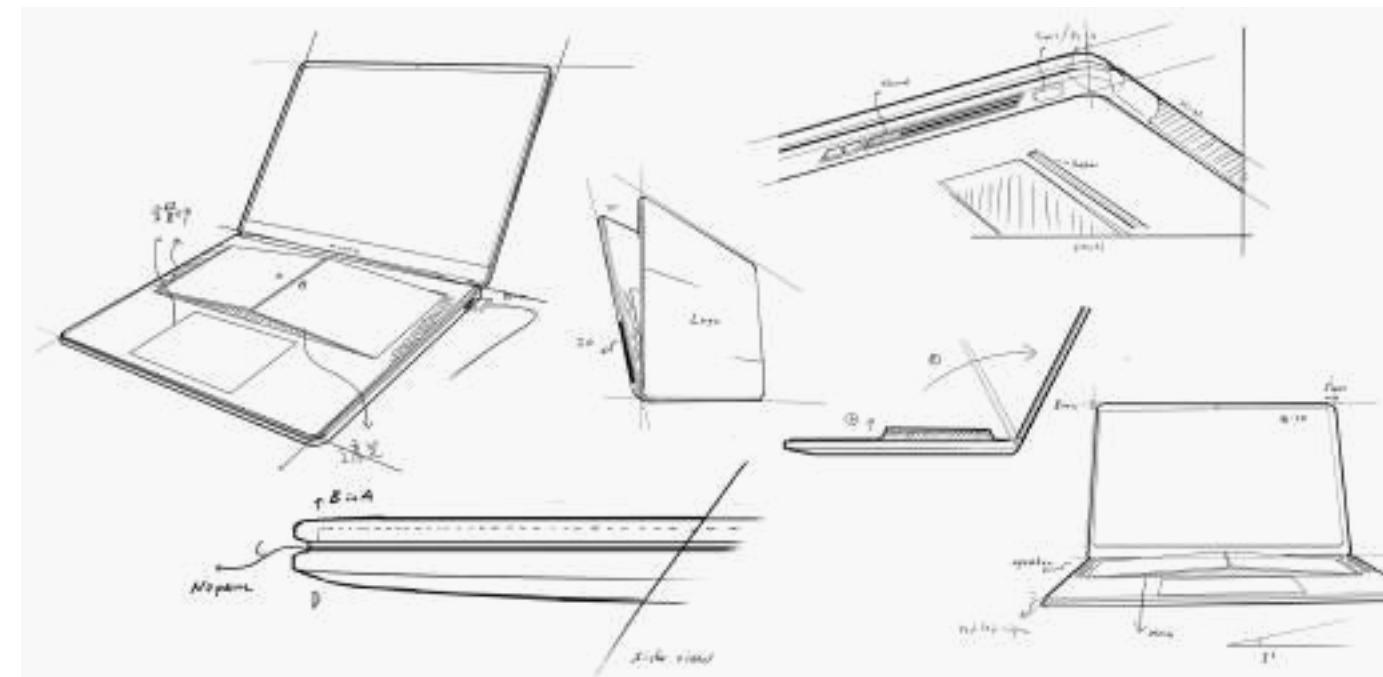


I'm an industrial designer from Taiwan and a soon-to-be graduate of Aalto University's International Design Business Management program. I transform abstract ideas into tangible, patentable solutions by marrying form with function. I distill complex concepts into intuitive designs that meet user needs and market demands while telling a compelling story through sketches, CAD renderings, physical models, or working prototypes.

For me, design is about more than problem solving—it's about deeply understanding what people truly want, even before they know it themselves. I observe, question, and empathize to uncover hidden needs and then shape how people physically and emotionally interact with products, so they are ergonomic, accessible, and engaging.

I thrive on seeing my designs come to life in the real world. Watching users interact, gathering feedback, and rapidly iterating to refine and improve is what drives my passion. That continuous cycle of ideation, creation, and evolution is why I love what I do.

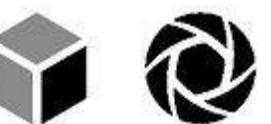
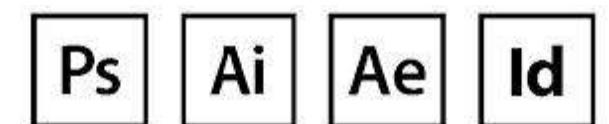
# Design Skills



Sketching



3D modeling with Creo  
Rendering with Keyshot



Prototyping with engineers

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# Mobile Office

Professional project: Team collaboration (3 members)

Copyright: Compal Electronics

Year: 2022

Duration: 12 weeks

Personal contribution:

- User trend analysis using netnography tools
- Appearance proposal and CMF proposal
- Be responsible for visiting the model lab and the paint factory to verify the status of prototype production.
- Coordinating and driving the patent application process.





## Reinventing the Ultrabook for the Mobile Office

As remote and hybrid work became the new normal after the pandemic, professionals needed devices as flexible as their schedules. Traditional workstations were too bulky, and slim Ultrabooks sacrificed ports for thinness, forcing users to clutter desks with external docks that overheated and slowed performance.

The Mobile Office solves these problems with a patented 360° foldable keyboard base that turns a full-size Ultrabook into a compact, hinge-centered powerhouse. Front-facing air intakes at the hinge improve cooling, while strategically placed ports stay accessible when open and stay sealed against dust and moisture when closed.

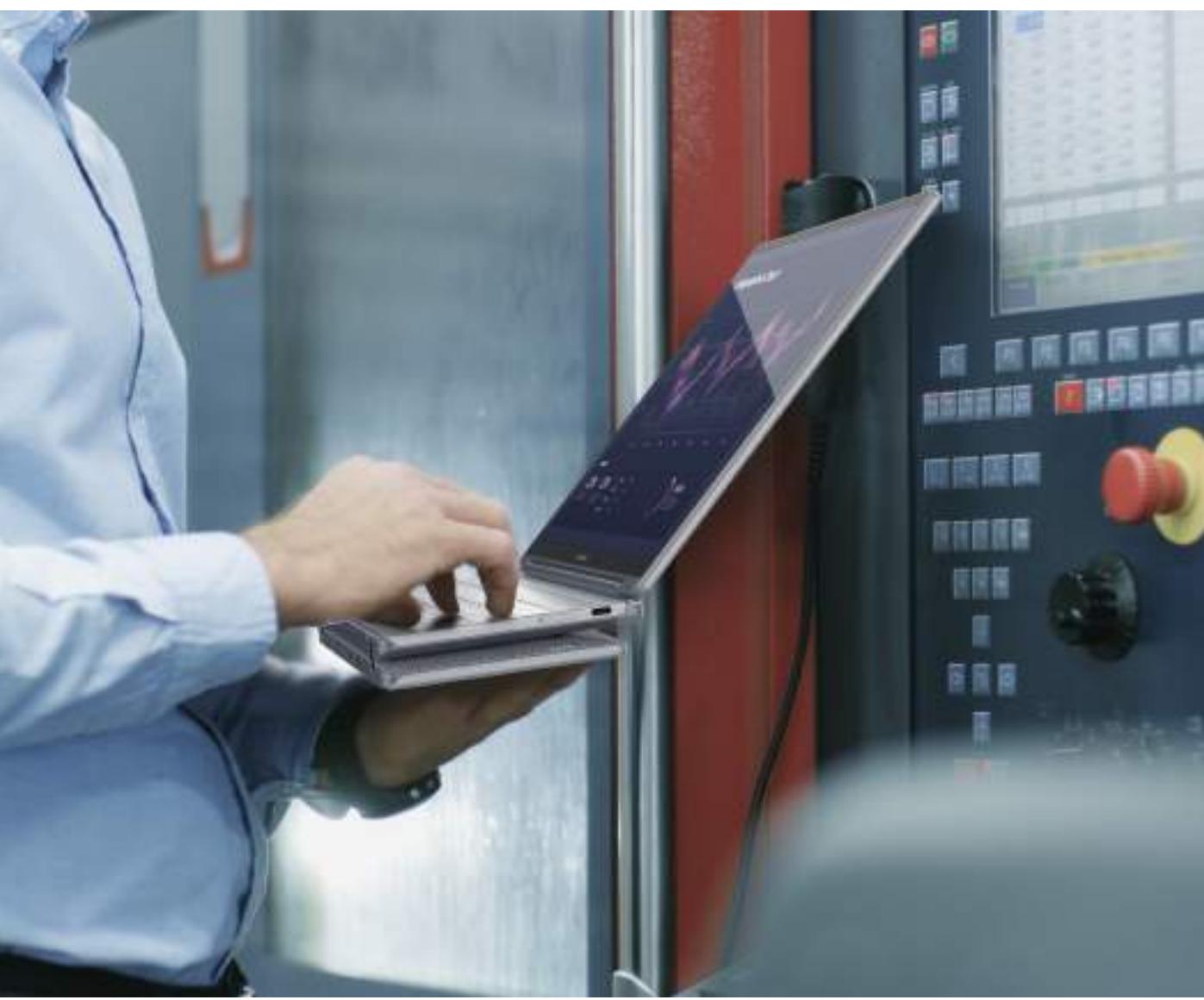
\*In this project, I actively participated in the early-stage research and development of design proposals. Although the selected final design was executed by my colleague, I contributed to the CMF design. The last few pages showcase my design proposals for this project.

## Background

**When mobile office becomes mainstream, portability and flexibility is prioritized by consumers.**

After pandemic, mobile office becomes mainstream. Work has become more flexible, taking place in multiple locations beyond just home and office. From our research, workstations are no longer popular with consumers because of the weight and thickness. Instead, Ultrabook laptops become popular, due to the high flexibility and portability.

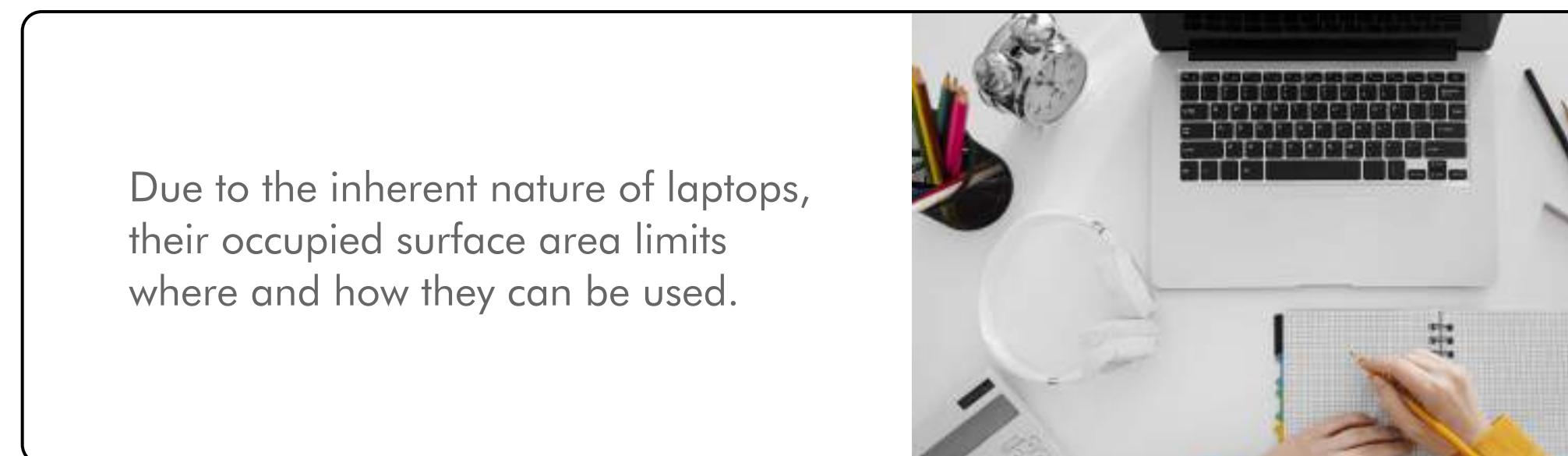
However, Ultrabook laptops often lack sufficient I/O ports as they emphasize on slim design and cost considerations, forcing consumers to purchase additional docks for expansion. Many users stated that the additional I/O docks messed up their desks. Furthermore, external I/O docks also frequently suffer from overheating and reduced data transfer speeds due to overload.



## Challenge 1: Mobility and performance are difficult to achieve simultaneously

Workstation laptop	∅	Portable laptop
 Dell Precision, HP ZBook, Lenovo ThinkPad P series		Dell XPS, MacBook Pro 14", Lenovo ThinkPad X series
 High performance Sufficient I/O ports		Light weight
 Heavy (2-3.5 kg)		Lower performance Limited I/O ports

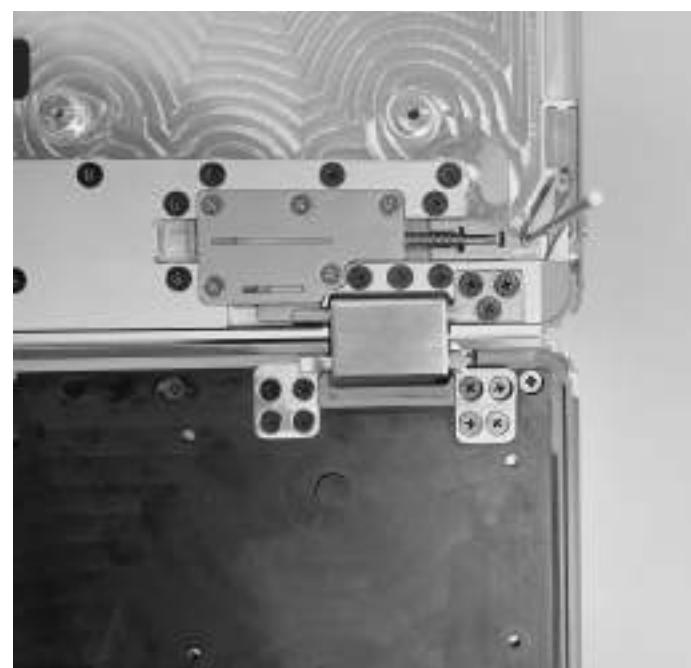
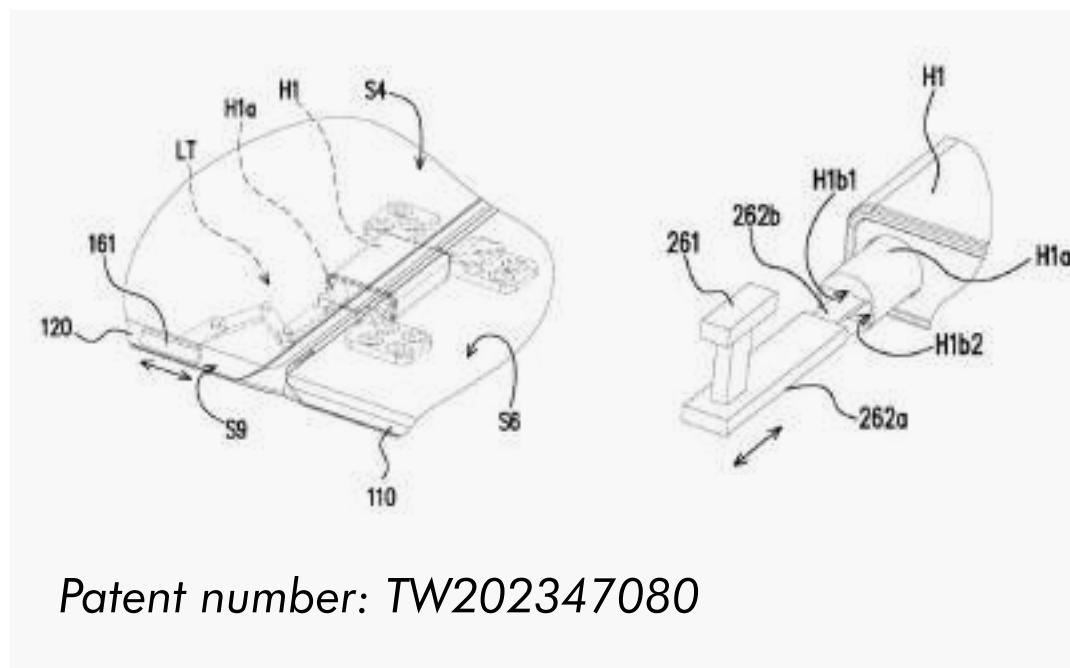
## Challenge 2: Due to the inherent nature of laptops, their occupied surface area limits where and how they can be used.



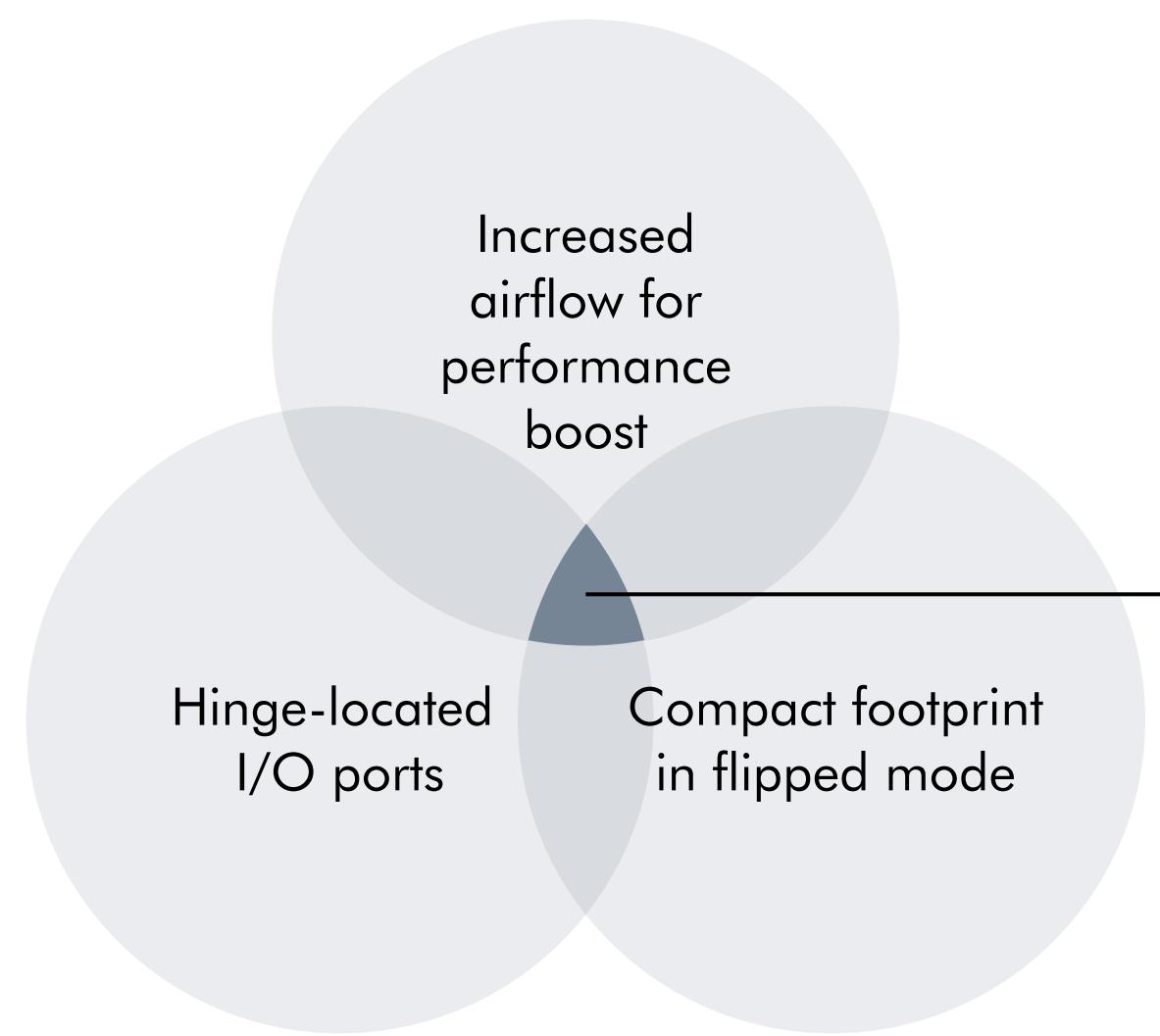
# How might we fold the device, not just for compactness, but for performance?

The Mobile Office features a patented foldable form factor that allows the keyboard base to bend 360 degrees at its center. This enables the device to fold into a compact configuration while introducing new functional possibilities. This innovative structure improves thermal airflow, optimizes I/O port placement, and enhances spatial efficiency.

The development process involved close collaboration with mechanical engineers, thermal engineers, and patent specialists. Designers had to carefully negotiate the internal structure, component dimensions, and how mechanical constraints would influence the device's external appearance.



## Impact



The Mobile Office delivers multiple performance and usability advantages. Front-facing air intake vents located at the hinge increase airflow in flipped mode, enabling the CPU to overclock or maintain higher wattage for extended periods. It results in superior performance compared to laptops of similar thickness. Frequently used I/O ports are also positioned at the hinge, ensuring easy access during use while offering dust and water resistance when the device is closed. Additionally, in its flipped mode, the laptop occupies less desk space than conventional models, making it ideal for users who value efficient workspace utilization.



## Mass production simulation

Although this project was a conceptual design project, we still worked with external manufacturer and created a mockup. Beside the mechanical structure, the most challenging part of this mockup was the fabric. To prevent the bottom of the keyboard from hitting each other, we decided to cover the bottom with fabric. We constantly adjust the shell thickness and leave enough space for fabric and glue.



# Behind the Scenes

## Concept ideation

After defining the opportunity areas, which was improving laptops' portability and flexibility, we explored different form factors.

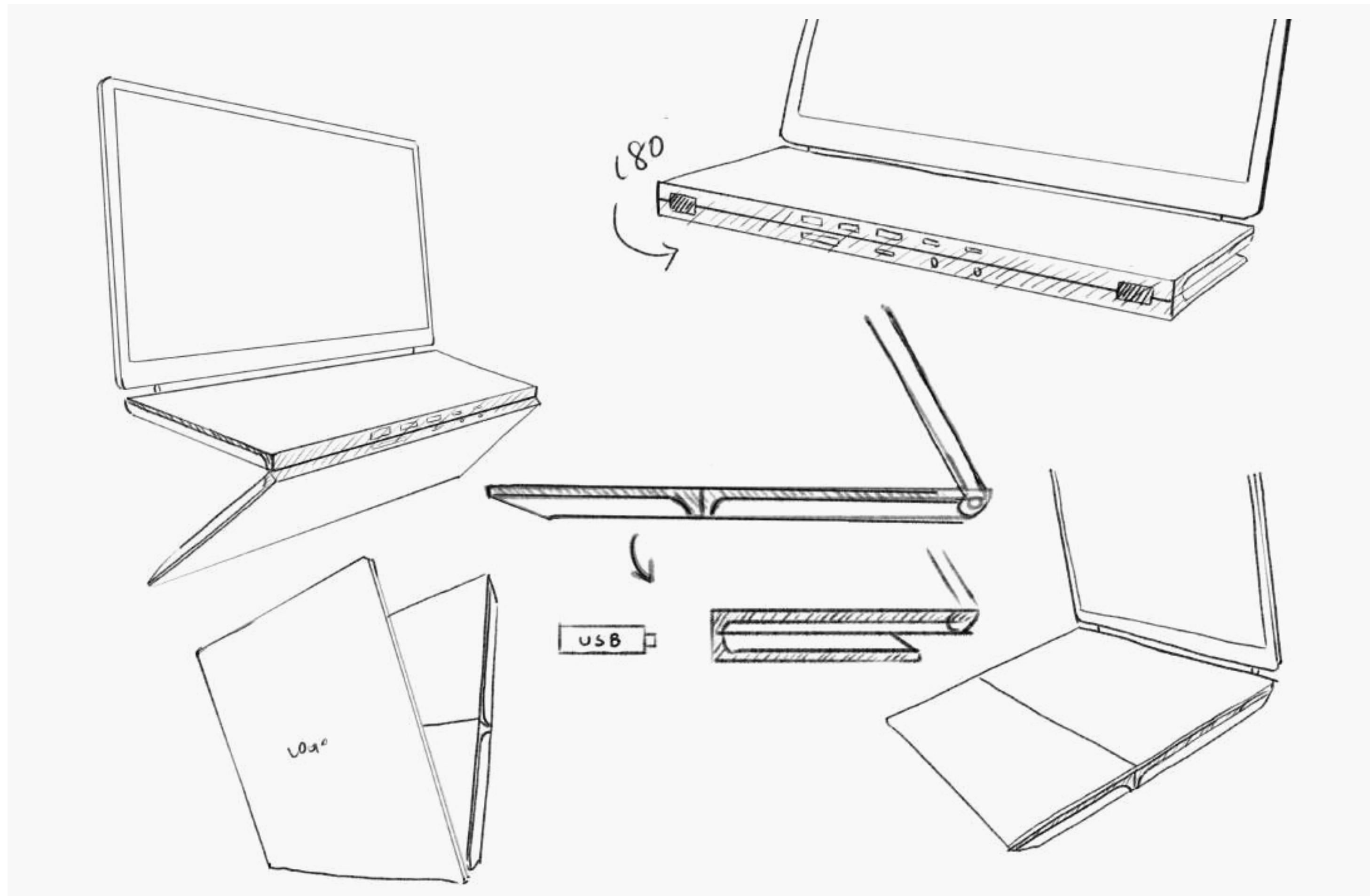
The first concept was to hide the I/O ports within the body of the device and make them accessible through a rotating mechanism. This approach protects the ports from dust and moisture when the laptop is in transit, offering greater durability for users who frequently move between locations. Additionally, since ultrathin laptops often lack sufficient side thickness to accommodate full-sized I/O ports, relocating them to a thicker part of the chassis via rotation allows the laptop's side profile to remain sleek and uninterrupted.

The second concept built on this by relocating all frequently used I/O ports into the central hinge and enabling a vertical "flipped" stance. By positioning ports in the hinge, we not only kept them shielded when the device was closed but also freed up the side panels for a cleaner aesthetic. In flipped mode, the laptop could stand upright on its hinge, drastically reducing desk footprint while aligning front-facing vents at the hinge to draw in cool air. This dual strategy promised both superior space efficiency and enhanced thermal performance, making it our final selected concept.



## Appearance design ideation

### Sketch



### Inspirations



## Unselected Design

This unselected design reveals a single, seamless curve that flows from lid to base, emphasizing a continuous, sculpted silhouette. The primary chassis is crafted from matte-finished aluminum, chosen for its rigidity and refined feel, while strategic carbon fiber inlays along the rear hinge and side panels add subtle texture, reinforce high-stress areas, and help reduce overall weight. The frosted pearlescent white coating gives the surface a soft, paper-like quality that both invites touch and resists fingerprints. Clean, nearly invisible seams around the perimeter maintain the purity of the form, while a barely perceptible hinge line hints at the device's mobility without interrupting its fluid geometry.

Although this was one concept among several, its careful pairing of materials and attention to continuous form guided critical decisions in the final design. The balance of lightness, strength, and tactile comfort established here ultimately informed the laptop's premium, cohesive appearance.







# PageMate

IDBM student project: Team collaboration (5 members)

Course: Networked Partnering and Product Innovation

Year: 2024

Duration: 6 weeks

Project brief: Design a user-centered IoT innovation project focused on identifying real-world needs and translating them into a functional concept.

Personal contribution:

- Market and user research
- Form factor exploration and prototyping
- Appearance design proposal & visualization
- Working prototype development



Light displays page numbers through the fabric.

Hair line belt decoration with logo

Matt & rough finishing

Touch wheel with hair line texture.

## Seamless reading across formats and devices

PageMate is a smart, IoT-enabled bookmark designed to unify the reading experience across physical and digital platforms. Whether flipping through a paperback or swiping on an e-reader, PageMate ensures users always return to the exact page where they left off. With PageMate, reading becomes more flexible, intuitive, and personalized. It meets the needs of today's hybrid readers, those who value the feel of a physical book but appreciate the convenience of digital formats.

By combining a slim, tactile device with a Bluetooth-connected mobile app and cloud syncing, PageMate eliminates the disconnect between print and digital reading.

# How to provide a seamless reading format-switching experience?

## ■ Increased E-book market

In 2020, e-book sales experienced a significant increase, indicating a growing market for digital reading formats (Whiting, 2021). Additionally, platforms like TikTok have contributed to a surge in reading among youth, with many reporting increased book consumption due to TikTok content.

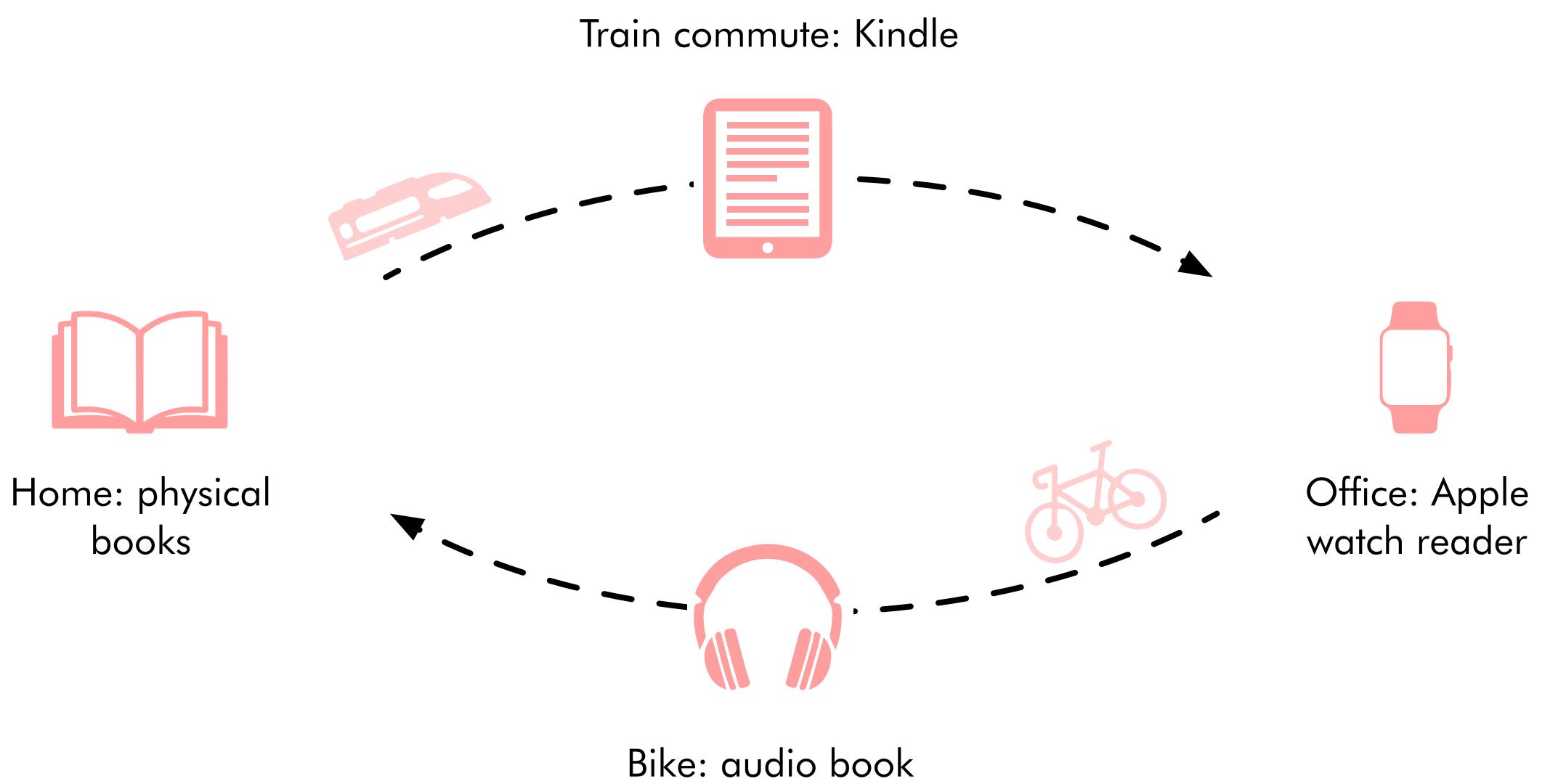
## ■ Growing demands of switching reading formats

In a study by Bailey, Sahoo, and Jones (2020), 50 out of 100 participants owned books in multiple formats, yet 24 refrained from switching between them due to the lack of an efficient method. This highlights a significant deterrent to reading books in multiple formats and indicates a demand for a seamless solution.



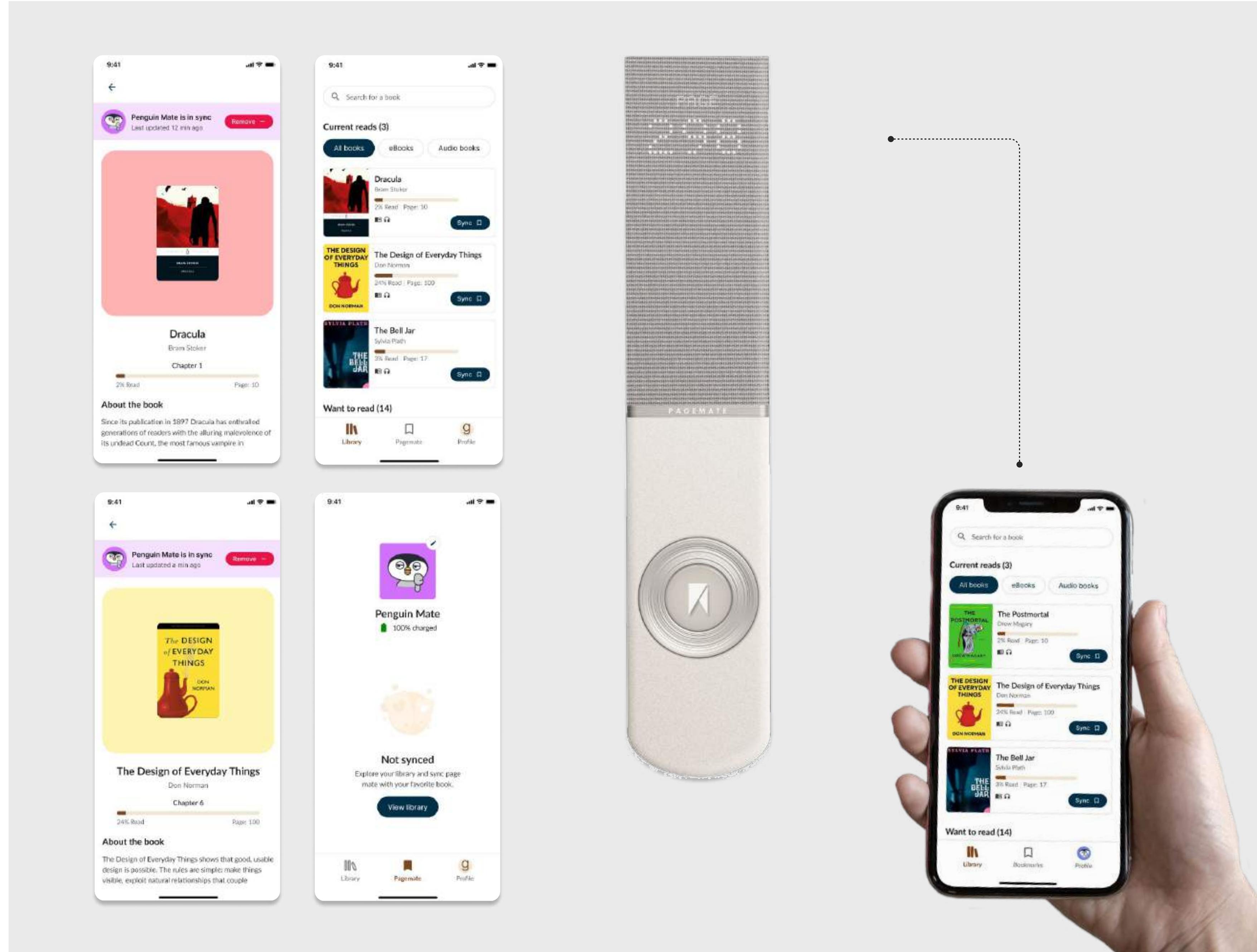
## Pain point: pages cannot be synced between different formats

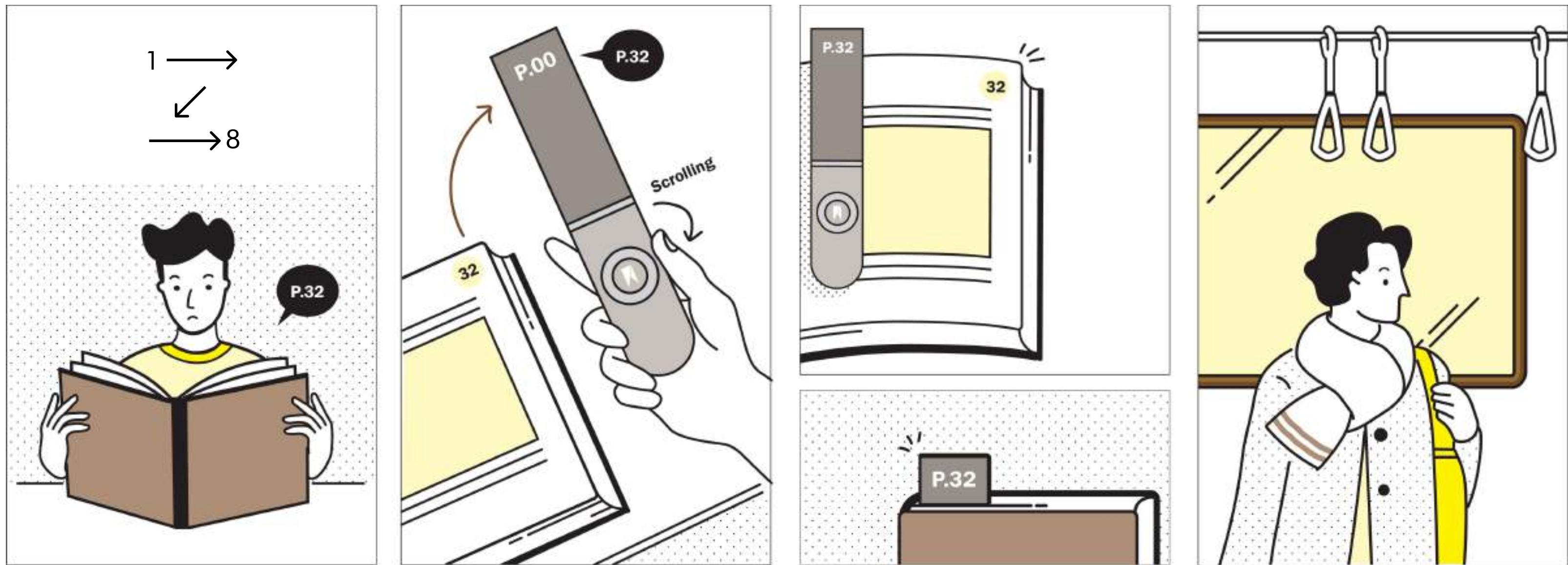
The format of reading changes depending on the environment. At home, many people prefer physical books, while outside, for the sake of convenience, they often choose e-books. In more extreme situations, such as while cycling, audio books become a more practical option. Although digital formats can be synchronized with one another, synchronization between digital and physical books remains impossible.



# Wherever You Read, PageMate Leads

PageMate is an IoT-enabled smart bookmark that tracks and syncs users' reading progress across various book formats and platforms. It includes a physical bookmark, a smartphone app (created by other team member), and a cloud server. It revolutionizes the reading experience by seamlessly synchronizing progress across both physical and e-book formats. For those who cherish the tactile sensation of a physical book or relish the convenience of an e-book, PageMate guarantees that readers always pick up right where they left off.





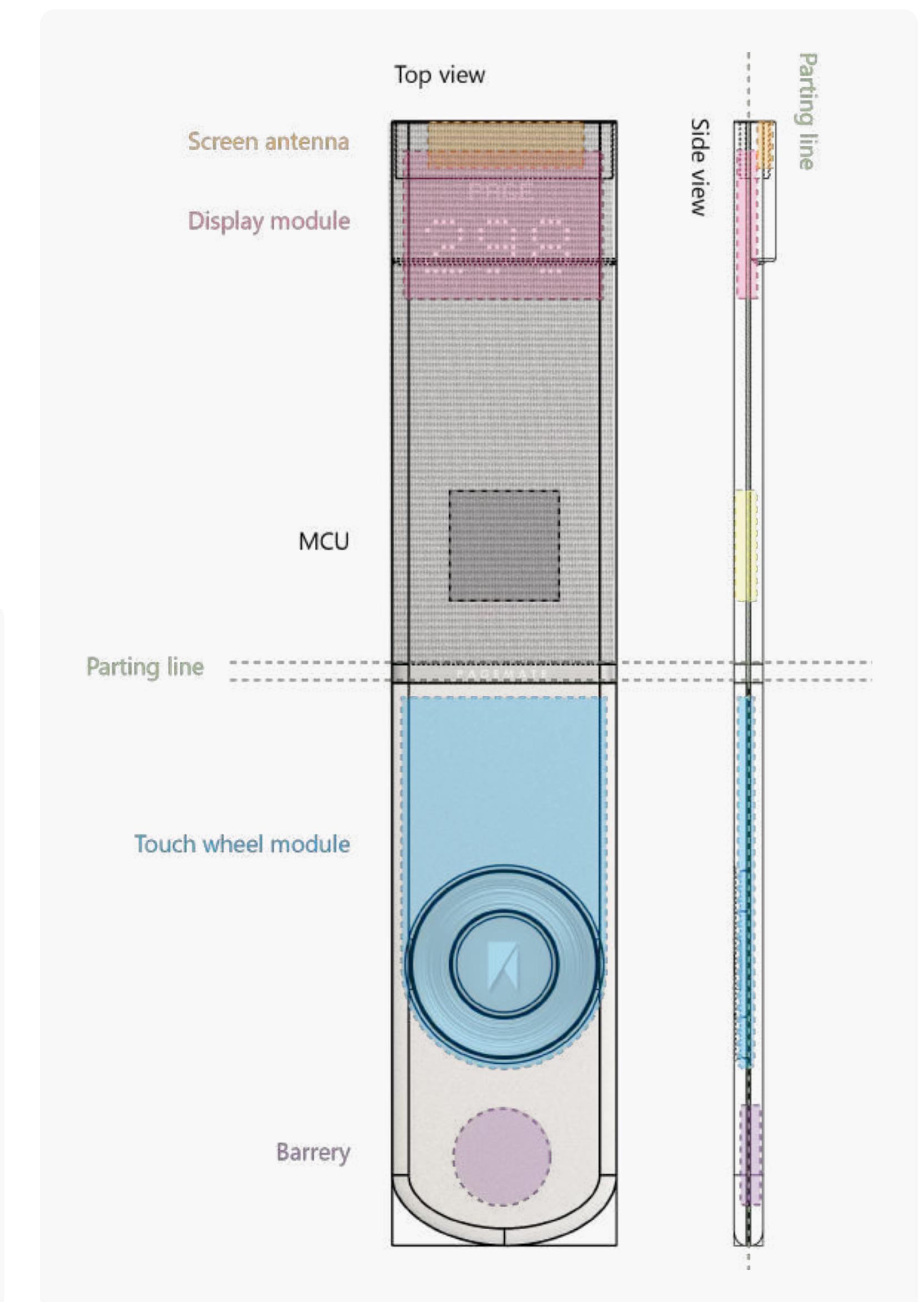
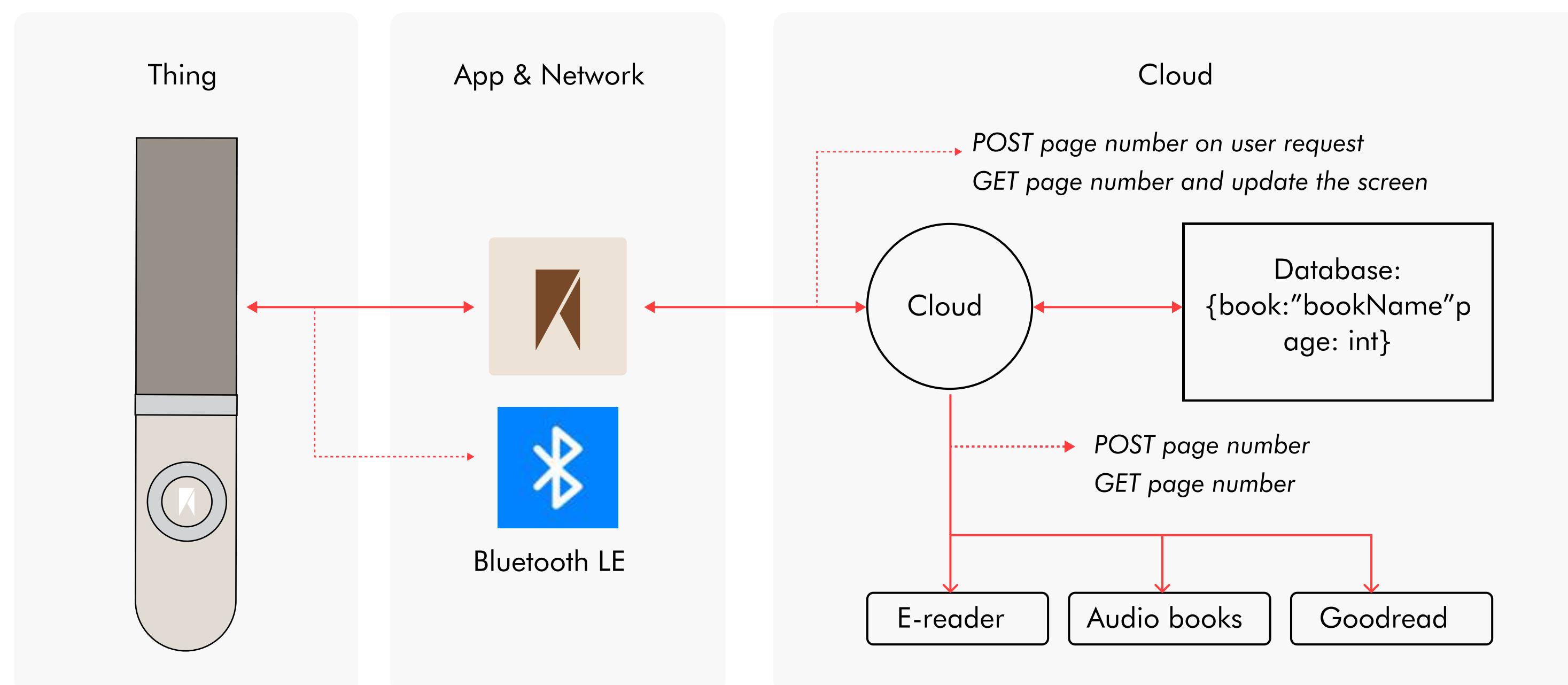
## User flow

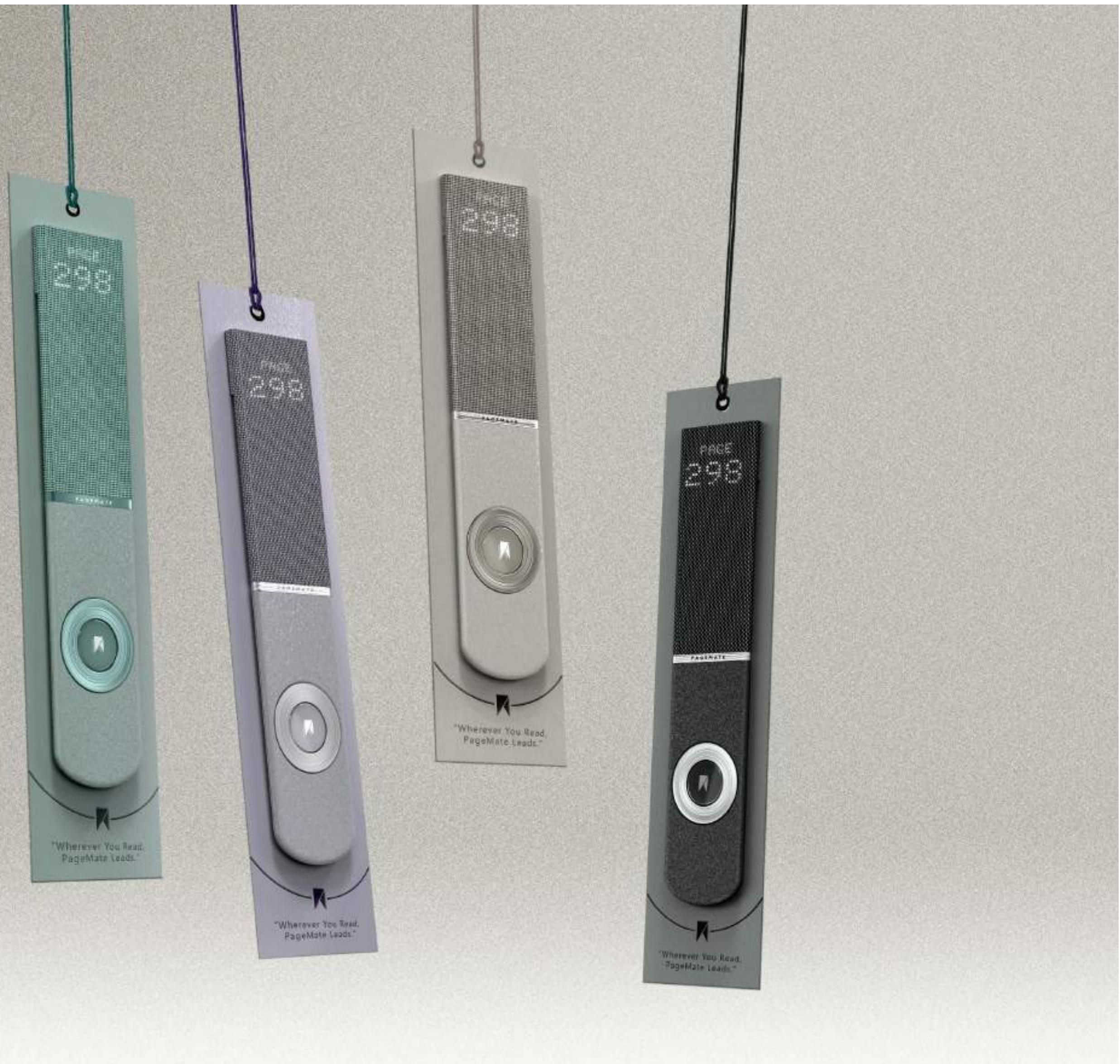
At home, the user is reading a physical book and stops at page 32. To log their progress, they use the scroll function on PageMate to set the device to the corresponding page number, then clip it onto the book. The user leaves home without taking the book, relying on PageMate to remember where they left off. Later, during their commute, the user reads on a tablet. Thanks to the synchronized data, the e-book automatically displays the previously saved page. The user continues reading and reaches page 67. When returning home, they scroll PageMate to update the progress to page 67 and insert it into the physical book. The next time they pick up the physical copy, they can instantly resume reading.



## Component & System

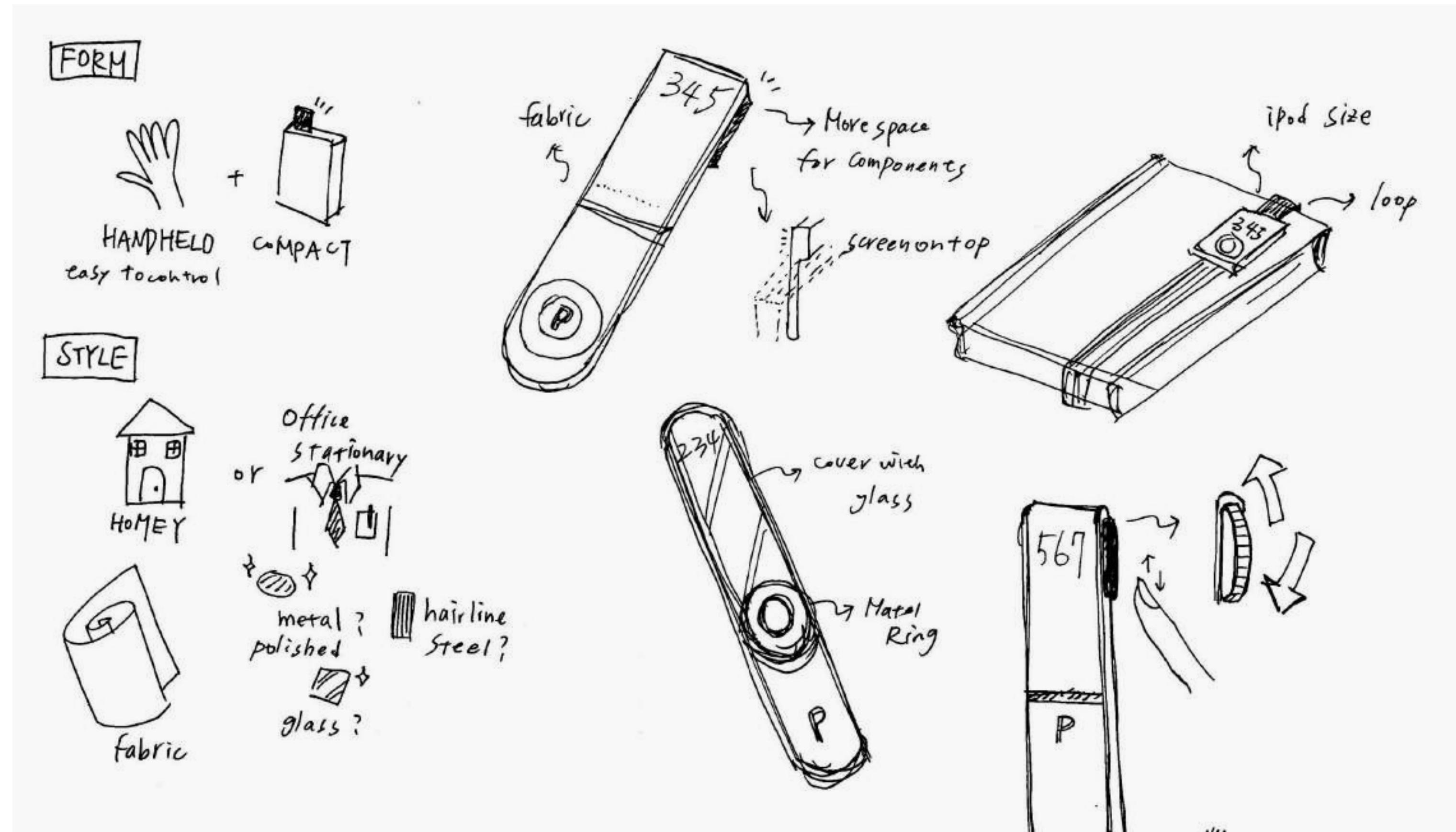
PageMate is a thin and lightweight device that can be inserted into any book to record the user's reading progress. As a bookmark, PageMate needs to be held between pages, so the device must be extremely thin. We referred to the thickness of the iPod Nano and kept the body under 4 mm. When selecting internal components, we prioritized the thinnest options available and avoided stacking parts whenever possible. It features a low-power microcontroller that communicates with the user's smartphone via Bluetooth. PageMate is equipped with a tiny battery that can be easily recharged using a Pogo pin charging interface. It also includes a touch scroll wheel that allows users to enter the page number.





# Behind the Scenes

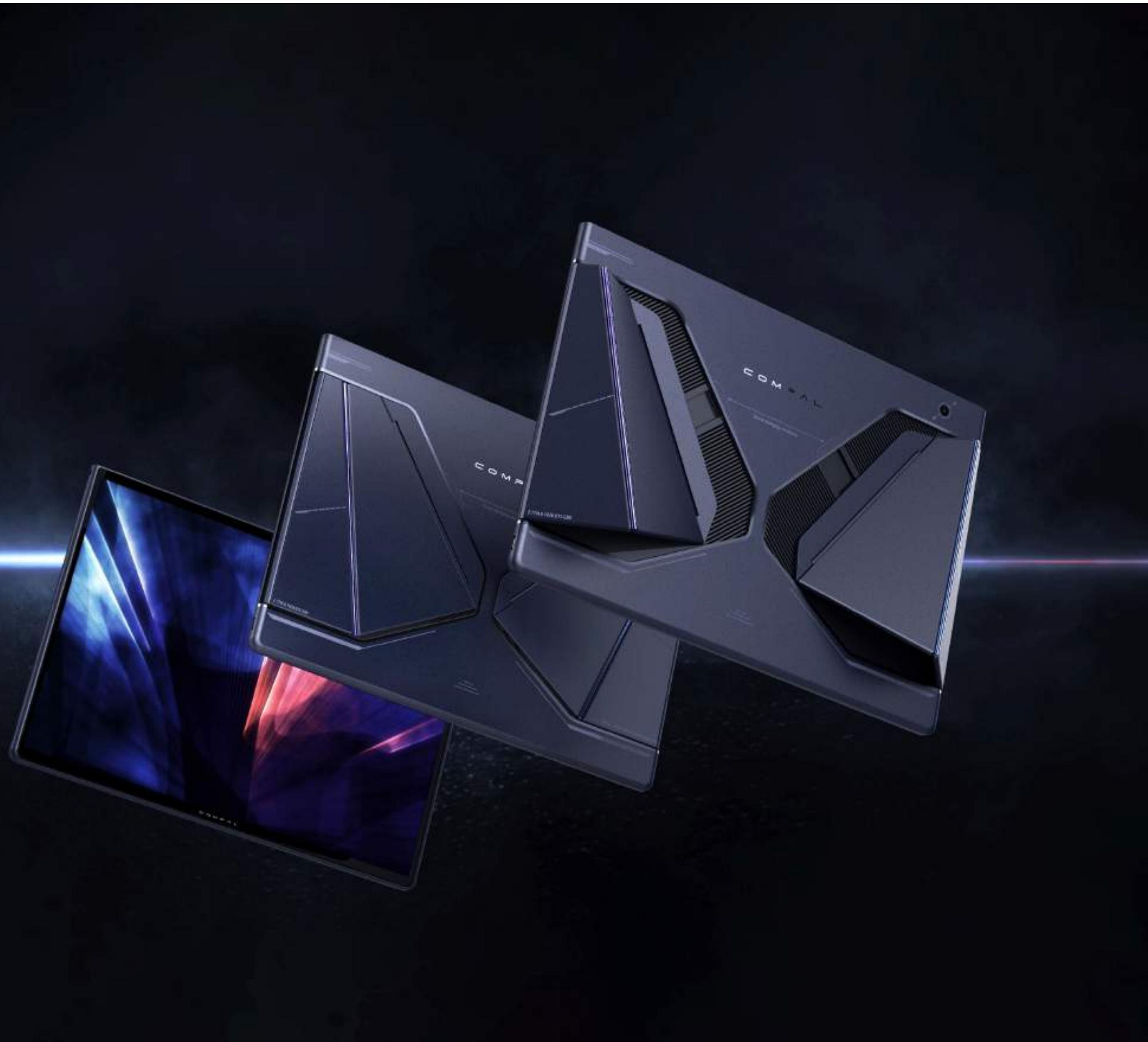
When exploring the form factors, several aspects were carefully considered. Since the bookmark is intended to be used in a fixed location, typically at home, portability was not a key concern. For this scenario, a flat form factor that can be easily inserted between pages is ideal, as it prevents damage to the paper and avoids adding bulk to the book. Initially, we considered a loop design; however, it was difficult to estimate the appropriate loop length, and it made the act of starting to read more cumbersome. In the end, we prioritized the primary use case and opted for a flat design, ultimately removing the loop. At the appearance design stage, we explored two directions: one with a luxurious aesthetic and another with a cozy, homely feel. Given that the primary usage scenario is within the user's home, we selected the latter—featuring a fabric covering and a textured surface to enhance tactile comfort. For the color palette, we chose ivory as the main color. Its warm undertones evoke a sense of comfort and familiarity. Overall, we aimed to make our smart bookmark not just a functional tool, but also a stylish accessory for book lovers.



## Prototyping

The prototyping process was divided into two stages. First, we used 3D printing to verify that the overall design was ergonomic and thin enough not to damage the pages of a book. Second, we developed a functional prototype, including both the system and hardware components. We used Arduino to program the device, display page numbers, and register touch input through a capacitive sensor.





# RoverPlay

Professional project: Team collaboration (3 members)

Copyright: Compal Electronics

Year: 2023

Duration: 12 weeks

Personal contribution:

- User research
- Two appearance proposals
- Prototype testing
- Be responsible for visiting the model lab and the paint factory to verify the status of prototype production.
- Coordinating and driving the patent application process.





## Take mobile gaming to your PC

For hardcore gamers who live for mobile titles but crave the precision of a simulator on their laptop, Rover Play delivers. Say goodbye to awkward controls on big screens. Our revolutionary FlexiRear Controller, with integrated ultrasonic sensors, transforms Rover Play from a sleek tablet into an ergonomic gaming powerhouse with a simple slide. Customize the rear touch areas for a truly personal experience. But Rover Play isn't just about control; it's about versatility. Prop it up at a low angle for comfortable tabletop play, or attach the included keyboard cover to unlock its full potential as a gaming 2-in-1 laptop. Rover Play adapts to your game, wherever you are.

\*In this project, I actively participated in the early-stage research and development of design proposals. Although the selected final design was executed by my colleague, I contributed to the CMF graphic design. The last few pages showcase my design proposals for this project.

## Background

### Driven by user demand for enhanced mobile gaming

The conceptualization of Rover Play emerged from two significant and converging trends within the gaming landscape: the increasing prevalence of rear-touch control in mobile gaming and the sustained growth of emulator software. A clear market indicator was the proliferation of rear-touch phone accessories, specifically designed to enhance the mobile gaming experience.

Concurrently, the emulator software market continued its expansion, highlighting a growing user base leveraging laptops for mobile gaming. These combined observations underscored an opportunity to re-evaluate and optimize the role of laptops in this evolving mobile gaming ecosystem.



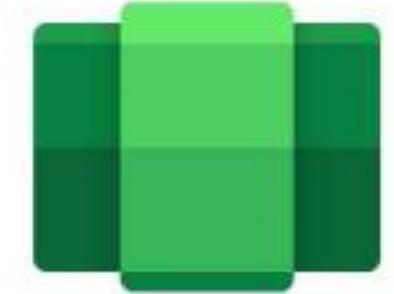
## Market trend

Bluestacks published the first Android game emulator in 2011. Since then, mobile game players started to play mobile games on laptops or PCs. Until 2021 and 2022, Windows Subsystem for Android™ and Google Play Games. The trend shows that the software companies attach great importance to the emulator market.



2011

Third party emulators appeared



2021

Windows Subsystem for Android™



2022

Google Play Games

## User Research

Most of the mobile action games support cross platform playing. Mobile gamers will choose the proper device based on the scenarios. Notably, some gamers play on tablets with unique gestures because of the heavier weight and the bigger screen.



## How might we enhance laptop-based mobile gaming to meet core user demands?

The continued growth of the emulator software market indicated the trend that mobile gamers tend to play on PC or laptops, which provide bigger screen, longer battery life, and precise control. As the first mobile gaming focused laptop, RoverPlay tackled the corresponding concerns such as heavier weight and heat dissipation with the innovative **FlexiRear Controller**. Through unlocking the foldable ultrasonic gaming controllers on the back, Rover Play became an ergonomic gaming console with rear touching function.



*Flat mode: the touching area are disabled.*



*Slide the middle plate to unlock.*

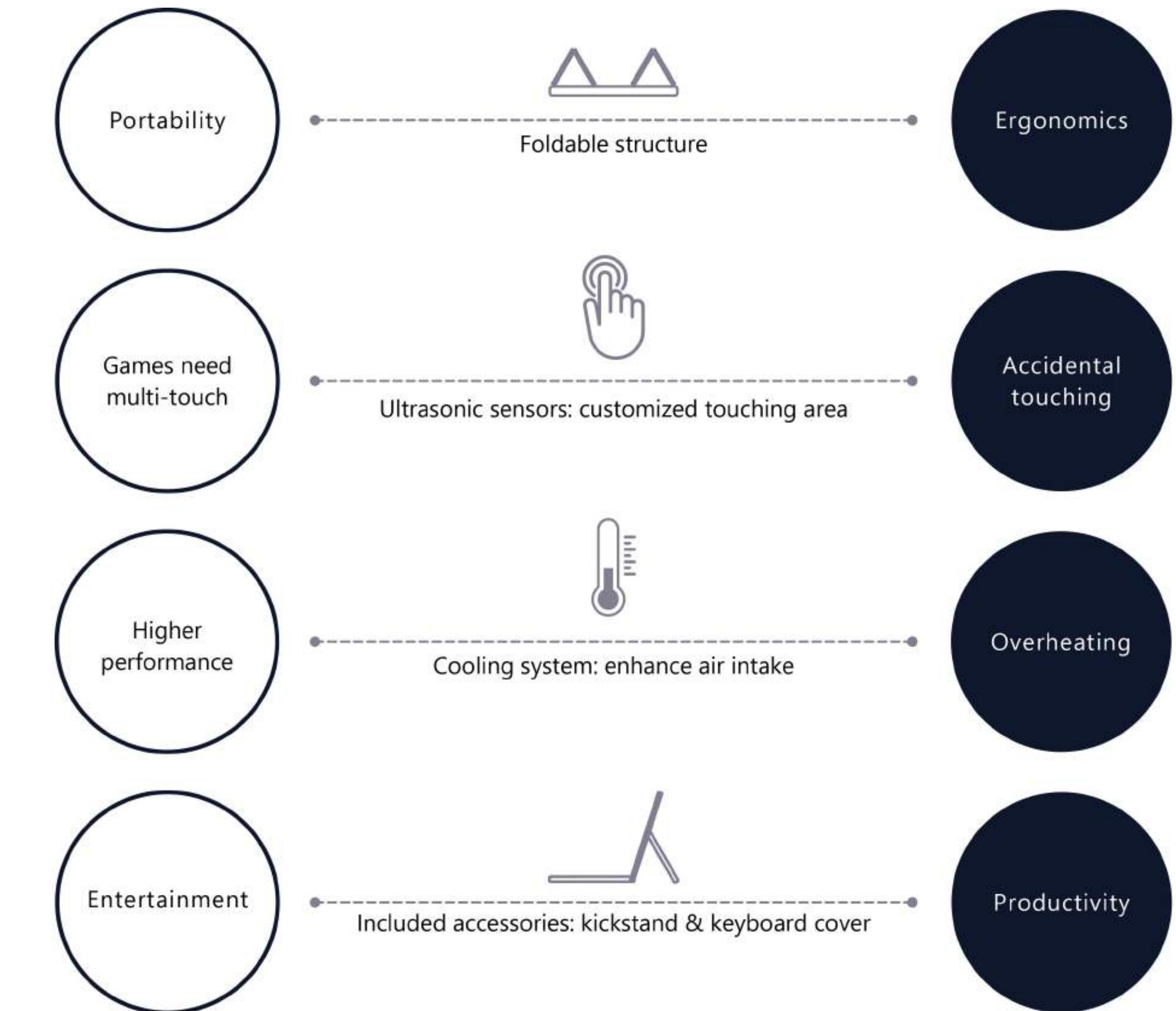


*Slide the outside plates and switch to the controller mode.*

## FlexiRear Controller

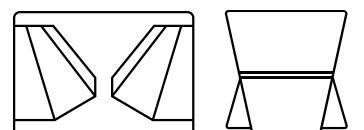
Rover Play directly addresses the pain points of playing mobile games on laptops, delivering an uncompromised experience. It skillfully reconciles seemingly contradictory features like portability and ergonomics through its triangular and foldable structure.

The device enhances gameplay with its built-in app, allowing users to customize touch areas and prevent accidental inputs. In console mode, extra thermal areas are activated to boost air intake, effectively managing heat during intense sessions. Finally, with the included keyboard cover and kickstand, Rover Play transforms into a versatile device, seamlessly blending entertainment with productivity.

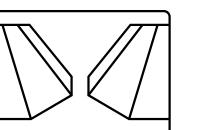


## Four-in-One Flexibility with RoverPlay

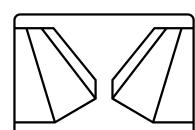
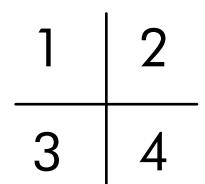
RoverPlay is a detachable laptop consisting of a keyboard, a tablet with a FlexiRear Controller, and a kickstand. These components can be combined into four different usage modes. These four modes are designed to adapt to different usage scenarios, such as gaming, productivity, media consumption, and portability.



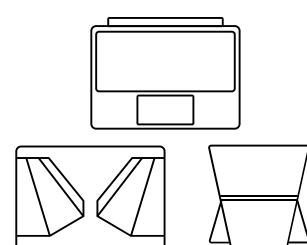
Viewing mode



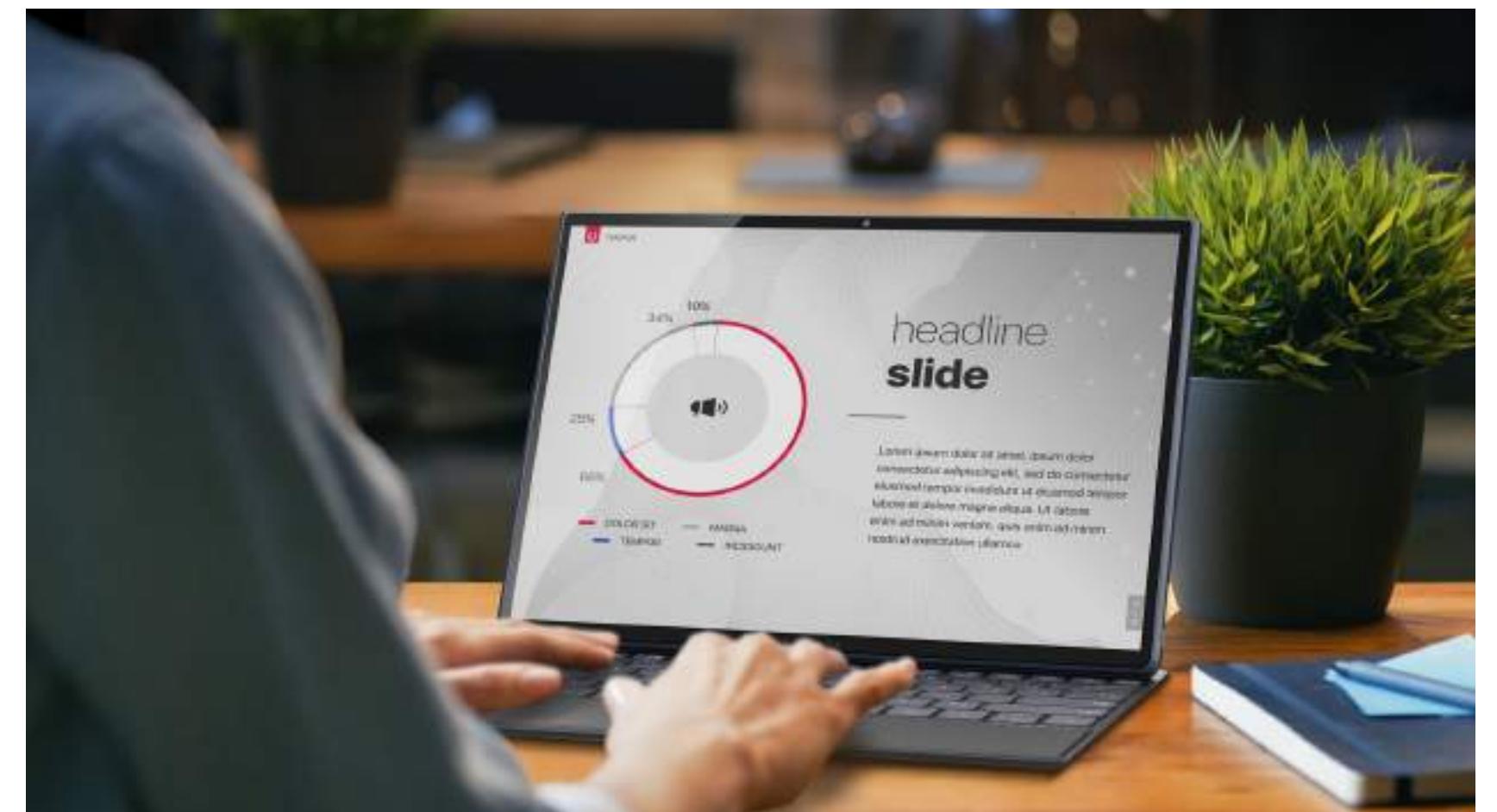
Low angle mode



Handheld mode

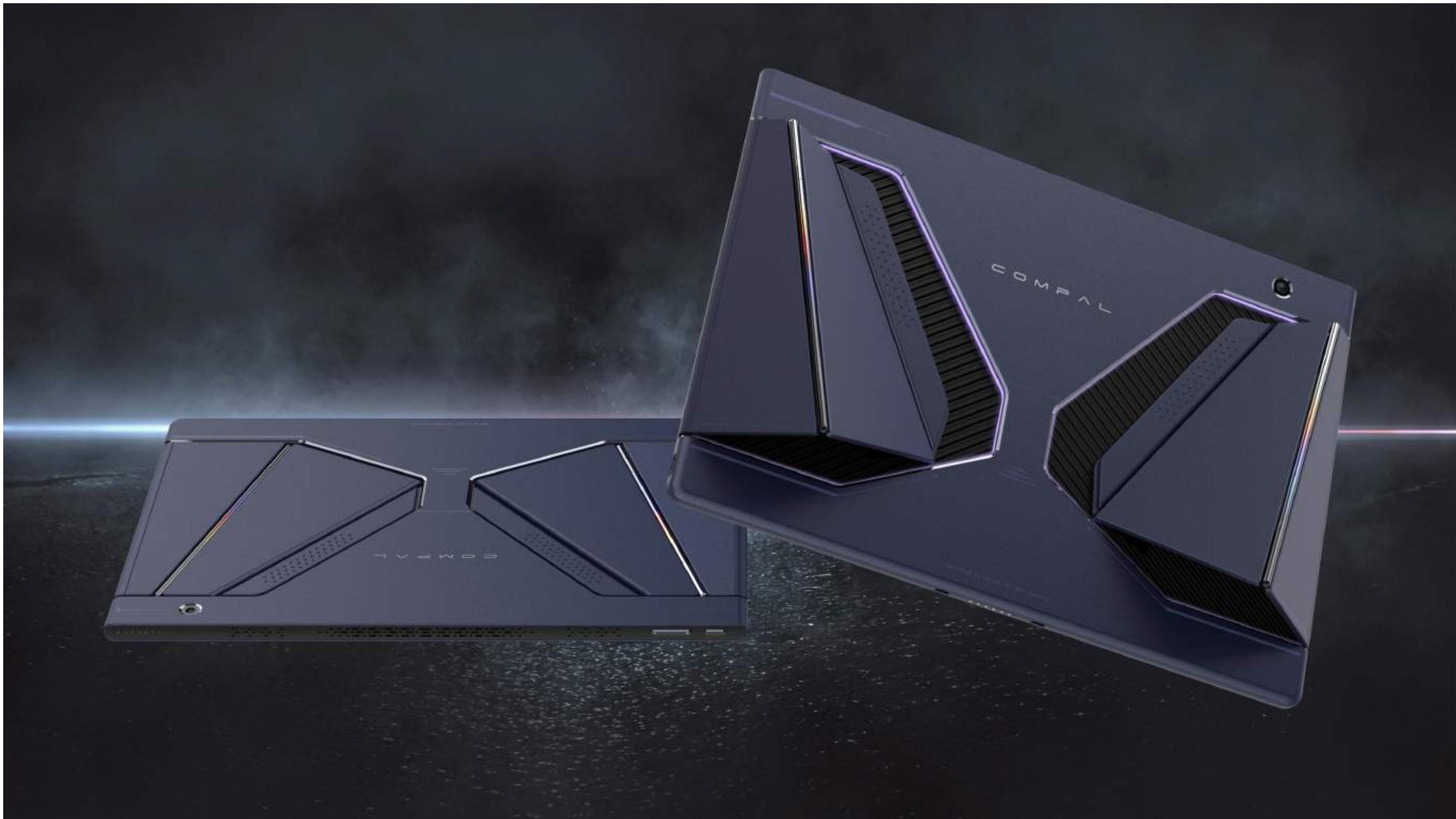


Clamshell mode



## Impact

RoverPlay's marks a significant innovation by merging the traditionally separate field of mobile gaming and laptop functionality. By providing users with the seamlessly transition between different modes of operation, whether it's a compact laptop for productivity or an ergonomic console for immersive gaming, RoverPlay caters to the diverse needs of modern gamers. This versatility opens up new possibilities for users to tailor their gaming experiences according to their preferences.





## Mass production simulation

Although the prototype only includes mechanical structures and does not contain functional electronic components (such as a motherboard and CPU), we wanted to simulate the user experience of gaming—such as vibration feedback and lighting effects. To achieve this, we embedded LED lights, a vibration motor, and a battery inside the model. Additionally, since the FlexiRear mechanism requires internal space, we repeatedly revised the 3D model to ensure manufacturability.



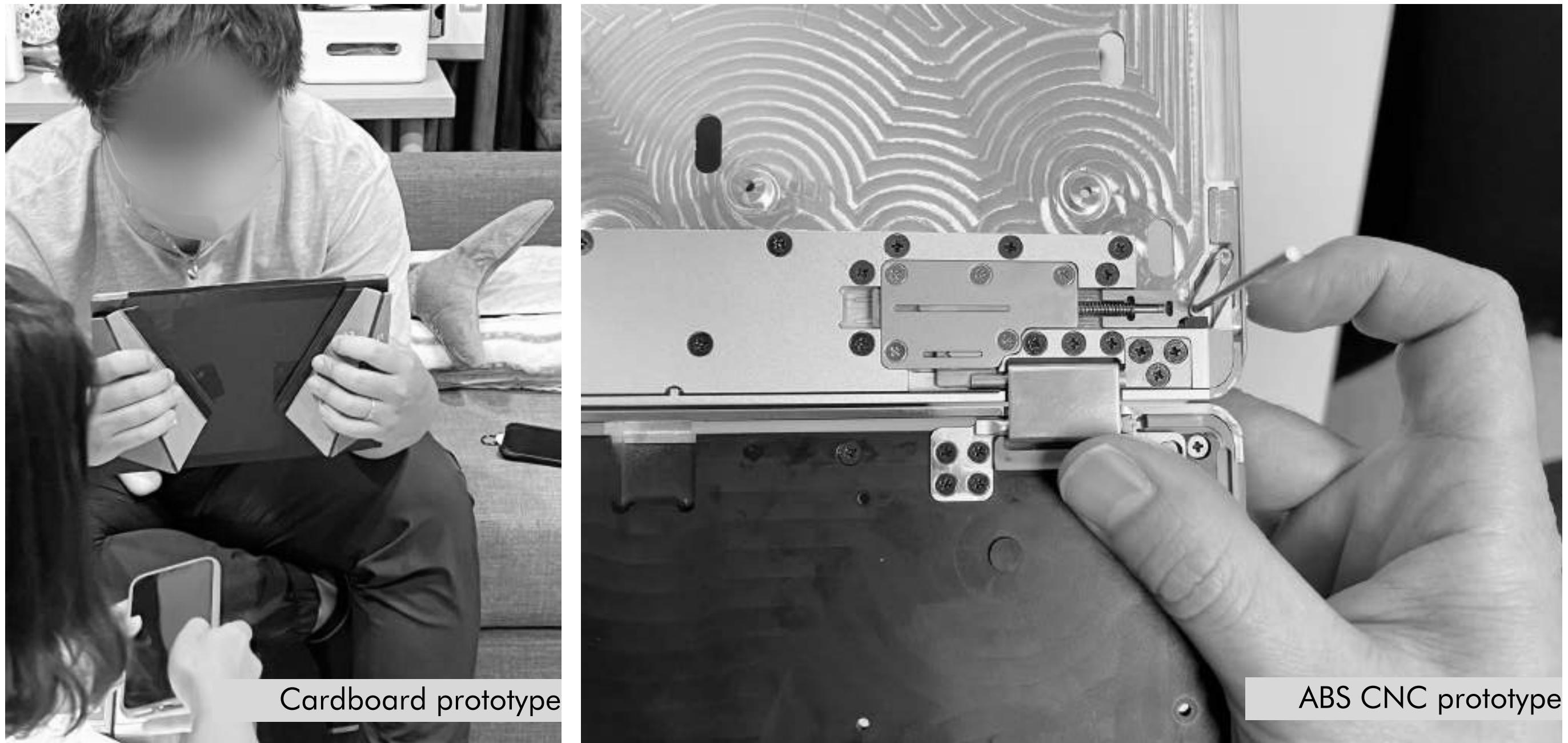
# Behind the Scenes

## Concept ideation and testing

The development process began with quick ideation and low-fidelity prototyping using cardboard models. These early mockups allowed us to explore form, size, and basic ergonomics. We invited users to interact with the prototypes and focused particularly on finding the most comfortable screen angle for adults when worn on the wrist.

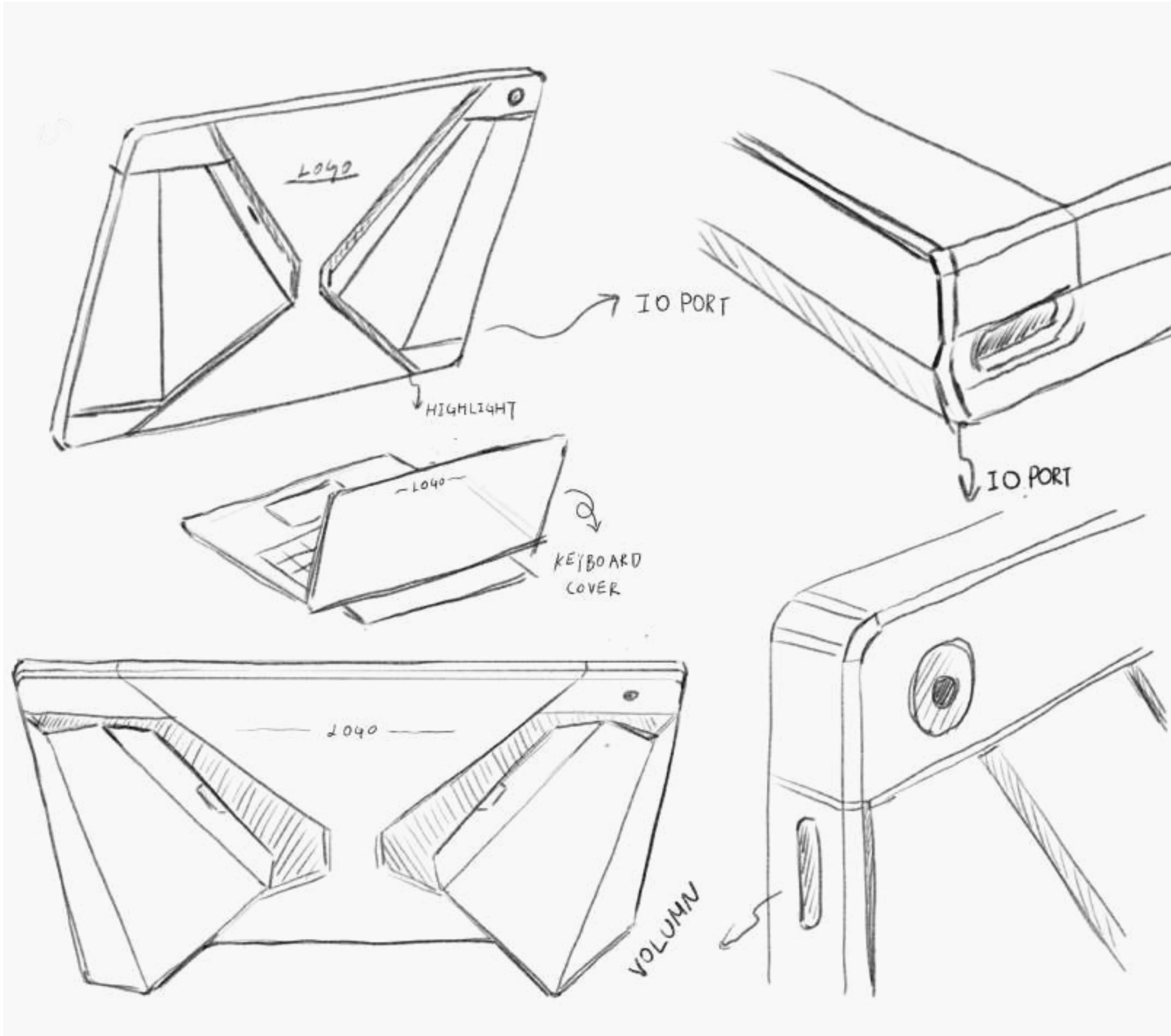
Based on user feedback, we advanced to a CNC-machined mechanical prototype to validate the core structure. At this stage, our priority was minimizing the size of the mechanical system while maintaining functionality. This helped us assess the feasibility of internal components and their spatial arrangement.

In the final stage, we developed a fully functional prototype that behaved like a real device. It allowed users to interact with the interface and experience the product as if it were a working unit, similar to using a compact, wrist-mounted laptop. This hands-on testing helped us refine both the usability and mechanical reliability of the final concept.



## Appearance design ideation

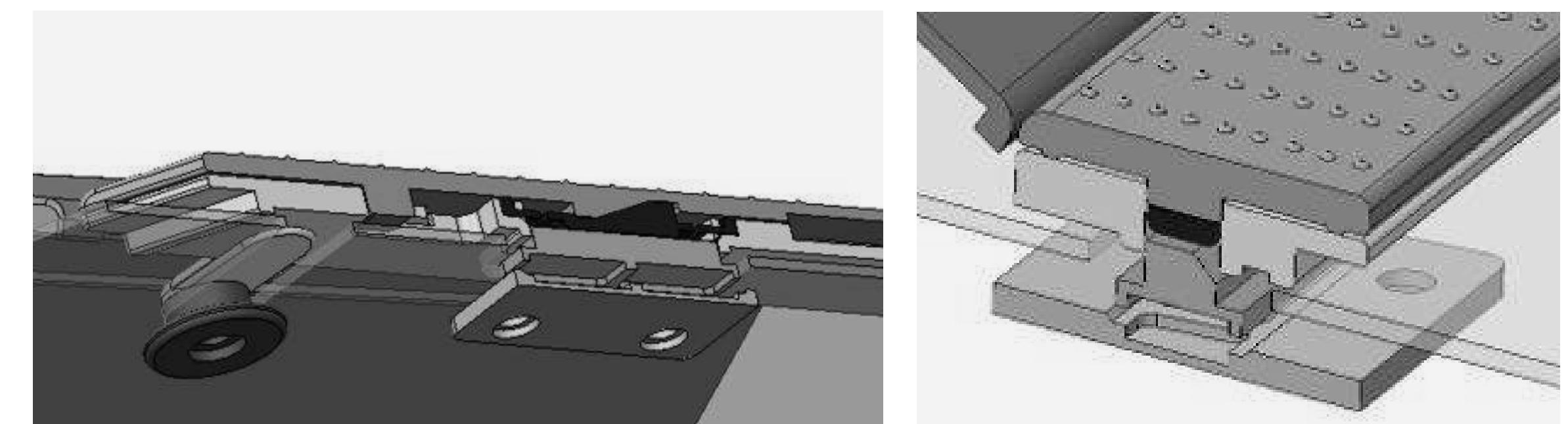
### Sketch



### Inspirations



### Modeling process



## Unselected Design

This unselected proposal aims for a clean and futuristic look, inspired by science fiction, advanced technology, and modern performance products. The use of pure white gives the product a sleek and minimal feel, while matte metallic finishes add a cold, high-tech touch. The goal was to create a visual style that feels modern, smart, and slightly futuristic—something that could easily fit into a sci-fi setting or a cutting-edge tech environment. The overall shape is simple and refined, with sharp lines and gentle surface transitions that give the product a sense of precision. Small texture changes and details are used to highlight areas the user interacts with, while keeping the overall design calm and focused.







# XFloat

IDBM student project: Team collaboration (5 members)

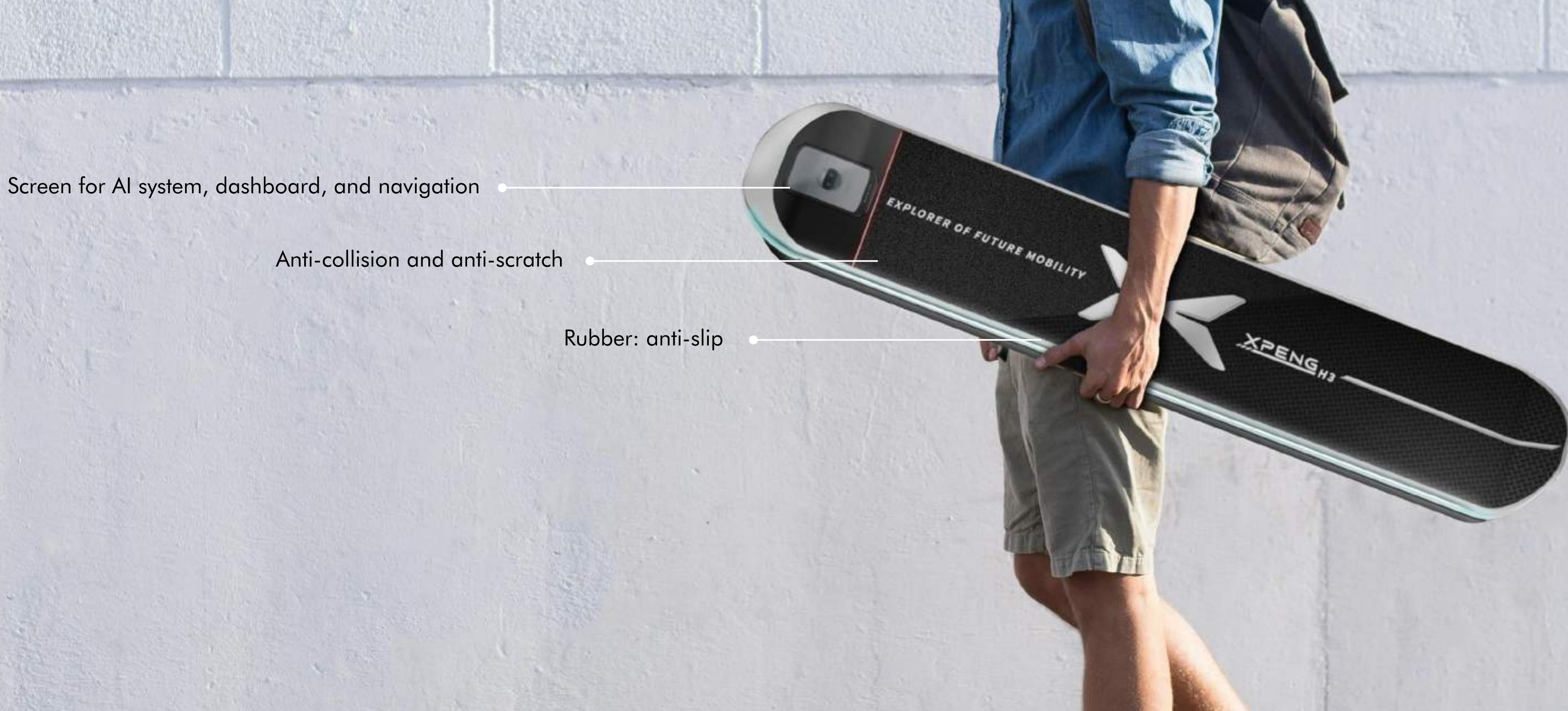
Course: Corporate Entrepreneurship and Design

Year: 2024

Project brief: Design a brand-driven peripheral product for a selected electric car brand.

Personal contribution:

- Market and user research
- Form factor exploration
- Appearance design proposal



## Personal mobility across air, land, and water

XFloat represents a 3-in-1 hoverboard, offering the ability to hover in the air, travel on roads, and float on water. Inspired by the XPeng X2, an electric vertical take-off and landing (eVTOL) flying car, this product embodies XPeng's vision of pushing the boundaries of mobility and redefining the journey beyond the road.

With the introduction of XFloat, XPeng extends its innovation leadership and strengthens its foothold in the personal electric mobility market. It caters to the growing demand for versatile, futuristic transport solutions among next-generation urban explorers who seek freedom, flexibility, and seamless movement across any terrain.

## **How can XPeng take you further—after you step out of the car?**

### **■ The explorer of future mobility**

Open aims to deliver smart EVs with leading technology, enhancing the experience of mobility. The five core values that guide XPeng's strategy are vitality, sustainability, intelligence, exploration, and quality. With these principles, XPeng has expanded its vision beyond traditional four-wheel transportation, aiming to address the evolving needs of modern urban dwellers. XPeng's mission and development strategy mainly revolves around redefining mobility through technology to give their customers the best experience.

### **■ Adventures after driving**

The road may end, but the journey doesn't. Stepping out of the car isn't the finish line—it's the gateway to hidden corners, spontaneous detours, and unexplored paths. As boundaries blur between destinations and discoveries, XPeng has the chance to turn every step beyond the drive into a new kind of adventure.



Source: XPeng.com

## Extend the experience beyond the car

What experience do XPeng's target audience expect from XPeng and want to extend to their daily life?

1. Adventure lifestyle: XPeng appeals to a younger, urban demographic that seeks freedom, mobility, and exploration. The brand's sleek design and long-range electric performance evoke a sense of spontaneous travel and weekend escapes. Users expect this spirit of independence and discovery to extend beyond driving into products and services that support an active and adventurous lifestyle.
2. Advance technology and AI features: XPeng is known for its cutting-edge smart features, including autonomous driving, voice assistance, and intelligent cockpit systems. The target audience values seamless and intelligent interactions and expects that level of smart integration in their daily environments, whether at home, at work, or on the move.



## XFloat, the 3 in 1 hoverboard

XFloat is a 3-in-1 personal mobility device designed to adapt seamlessly to different environments: road, air, and water. It offers users an intuitive and versatile riding experience by combining XPeng's intelligent technology with advanced mobility engineering. Each mode is supported by a set of retractable and foldable components that automatically adjust to the environment. The structure is designed for seamless transformation, allowing parts to expand or collapse as needed to support balance, propulsion, and control.

In Air Mode, the lower structure retracts while levitation elements activate to create a low-hovering effect. This mode introduces a futuristic and lightweight mobility experience that encourages exploration in open or paved areas.





In On Road Mode, XFloat functions as a smart scooter equipped with XPeng's Xmart OS. The handlebar and wheels extend to enable smooth urban travel, while the onboard interface provides real-time navigation, connectivity, and user customization.

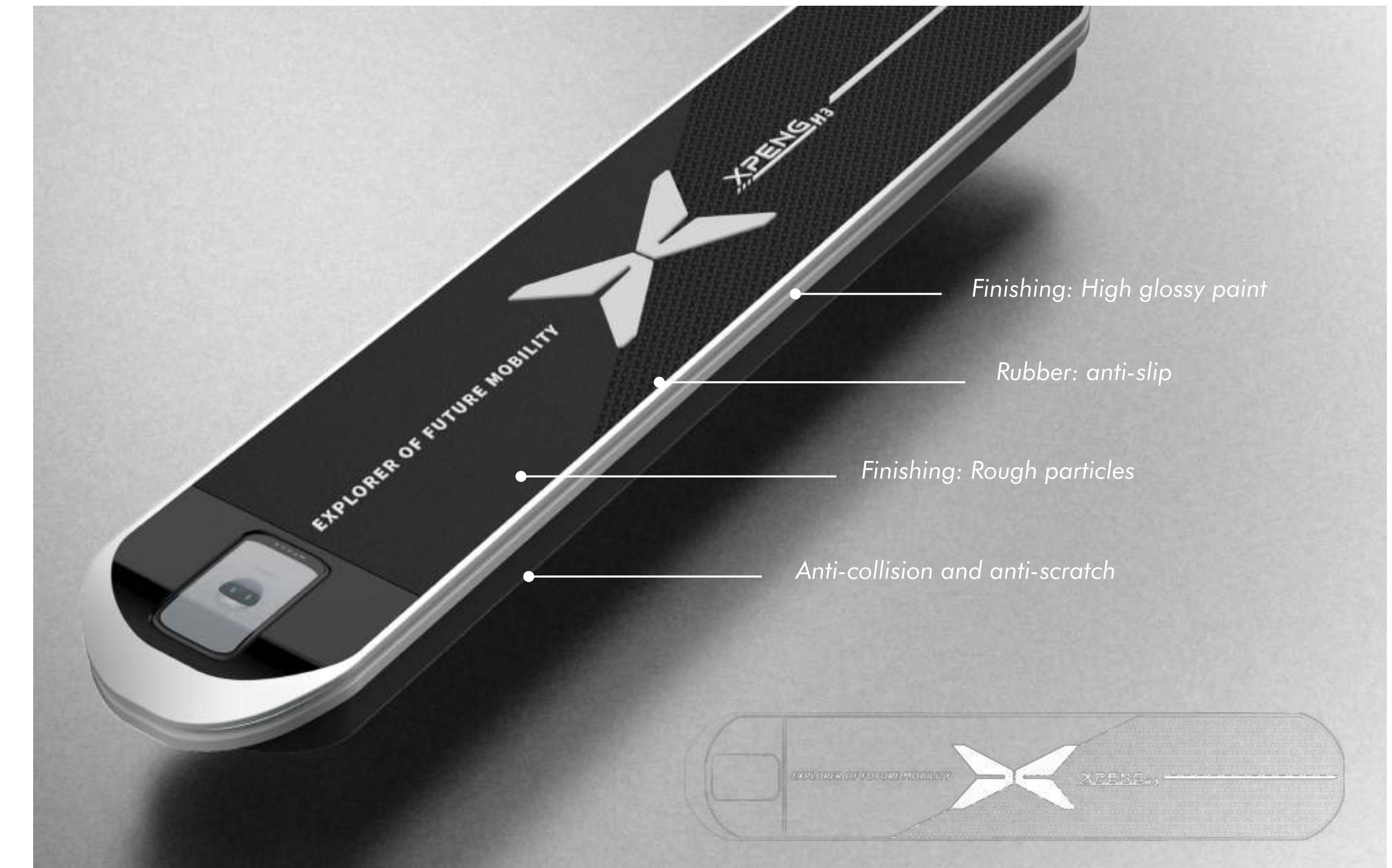
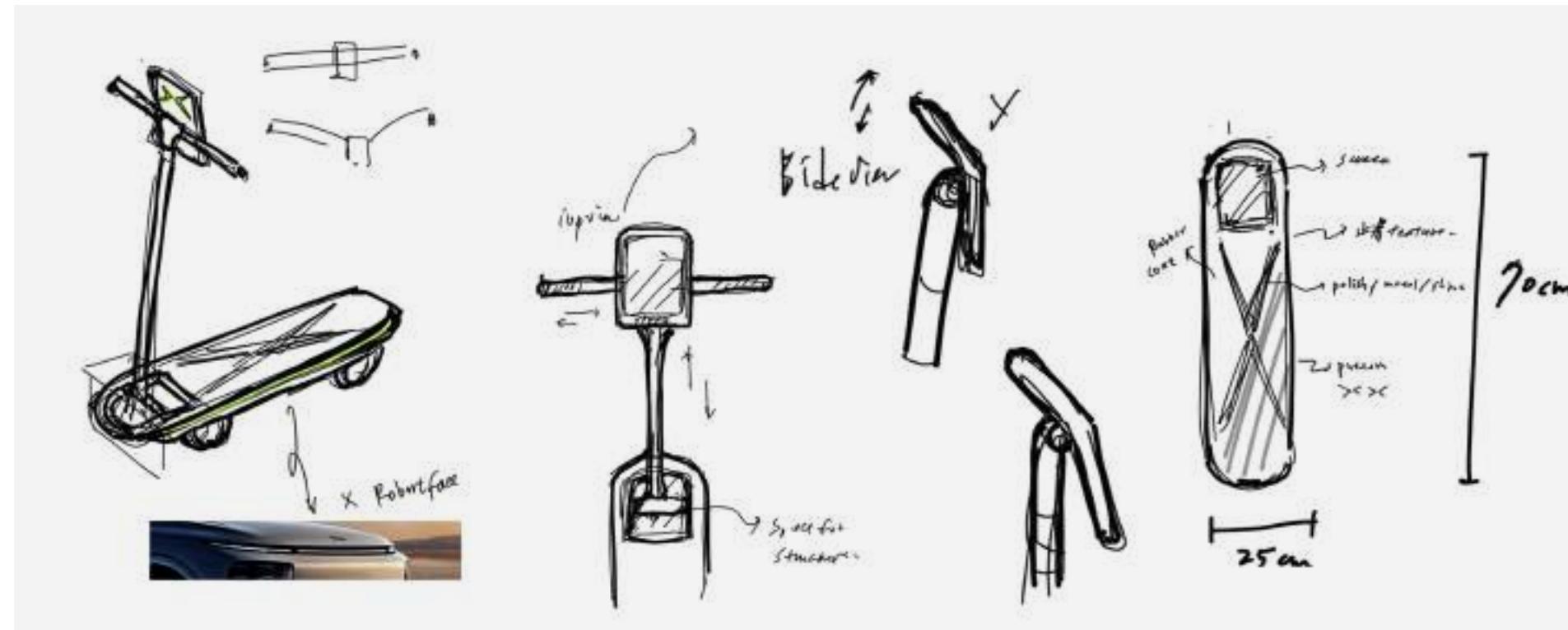
In Water Mode, hydrodynamic elements unfold to stabilize the board, allowing it to glide smoothly across the water. XPeng's advanced control algorithms ensure a safe and balanced ride.

XFloat extends the XPeng mobility experience beyond the vehicle, offering personal freedom and seamless movement across various terrains in a single transformative product.



## Integrating the iconic X Robot aesthetic

The XPeng XFloat follows the design philosophy from XPeng family with streamlined form, a sense of sci-fi, and the classical robot face. The front edge of the hoverboard drops slightly, while the rear wing extends upward. It not only reduces the wind resistance, but also defines the front and rear side so that drivers can easily distinguish. In terms of the lighting system, the hoverboard is surrounded by led light. Through the built-in AI system, divers are allowed to customize with their preference. When the battery is running out, the light will turn red to warn drivers to land as soon as possible. Moreover, there is a break light on the lower edge of the tail wing for reminding.



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Hi!

*Thanks for taking a look at my work! If you need a designer who balances aesthetics, functionality, and manufacturability in every project, I'd welcome the chance to discuss how I can help your team achieve its goals.*

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