

# 2025 Portfolio Merijn Verhaak



## Overview



Hey! My name is Merijn Verhaak. I am a Dutch student Industrial Design. I want to design experiences that bring the little things in life to every person.

*I'm odds and ends, but I'll be stumbling away  
Slowly learning life is okay*

– Take on Me, a-ha

### ATTITUDE

- Eager to learn
- Creative through playfulness
- Collaborative
- Vocal in teams
- Proactive

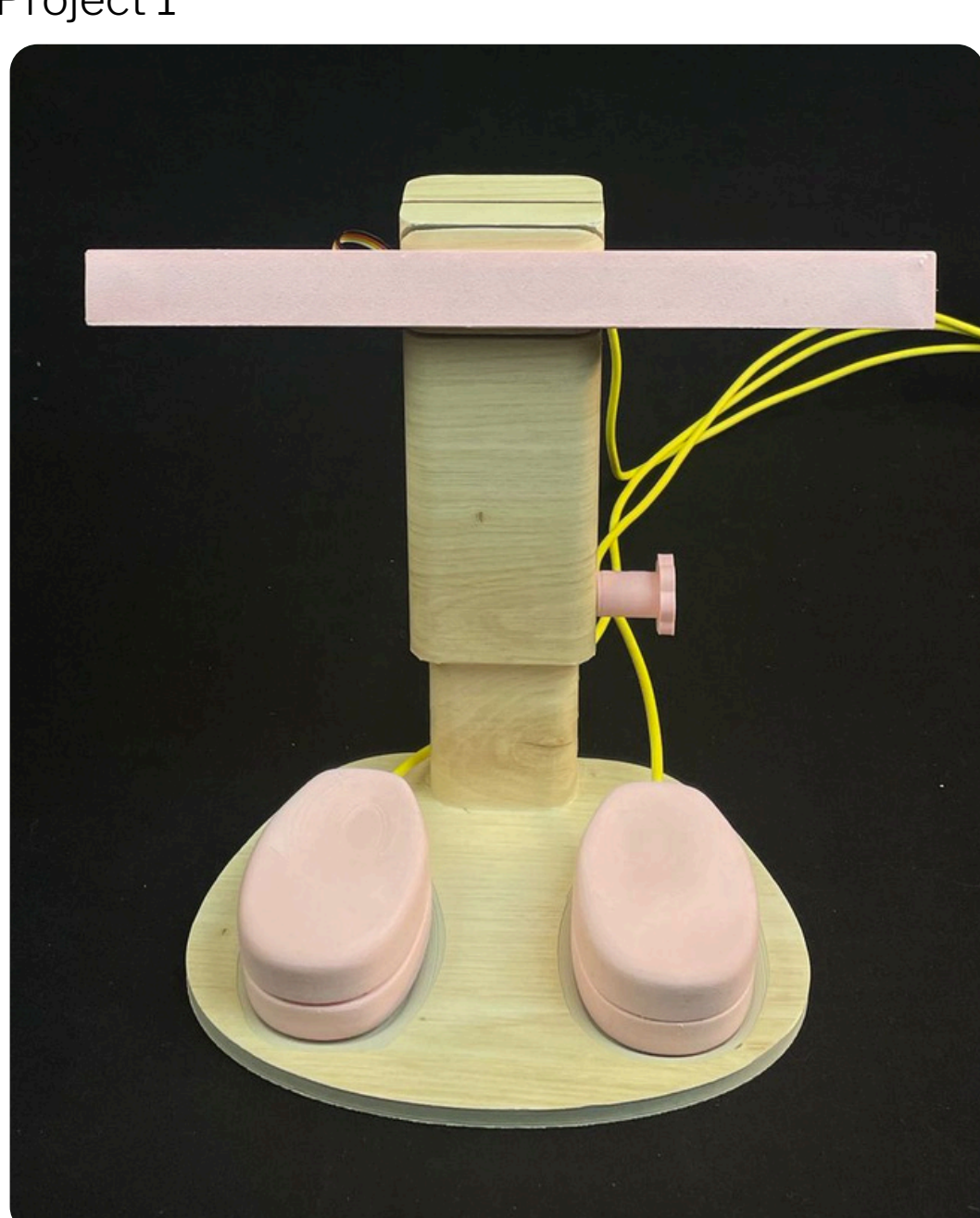
### SKILLS

- Arduino Prototyping
- Java (script) prototyping
- 3D Modelling
- Concepting

### EXPERIENCE

- VWO NT/NG with 10 subjects: Art History, Music, History & Economy as electives
- Student TU/e ID 2023 - Ongoing
- Participant MOBIFREE Futurelab Waag

## Project 1



# Gondry.

CBL P3 Sep 2024- Jan 2025

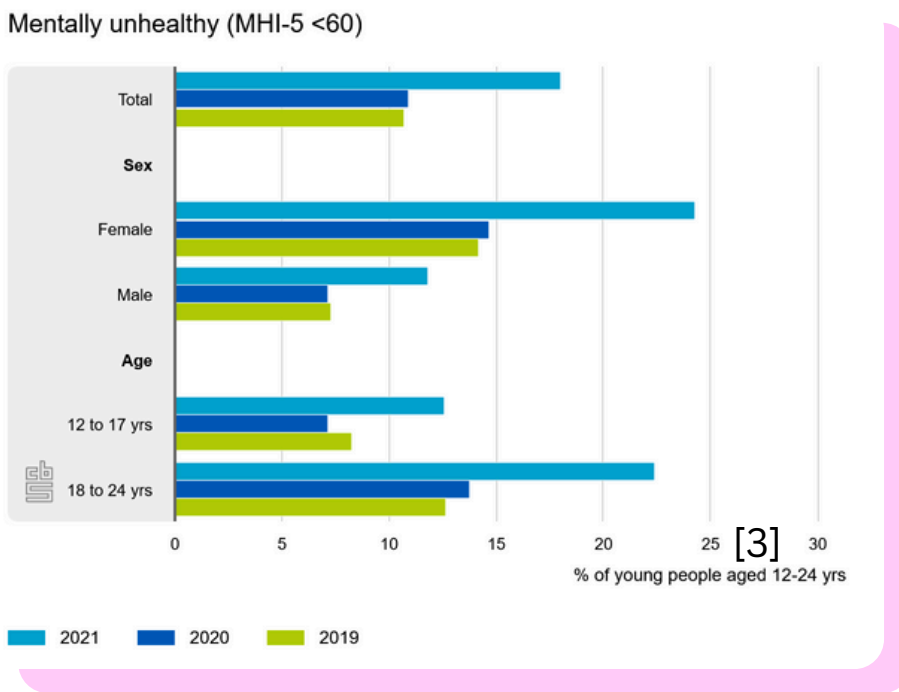
A self-reflection device through conversations with AI and inspiration from the EMDR methodology

*Good news is all they want to hear  
They don't like it when I'm down*

– Good News, Mac Miller

projects.id.tue.nl/id/6vl1g2

## Project 1



- [1] <https://doi.org/10.1177/2167702617723376>,
- [2] <https://www.prweb.com/releases/new-study-reveals-lack-of-access-as-root-cause-for-mental-health-crisis-in-america-883070840.html>,
- [3] <https://www.cbs.nl/en-gb/news/2022/22/mental-health-has-worsened-among-young-people>

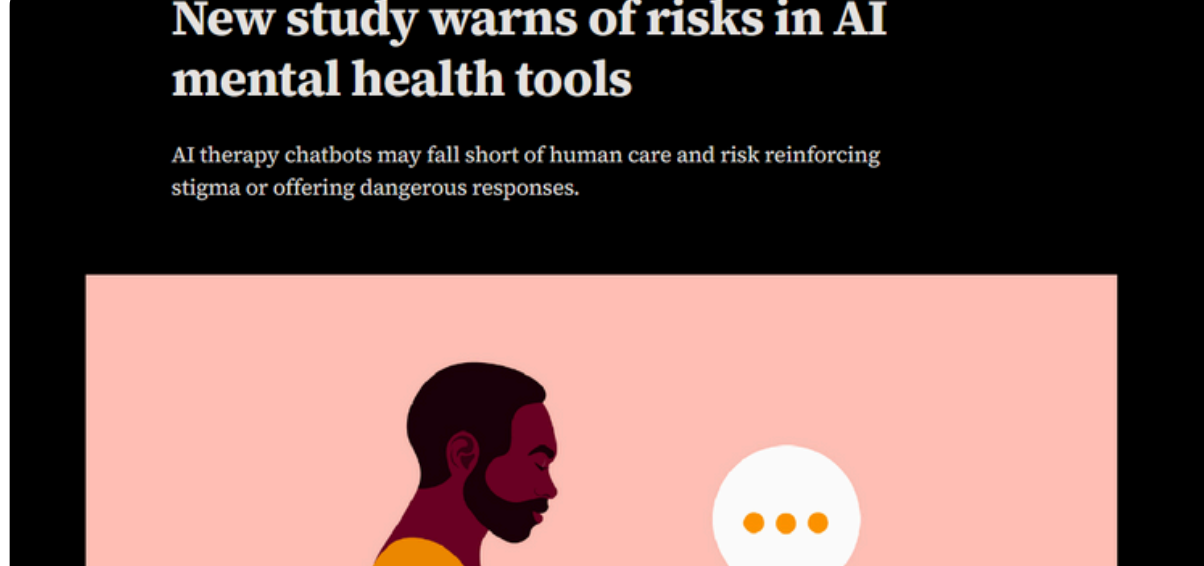
## The Problem

Modern life presents young adults with many challenges, from academic pressures to social expectations and personal responsibilities. This relentless pace of life often leaves them grappling with stress and diminished mental clarity.

More so than before, young adults, namely Gen Z and millennials are facing increasing isolation and loneliness, as well as reduced accessibility to mental healthcare. [1]

Particularly in the case of accessibility to healthcare, causes include financial difficulty, social stigma, and long waiting lists. [2]

## Project 1



A recent article from Stanford, linking to a recent paper about the AI mental health tools using models like ChatGPT-4o or character.ai for the personality. These LLM's have the same stigma towards those with mental health problems, give inappropriate answers towards the user because of their nature to agree with what the user says. This doesn't follow the protocol that professionals use.

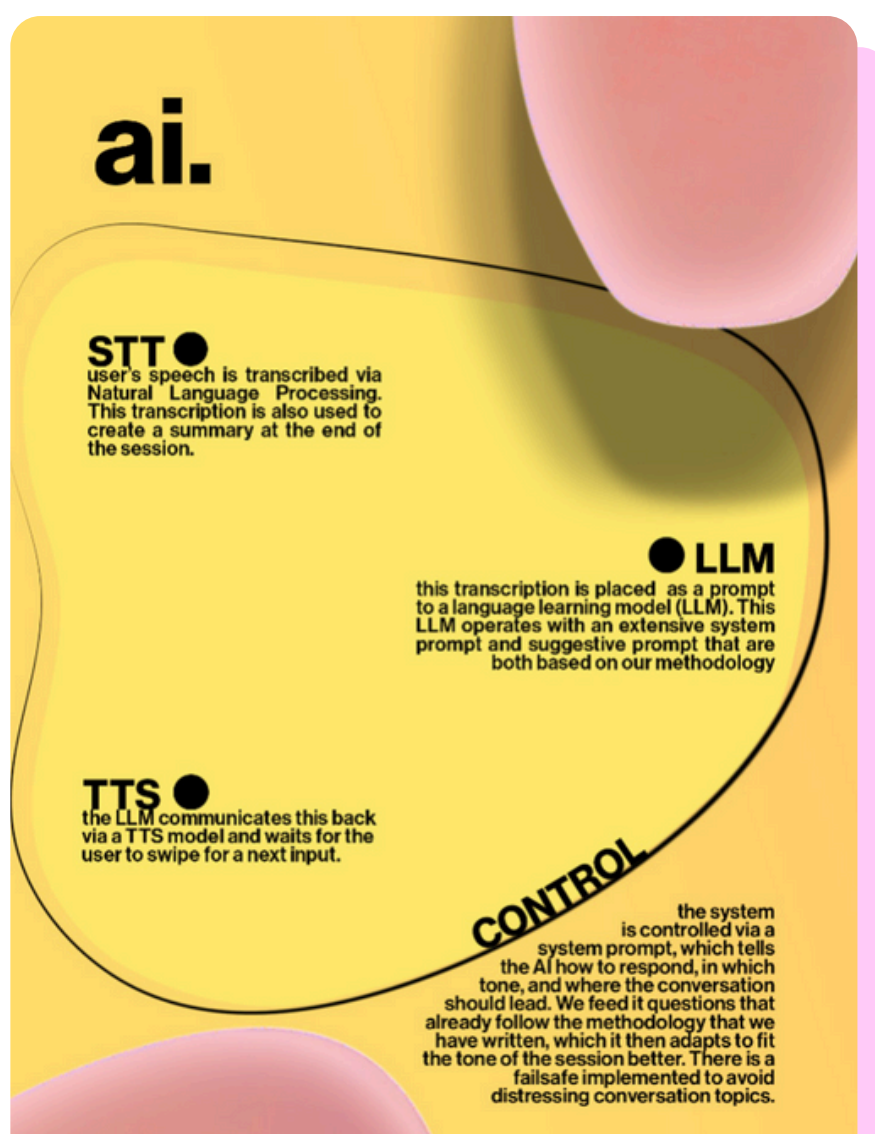
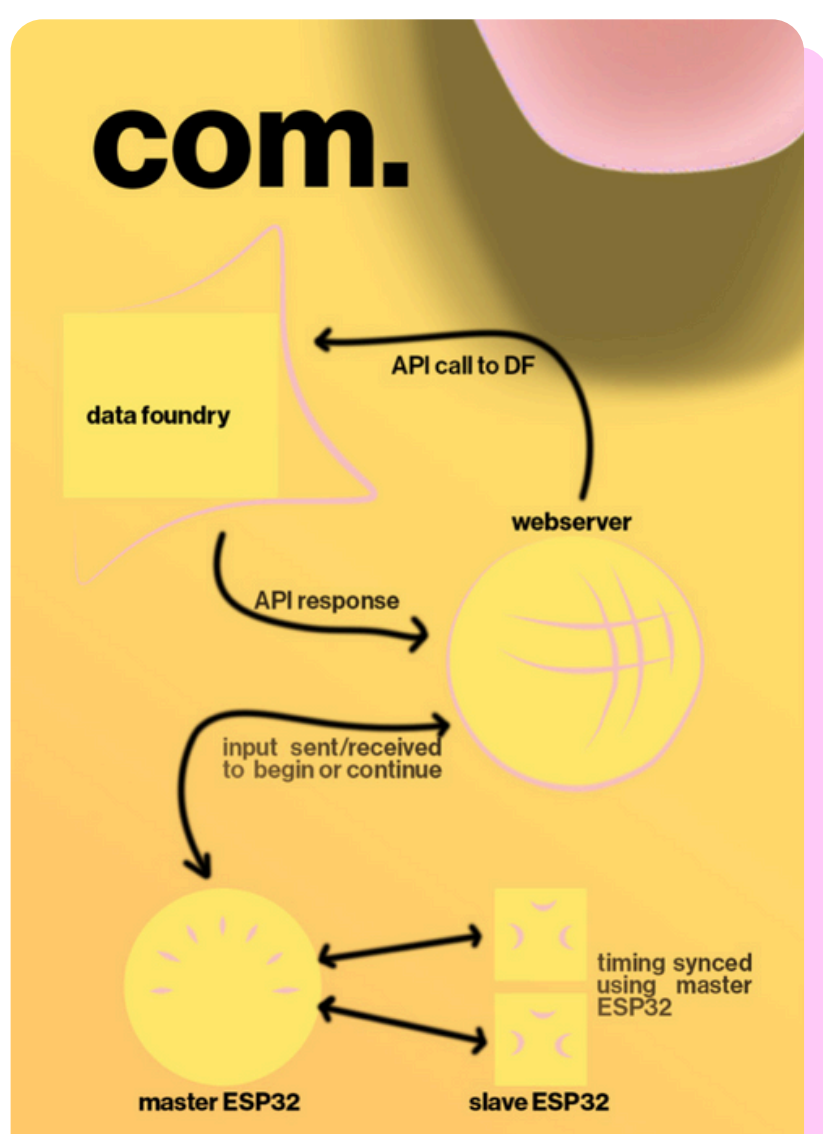
- [4] [news.stanford.edu/stories/2025/06/ai-mental-health-care-tools-dangers-risks](https://news.stanford.edu/stories/2025/06/ai-mental-health-care-tools-dangers-risks)
- [5] [arxiv.org/pdf/2504.18412](https://arxiv.org/pdf/2504.18412)

To tackle this problem, we opted to focus on the accessibility problem.

By making a device that incentivizes self reflection, people can vent out their thoughts from the comfort of their rooms. This circumvents the social stigma by making it private, and reduce the long waiting lists through preventative measures.

Conversational Agents in therapy is an area that is already being explored. However, there are key concerns: Privacy and Data Security, the power dynamic between AI and the user, and safety. We opted to focus on young adults and designing around the user being in control at all times. Since as just mentioned they have more diagnosed mental health problems. And this user group are already using LLM's as therapist, companies that don't hold to ethical standard and practices.

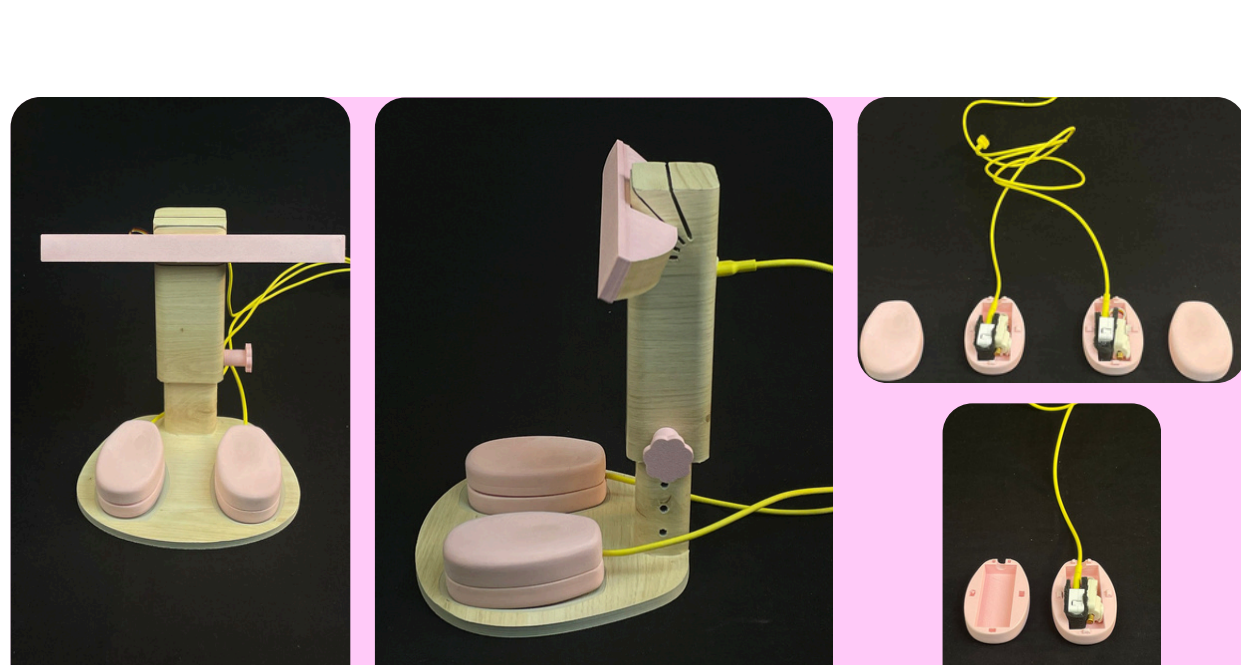
## Project 1



My role in realizing the concept was designing and coding the back-end of the prototype, which consisted of chaining AI models to each other and sending messages wirelessly to the device.

The AI models we used were local models meaning that they could be ran with absolute privacy. The models are hosted on the TU/e servers.

## Project 1



For the final design we wanted to create something that can stand on your desk and not feel out of place when not in use. The design is inspired by the Art Deco movement, and playful Scandinavian design for its use of wood and pastel colors.

The interactions were designed around relaxing movements of gestures, to swipe to move on to the next prompt or phase of the EMDR process, or repeat the question/ rephrase. This allows the user to stay in control of the conversation. EMDR uses Bilateral Stimulation where the stimulus moves from left to right and back.

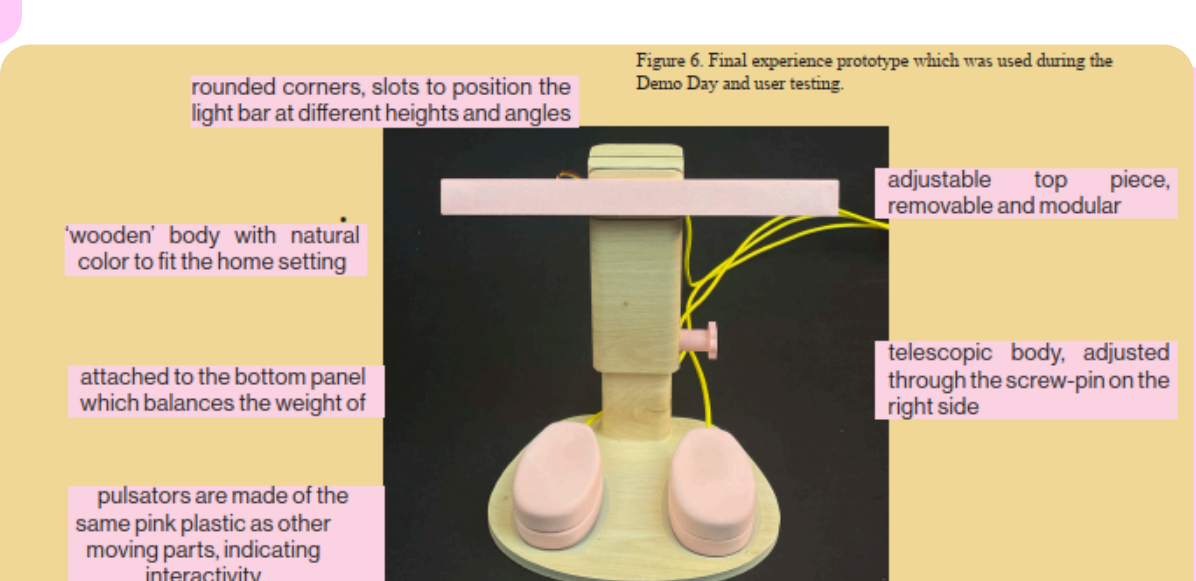


Figure out of the report detailing the design

## Project 1

We had a 13 person user test, to validate our concept. We tested it using two quantitative metrics used in the EMDR process (SUD & VOC), and a questionnaire afterwards.

**Research Insights**

Expert: AI is valuable but needs oversight and guardrails

The core concept worked, we saw a drop in distress (SUD) and an increase in positive self belief (VOC)

The shape of the pulsator was confusing, the affordance wasn't clear enough

The flick gesture was unreliable & didn't work properly

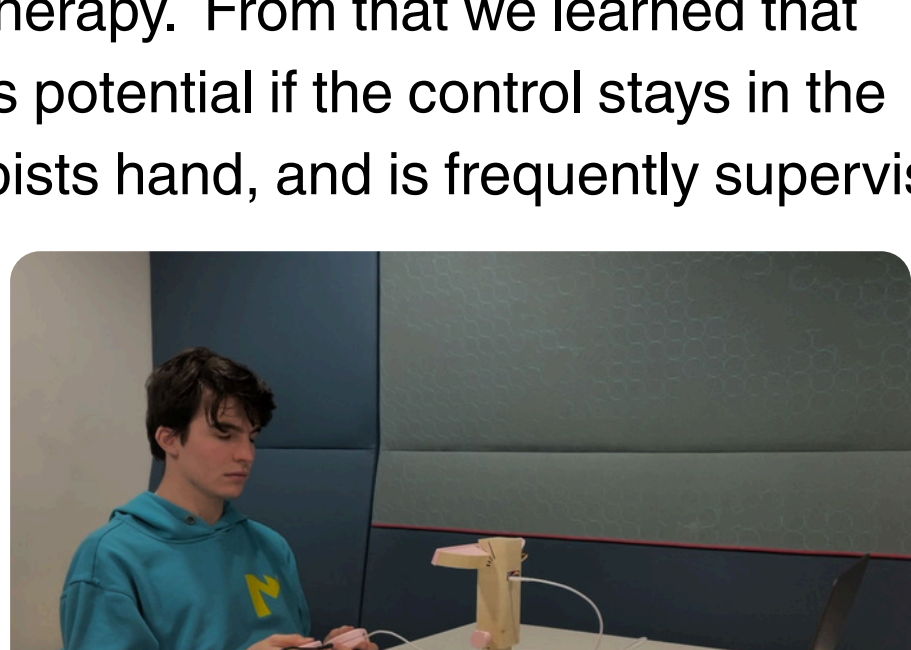
**Future Steps**

In every iteration make use of best ethical practices

Focus on improving the user experience, since there is a proof of concept

Redesign pulsator, use machine learning for detection and add buttons to be ergonomic and better affordances

Across the project we conducted an expert interview from a therapist expert specialized in EMDR about the potential and dangers of AI in therapy. From that we learned that there's potential if the control stays in the therapists hand, and is frequently supervised.



Me testing out the user test

## Project 1

By doing this project I learned how to integrate more complicated API calls by chaining AI models together. The calls were done through a webpage, so I learned HTML and JavaScript in the process.

The project can be improved by making the physical design more ergonomic and adding physical input as a second option to gesture controls. Gesture controls can sometimes be inconsistent, as noted in the user test feedback. In a perfect world, this device would host the model by itself. In theory, the entire process could be done offline, guaranteeing data safety. To improve the device, I would try to design more closely with therapists and market it towards that purpose. We didn't do it for this project because the ethics forms and process would hold us up.

This would mean integrating more CAD-related skills, which I didn't get to do in the project. I remain passionate about the potential of machine learning, while recognizing that it is dangerous if misused. Since the field in ID is so new, there is a lot of space to explore.

# SpaceScape

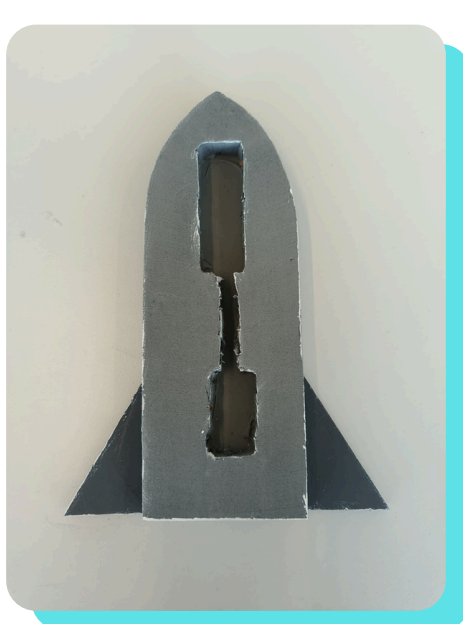
DCE 2/2025 - 4/2025



An space themed escape room experience using ESP32's and processing. Creating a wireless interconnected network.

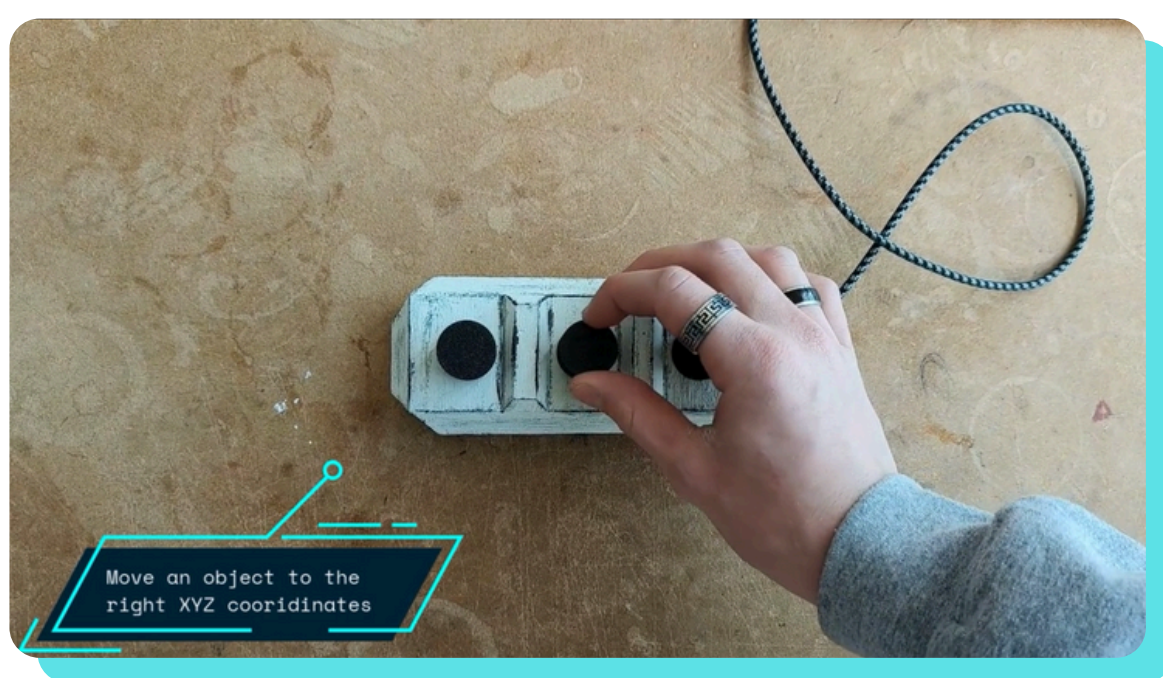
*This ship is taking me far away  
Far away from the memories*  
- Starlight, Muse

[projects.id.tue.nl/id/g5lepa](https://projects.id.tue.nl/id/g5lepa)



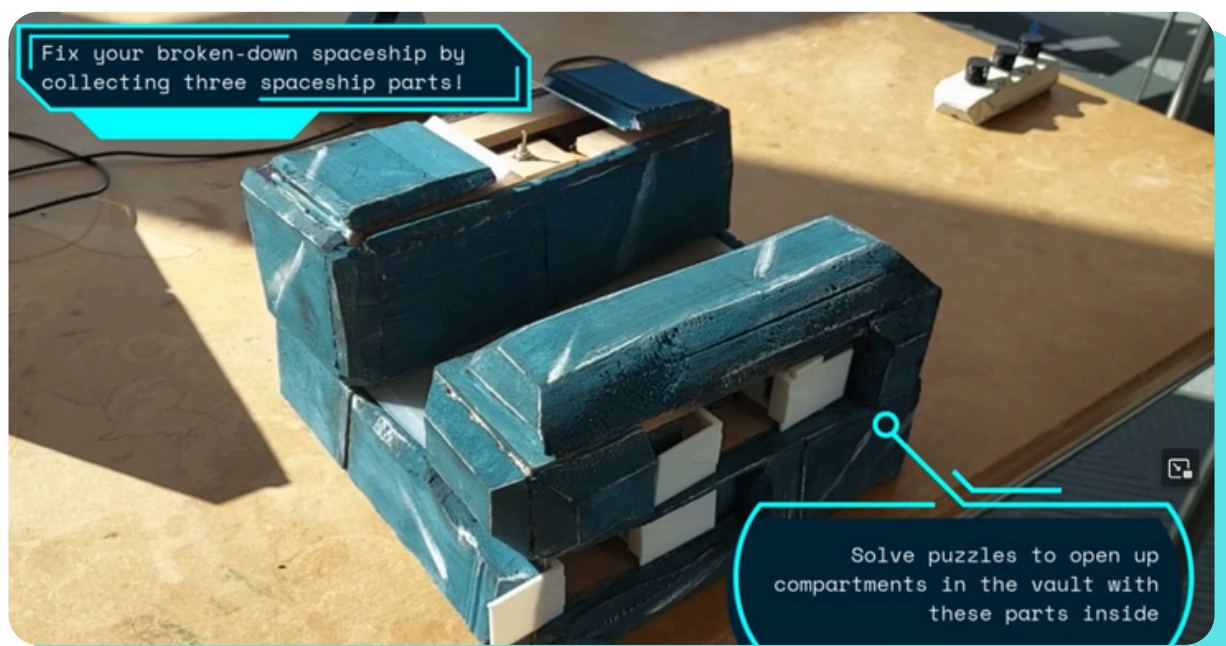
For every puzzle solved you get a part to repair the escape rocket. The puzzles can be completed in any order. The rocket is easy to assemble, and once launched starts increasingly vibrating from a vibration motor.

The first puzzle consists of two components: a monitor, and a cube. The monitor displays a color sequence, you are required to repeat that on the cube.



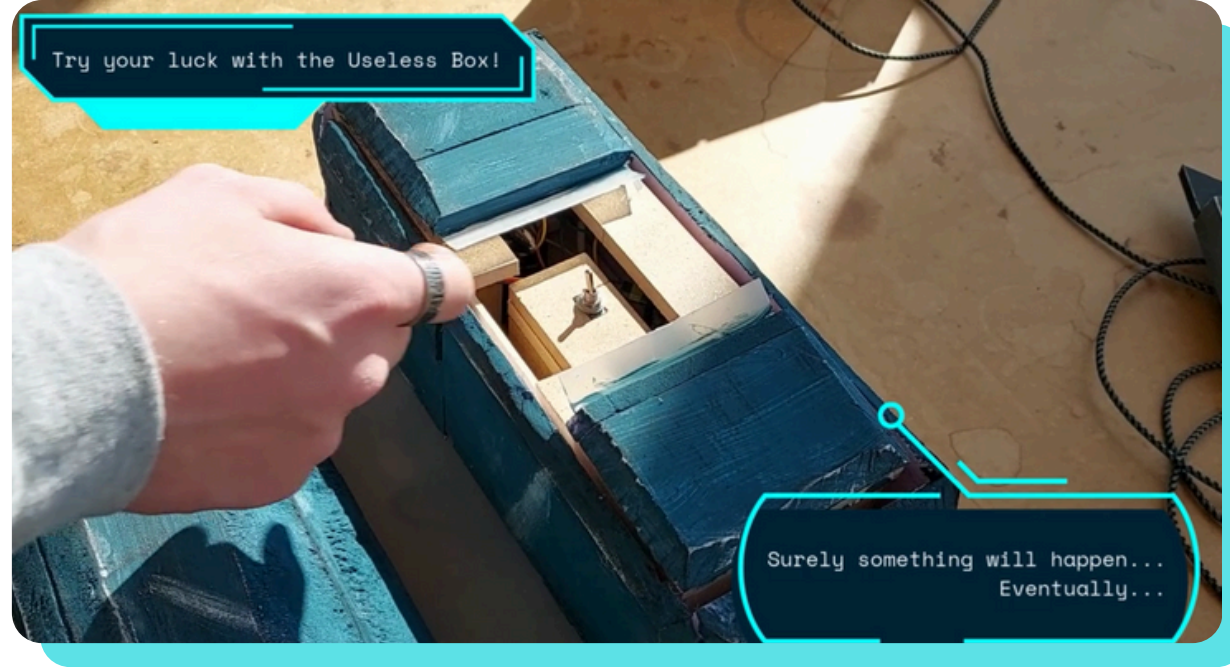
The second puzzle involves another screen, and three rotary encoders. This time the goal is to find the spot in a 3 dimensional space, the rotary encoder represents the xyz axis.

The third puzzle is a digital radio where there are 2 rotary encoders that change the frequency and amplitude. Getting them to the correct spot completes the puzzle

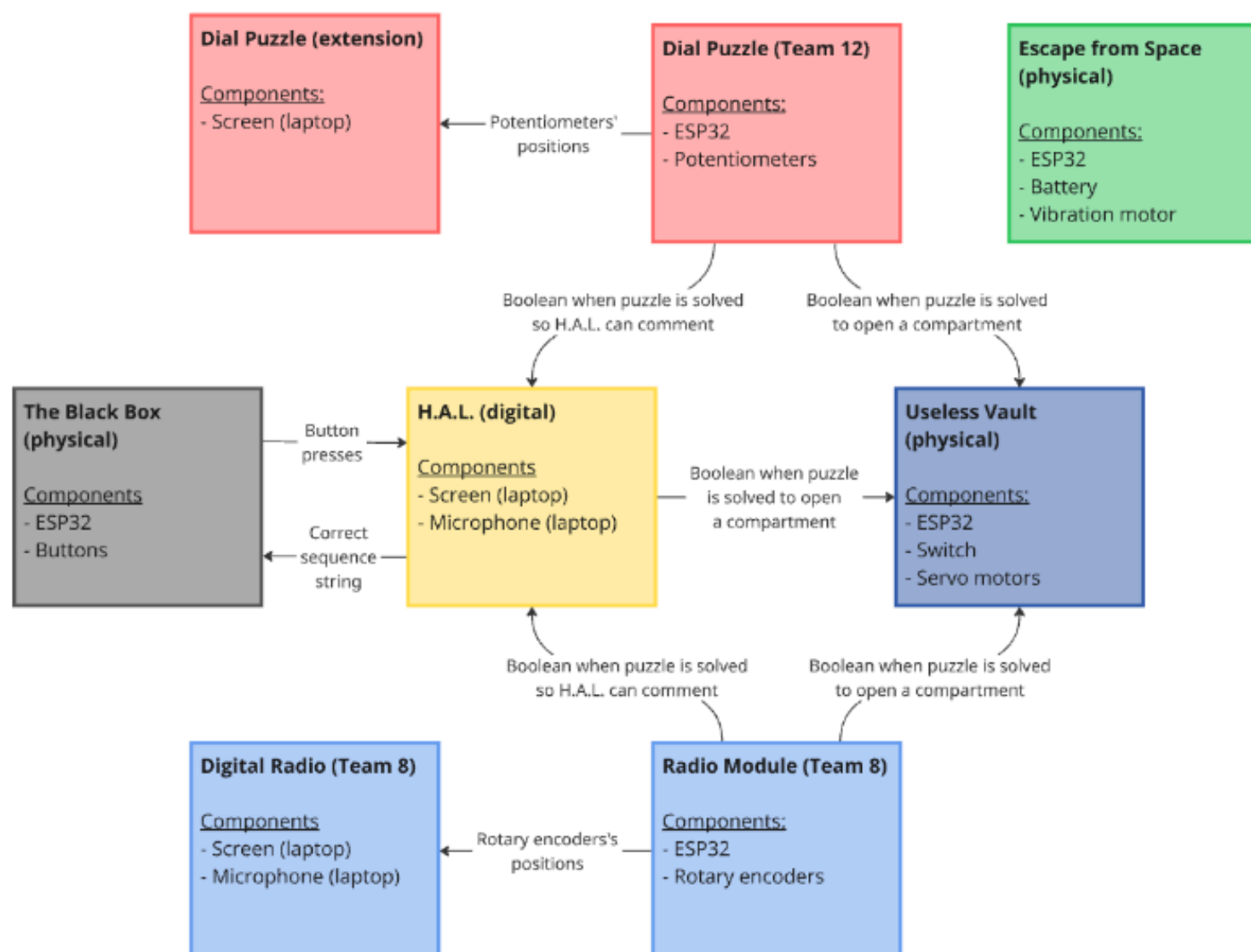


To store the parts, a "useless" vault was created. Once a puzzle is solved a door opens to reveal the part.

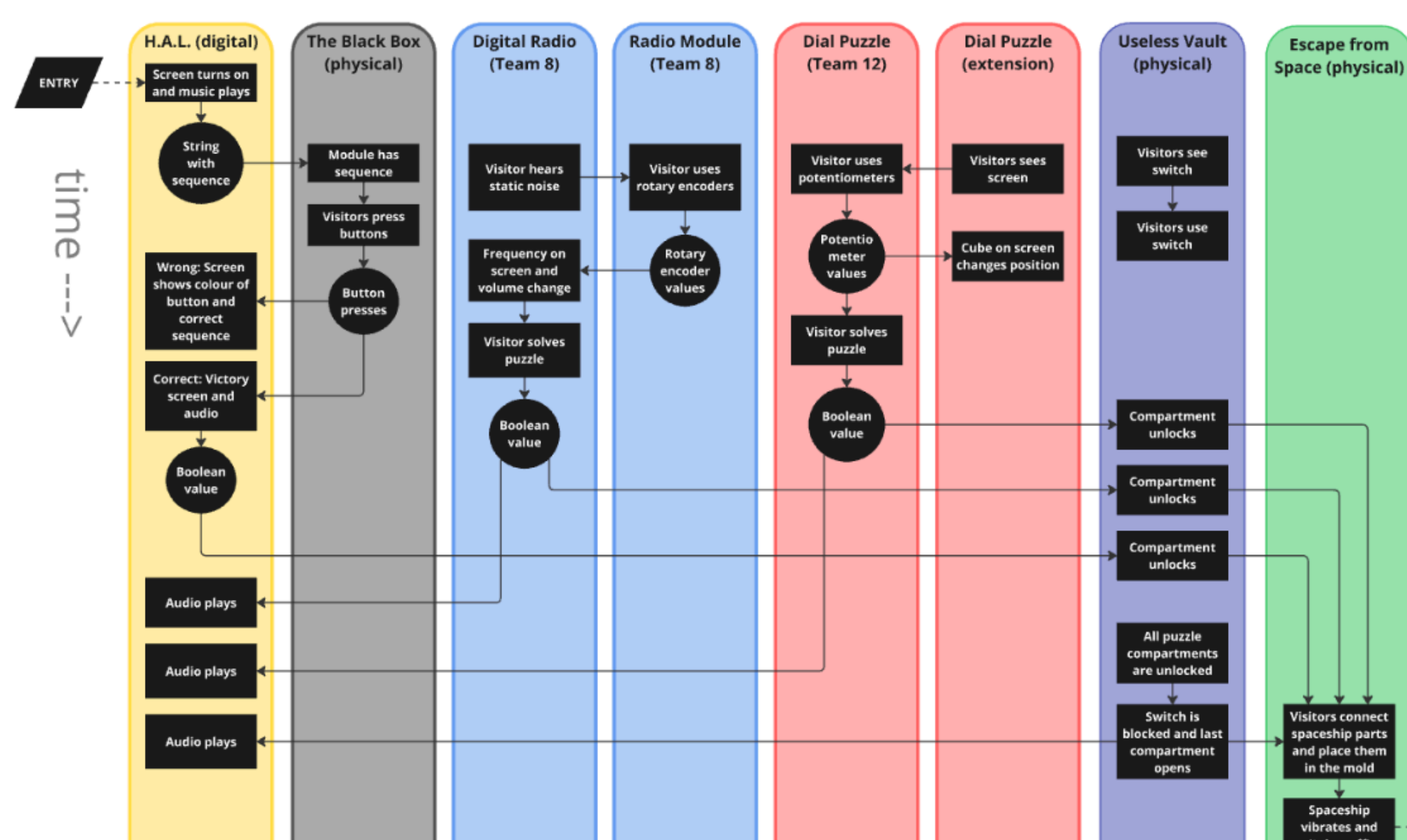
We recreated the "useless box" that once every puzzle is completed acts as an ignition switch for the rocket to launch.



## System Diagrams



## System Diagrams



This project was fun and eventful to work on, I got to improve my wireless communication programming, while this time with java included. Honestly I would have loved to have worked on this for longer integrating more kinds of devices, and potentially integrating bluetooth protocols. I put the most amount of time into making everything communicating together, and less of the physical fidelity, which is a point of improvement.

The design aesthetic was DIY, which is why the quality of the product is lower. For an iteration I would improve this, by utilizing laser cutting & 3D printing more.

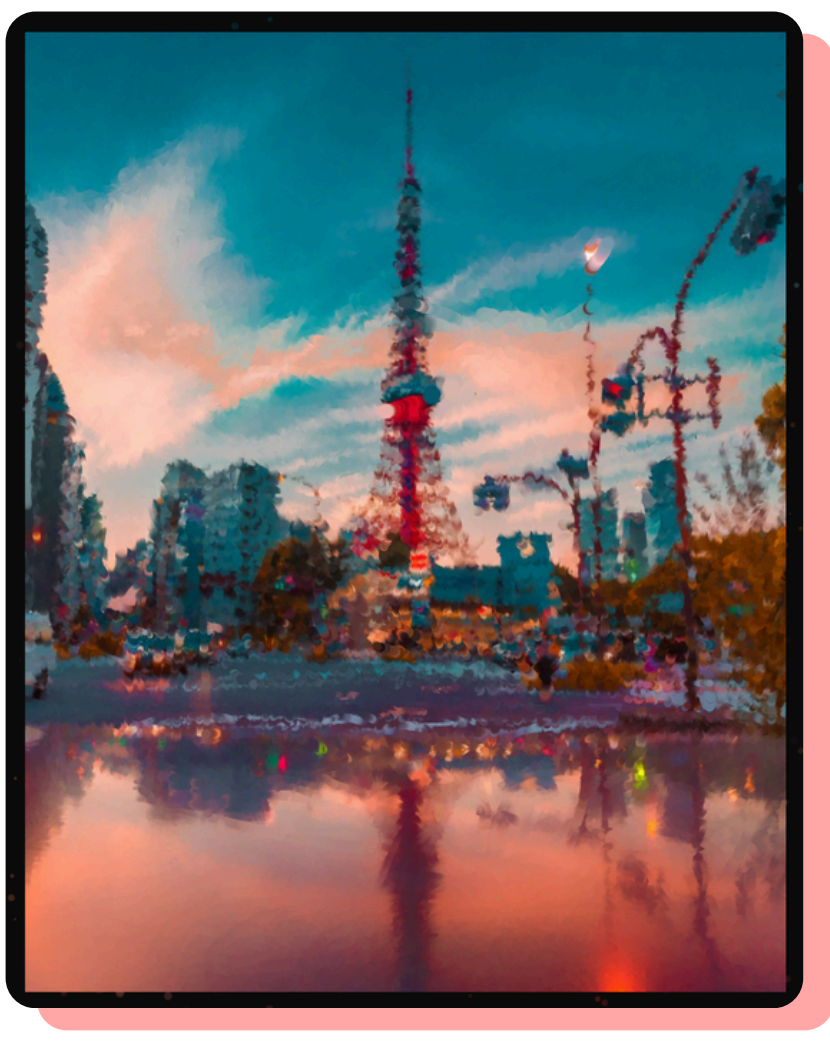
# Various Work

2023 - 2025

Some more work that isn't as clear of a process, but shows off different skills or projects that I am proud off

So much more I want to learn about more... got only room for growth I've got nothing but room for growth

- のびしろ (Nobishiro), Creepy Nuts



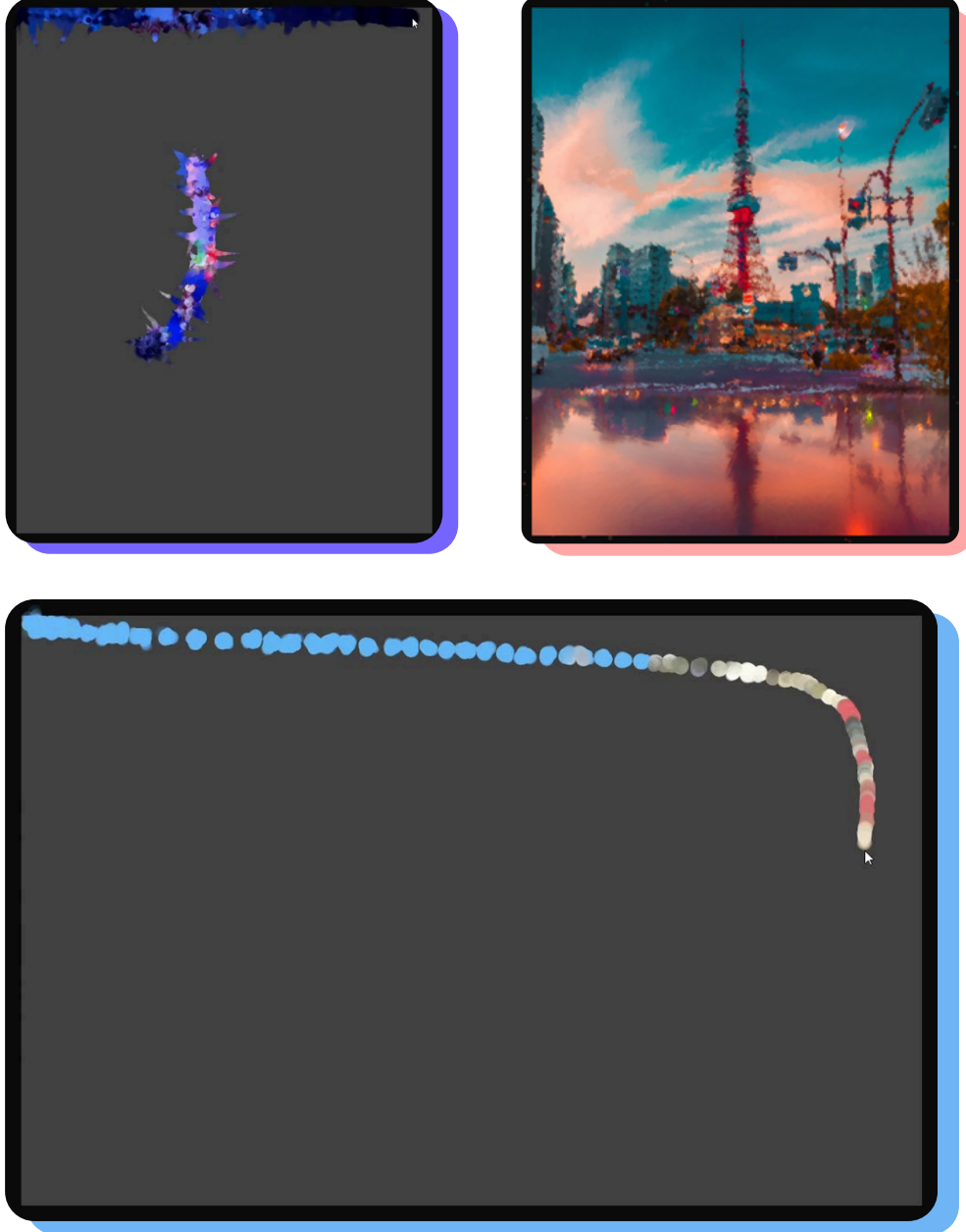
# Creative Programming

2/2024 - 4/2024

Design brief: Use object oriented programming with java to create an interactive artwork.

Impressioguessr was the result, I used the unsplash API to gather images from cities all across the world. An algorithm would fracture the image in balls, creating an impressionism esque aesthetic.

I have considered to improve this project by turning it into a wordle / connections / tradle type website for daily puzzle games. But so far haven't had the time.

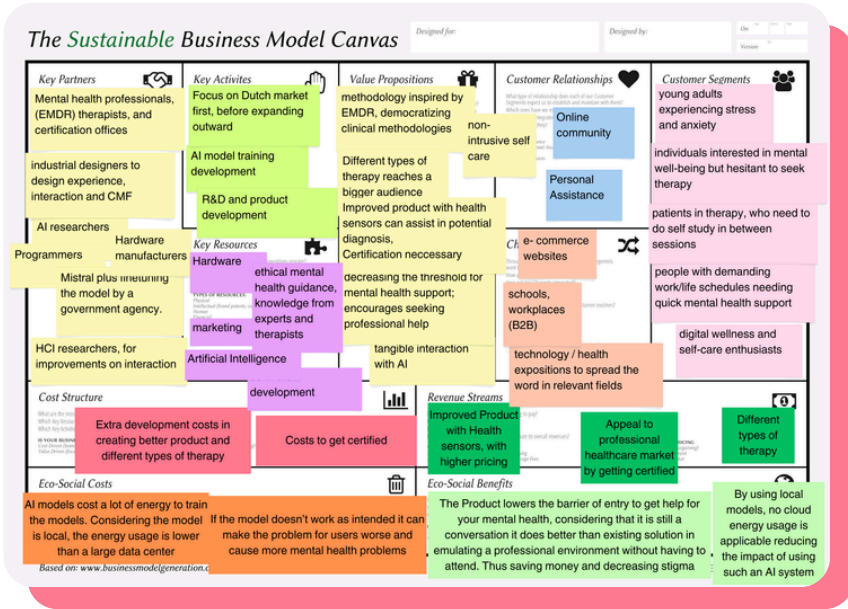
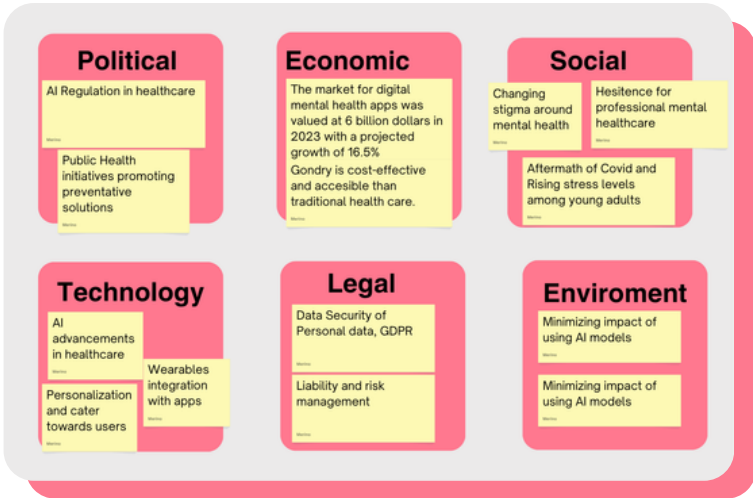


# Business Innovation Methods

2/2025 - 4/2025

Business Innovation Methods taught me the basics of business and strategic insights. Using various business models, like SWOT and PESTLE frameworks for analyzing, future cones for strategic planning, and Service Blueprints to sketch out a better solution by creating a MVP.

I enjoy working on topics like this, because of the challenging situation and all the things that need to be considered



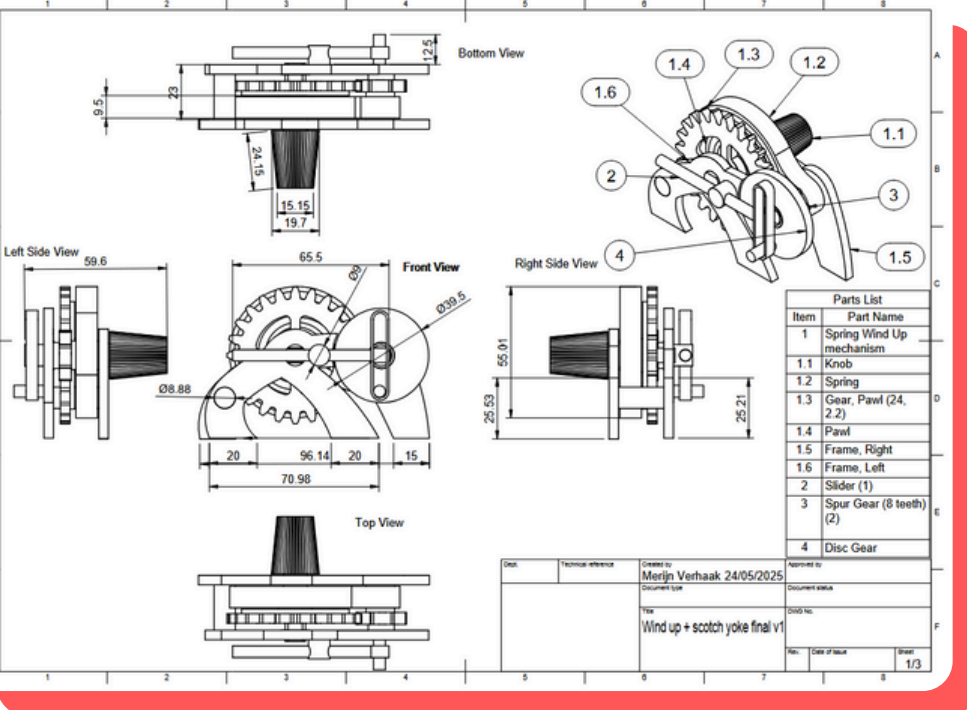
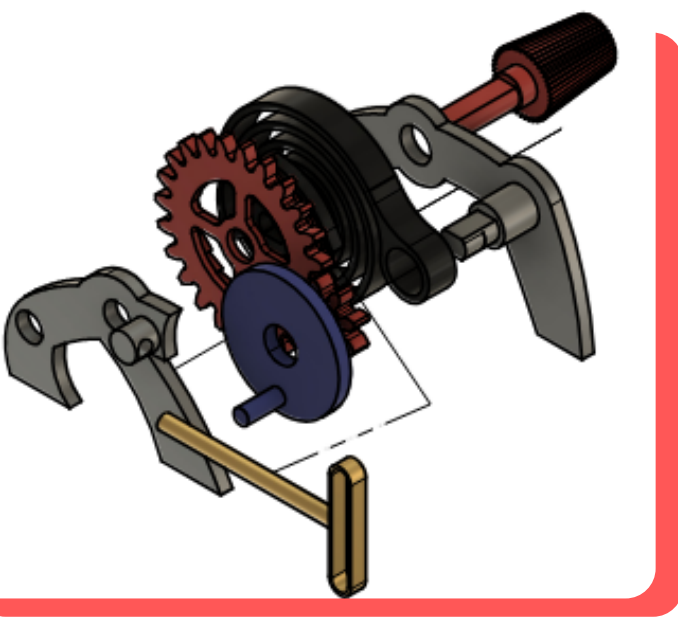
Examples of models used

# Mechanical Sculpture

4/2025 - 5/2025

The main goal was to learn parametric modelling and designing a mechanism with two force translations. I created a wind up mechanism that translates into a scotch and yoke mechanism. The slider is made from brass, the rest is 3d printed. The power release is my main point of improvement for this design.

My ability to model increased a lot through this assignment by challenging myself to go into the deep end. For a future project I would want to integrate designing for manufacturing as this isn't discussed as much in the academic field.

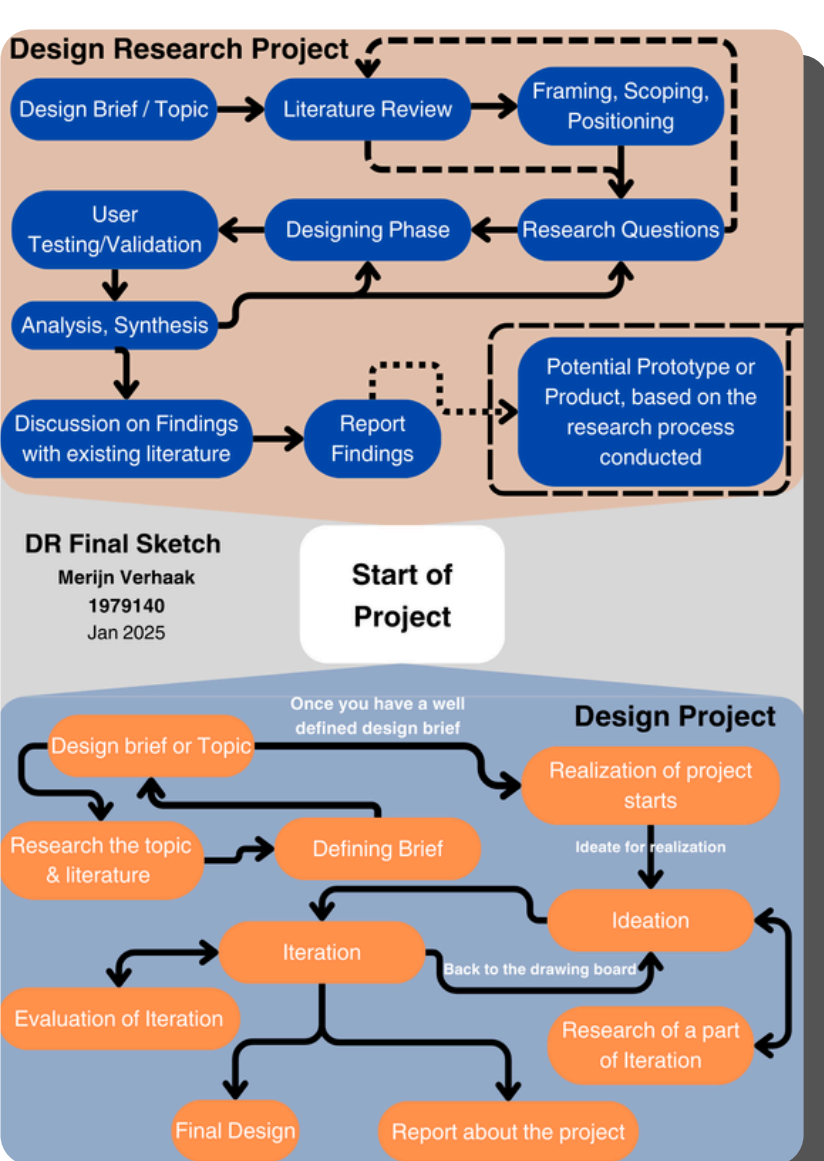


# My Ideal Process

10/2024 - 1/2025

Throughout a course we were prompted to create a sketch explaining your design process. I eventually came to this solution, where I'll add that I place a lot of value on iteration and slowly getting to a great project.

I made a difference between a design research project and design project because of the difference in end product or goal.



# Thank you for reading!

Want to see more? [mverhaak.nl](http://mverhaak.nl)  
Contact: [contact@mverhaak.nl](mailto:contact@mverhaak.nl)  
Linkedin: <https://www.linkedin.com/in/merijn-verhaak-0a6114301/>

