

Archive Signal

An Experimental Design and AR-Based Interactive App Prototype Exploring Hidden Communication Artifacts in the Science Museum's Information Age Gallery

The outcome of this project is the design of an augmented reality (AR)-based interactive app experience, developed in response to the brief's challenge to reimagine how museums can surface lesser-known aspects of their collections.

This project engages in an experimental investigation of museum interaction design, aiming to rethink how cultural memory and hidden artifacts can be rediscovered through spatial, screen-based, and camera-mediated interfaces. By activating the printed Science Museum guidebook as an interactive surface, the app transforms a static object into a dynamic portal that reveals lost communication technologies.

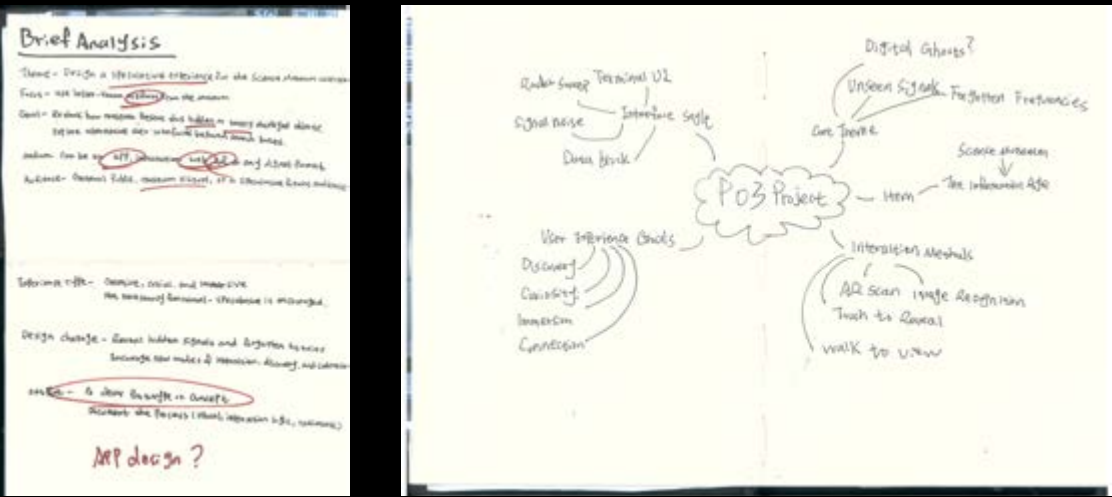
Through three selected artifacts from the Information Age gallery — a Morse Telegraph Key, a Marconi 1.5kW Transmitter, and the Pilot ACE computer — the project explores themes of transmission, erasure, and digital archiving. Each object is introduced through an AR-generated combination of image, sound, video, and text, creating an immersive encounter anchored in physical gesture and movement.

Project 03 - Objects and Narratives
Project designer - Jialai Cao



Research and References

Project analysis & Planning



During the research phase, after carefully reading the project brief and analyzing themes such as visibility, interaction, and non-linear storytelling, I developed the conceptual direction for Archive Signal.

Collection Selection



Collection 1 – Morse Telegraph Key and Sounder

The earliest tool for transmitting coded messages over long distances using Morse code.

Collection 2 – Marconi 1.5 kW Transmitter

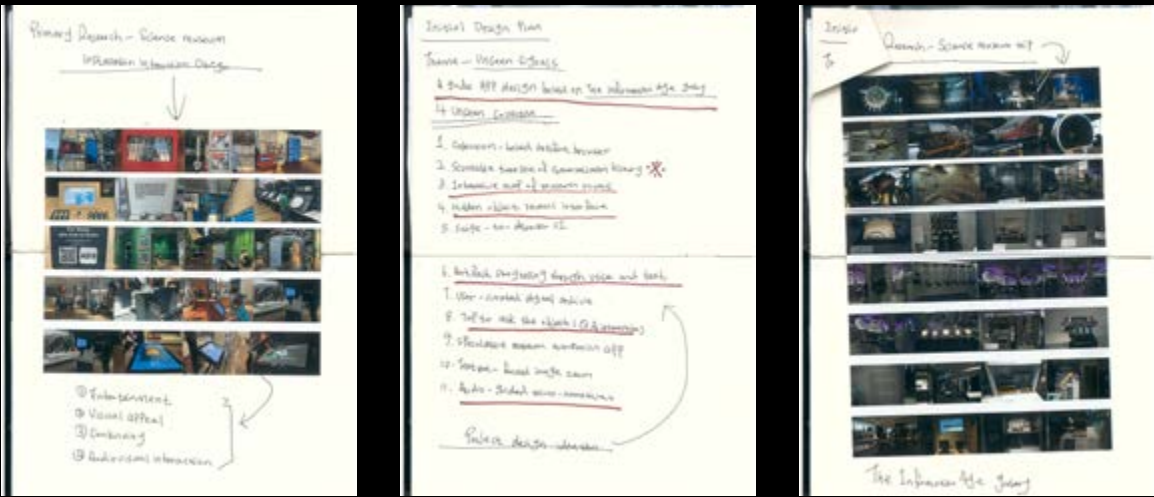
One of the first wireless radio transmitters used by the BBC to broadcast to the public.

Collection 2 – Pilot ACE Computer

An early British general-purpose computer, based on designs by Alan Turing.

These three artifacts mark key stages in the evolution of communication – from signals, to broadcast, to computation – showing how information has moved through different forms over time.

Design Solution & Primary research



The final outcome is an AR mobile app prototype that reveals hidden communication artifacts through image scanning, using black-and-white visuals, sound, and video.

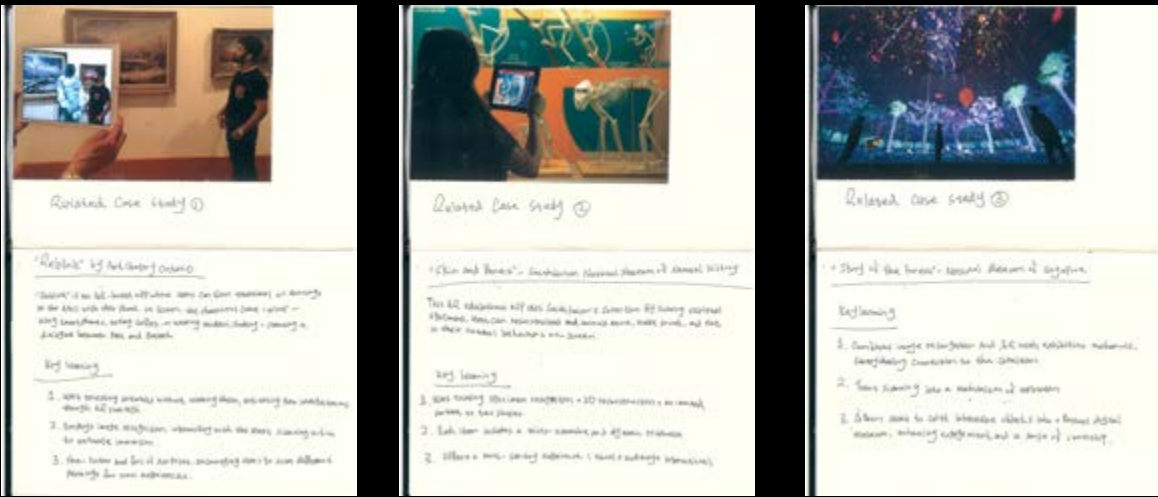
Key Theoretical & Answer

1. How might museums surface the lesser-known aspects of their collections?
2. How might the collection be interacted with to encourage exploration and discovery?
3. How might museums present alternative user interfaces onto their collections (rather than a search box)?

Museums can surface overlooked artifacts by using narrative-based, spatial interactions powered by AR and image recognition. Instead of relying on traditional search boxes or linear timelines, users are invited to move, point, and scan real-world materials – such as printed guidebooks or signage – to unlock hidden layers of content. These interactions create a more embodied and intuitive form of engagement, where discovery happens through gesture rather than input.

By reframing smaller or forgotten objects through themes like “lost signals” or “invisible systems,” museums can activate new ways of storytelling. Rather than showcasing only iconic technologies, they can highlight the quiet, everyday tools that shaped communication history. This approach turns the museum experience into a dynamic landscape of signals, waiting to be uncovered, archived, and reinterpreted by the visitor.

Related Design Case Studies



1. Reblink – Art Gallery of Ontario

<https://blog.vanmildert.com/post/the-reblink-exhibition>

Inspiration –

Use AR as a storytelling tool to reframe static artifacts without physically altering them. I can apply this by layering motion, sound, and context over historical objects like the telegraph or transmitter.

2. Skin and Bones – Smithsonian NMNH

<https://www.si.edu/newsdesk/releases/smithsonian-brings-historic-specimens-life-free-skin-and-bones-mobile-app>

Inspiration –

Use AR to visualize hidden dimensions of static exhibits (e.g. movement, sound, function). I can apply this by recreating how each artifact functioned—like hearing Morse code or simulating early computing.

3. Story of the Forest – National Museum of Singapore

<https://www.teamlab.art/w/story-of-the-forest/>

Inspiration –

Turn scanning into an act of discovery and personal collection-building. I can apply this by letting users scan guidebook pages to “collect” communication artifacts and build a digital archive.

Research Phase Summary

By referencing Benjamin’s theory and drawing from interactive publishing formats, Archive Signal is an AR-based interactive app designed for the Information Age gallery of the Science Museum. It features three forgotten artefacts, brought back to life through augmented reality to help visitors re-see, re-engage, and re-understand the overlooked signals of the past.

Target Audience and Personas

User Groups

For this project, the audience is divided into two core user types based on their interests and modes of engagement:



Reflective History Enthusiast



Curious Digital Native

Visitors are often curious about unseen or lesser-known artifacts. Many skip traditional text panels, preferring interactive or visual engagement. Younger users expect fast, intuitive interfaces; older users value clarity and context. Typing or menu navigation is often ignored — people respond better to gesture-based or camera-driven interactions.

Persona Create



Jamie is a 21-year-old curious digital native who thrives on fast-paced, visual interaction. As someone who often skips over long labels and quickly loses interest in static displays, Jamie is drawn to dynamic, touchless experiences that feel spontaneous and rewarding. Hidden content and collectible elements appeal to their sense of discovery and play. For Jamie,

interaction should feel intuitive and exciting, with a strong sense of immediacy. The design should prioritize quick AR reveals, minimal text, and a visual system that reinforces the feeling of “I found this.”



Richard is a 52-year-old reflective history enthusiast who values depth, clarity, and structure. He is often overwhelmed by overstimulating or overly flashy interfaces and prefers calm, trustworthy storytelling. Richard is particularly interested in the overlooked stories behind everyday artefacts, and appreciates content that unfolds thoughtfully. For Richard,

the experience should offer a clear narrative hierarchy, an archival tone, and space for contemplation. Layered AR storytelling with accessible structure and minimal visual noise helps him engage meaningfully with historical material.

Pain Points / Opportunities analysis



Pain Points

1. Static exhibits lack emotional or personal connection.
2. Search boxes and timelines feel abstract and removed.
3. Hidden or “boring” artifacts receive little attention.

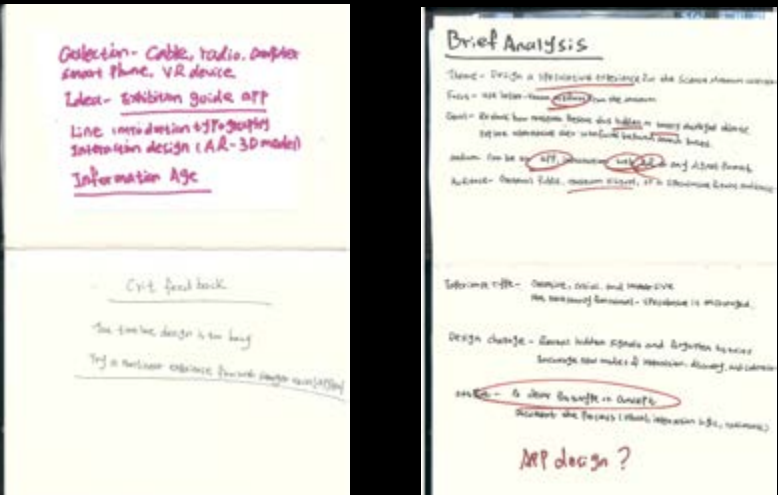


Opportunities

1. Use AR scanning as a form of discovery and interaction.
2. Turn printed guidebooks into interactive portals.
3. Let users collect, explore, and reveal forgotten signals through motion and visual input.
4. Balance surprise (for Jamie) with historical clarity (for Richard).

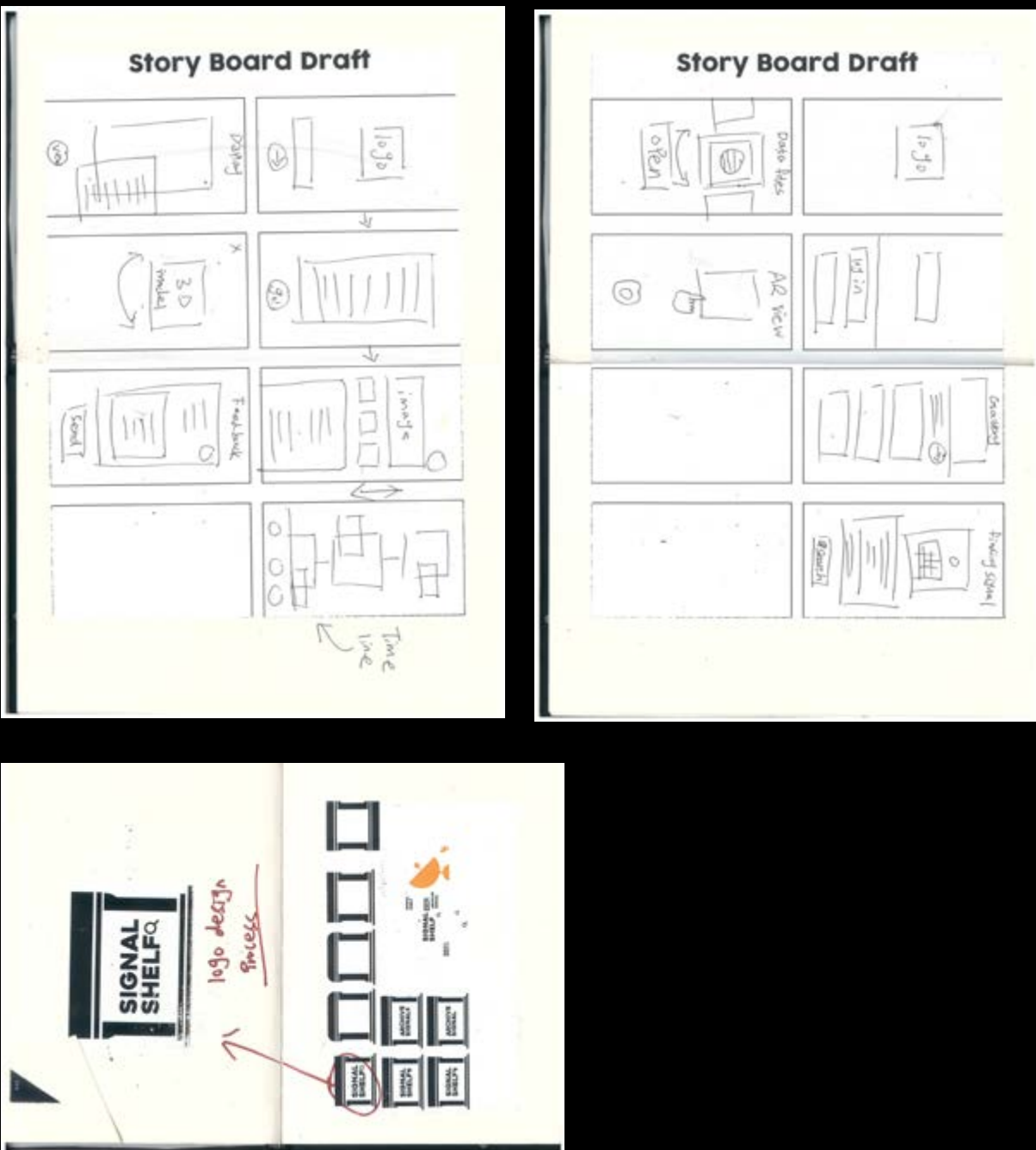
Experimentation and Process

Initial Concept Sketches



After analyzing the project brief and researching interaction models in AR and museum contexts, I began developing early concept sketches for Archive Signal. These included exploratory diagrams for user flow, focusing on how scanning printed materials could trigger non-linear access to content. I experimented with interface sketches that combined camera input, gesture cues, and animated overlays to simulate how users would uncover hidden artifacts through visual recognition. I also mapped out how each artifact could be associated with its own layer of sound, video, and floating visual elements. These early tests helped shift the experience away from a typical app layout toward a hybrid format — part scanner, part archive interface — emphasizing responsive, moment-based interaction over structured menus or timelines.

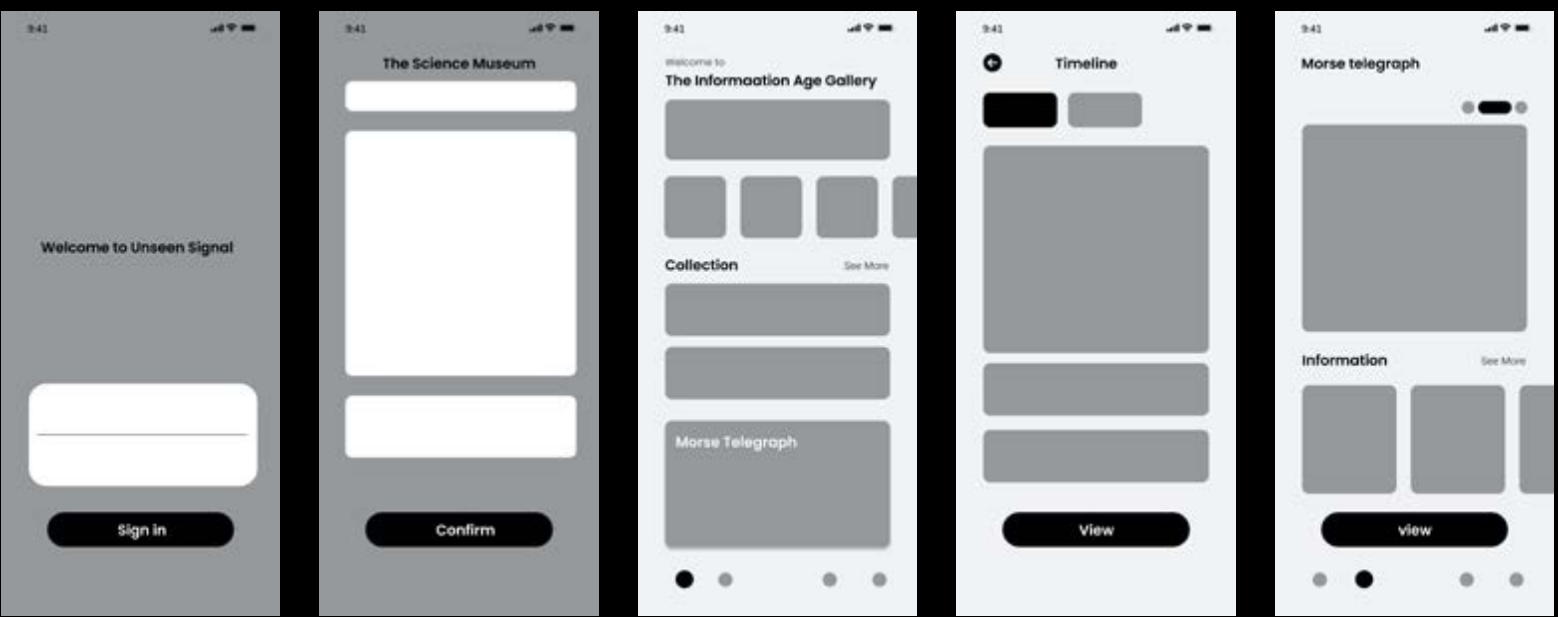
Experimental footage



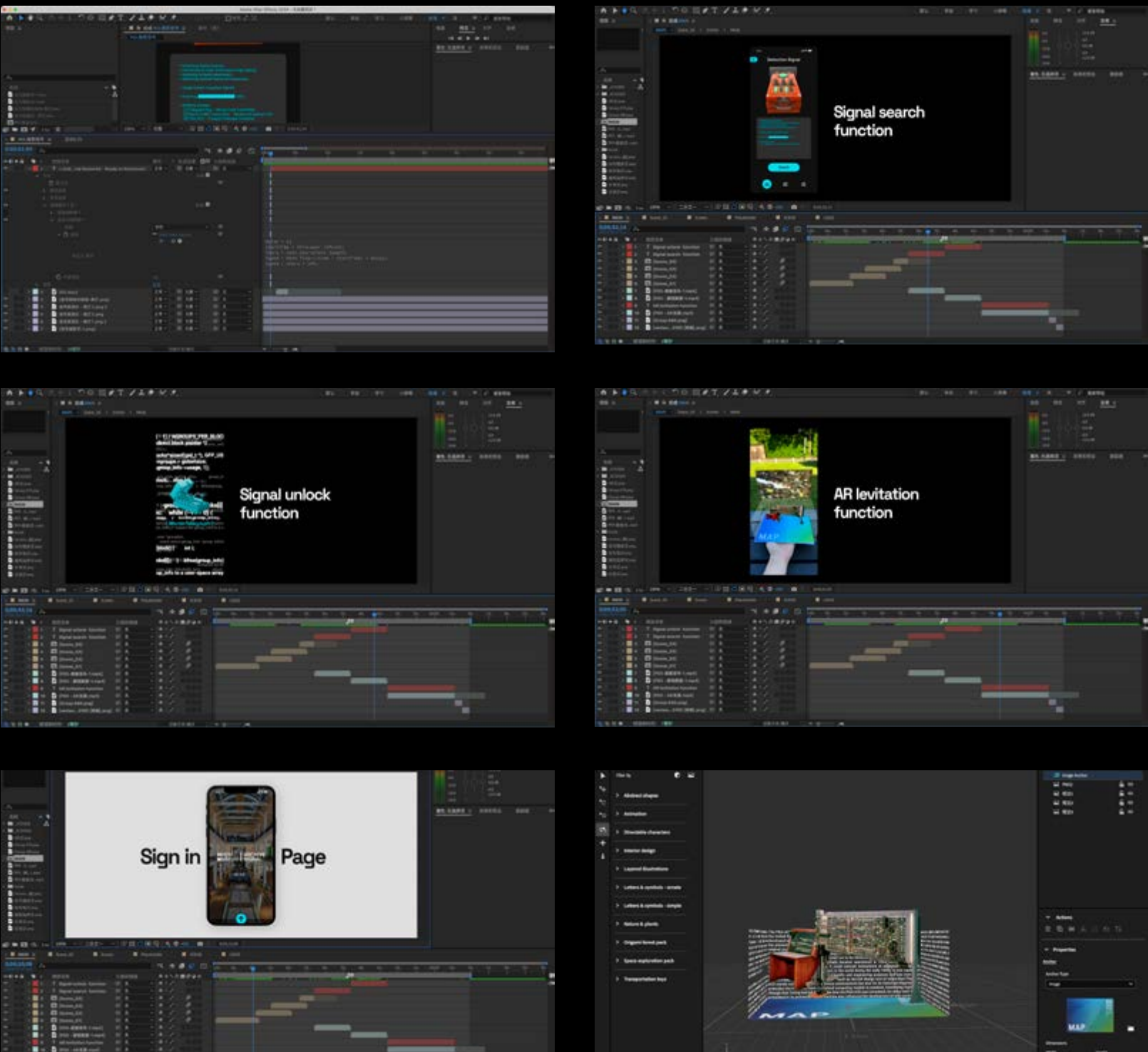
In the early sketching phase, I explored different visual directions for the user interface, focusing on how AR interactions could emerge naturally from printed materials. My first iteration involved hand-drawn wireframes and basic UI flow sketches to test how users might scan, navigate, and view content across different artifact entries. Through feedback and reflection, I refined the layout to emphasize a clean, black-and-white aesthetic with clear hierarchy and minimal distractions.

I also experimented with different logo directions, aiming to capture the idea of “signal recovery” and “archiving the unseen.” The final logo combines graphic signal lines with a bold typeface, aligning with the visual tone of the app. These iterations helped shape a cohesive identity that supports both the speculative and archival aspects of the project.

Low-fidelity Draft



Functional Interaction Effect



Design Decisions and Conceptual Framework

Design Decision Narrative

AR-Based Image Recognition Interaction

Replaces traditional input methods like search boxes with embodied, camera-driven interaction. Encourages discovery through physical scanning and gesture.

Guidebook-as-Interface Approach

Transforms a static printed object into a dynamic interaction surface. Bridges physical museum material with digital augmentation, reinforcing the theme of hidden signals.

Nonlinear, Multi-Entry Experience Flow

Moves away from a fixed timeline or menu. Allows users to access any of the three artifacts through scanning, simulating the randomness and surprise of signal detection.

Floating Video and Audio Layers

Introduces historical context in layered formats. Sound (such as Morse code or typing) evokes the tactile and temporal qualities of the original technologies.

Minimal UI with Typographic Emphasis

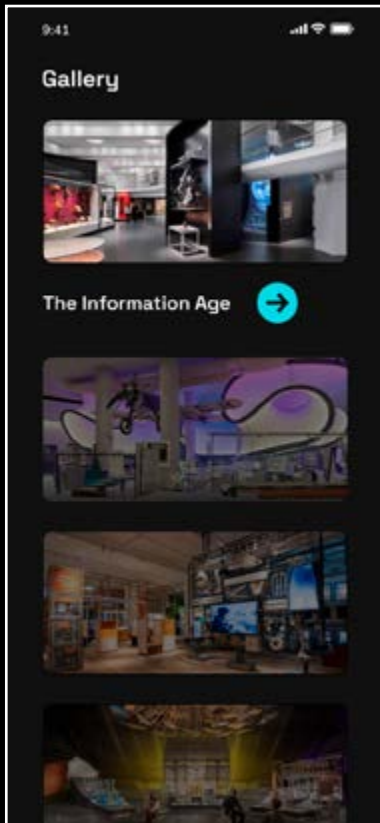
Supports clarity and focus, aligning with the speculative and research-driven tone of the project. Text acts as both interface and narrative element.

“Archive Card” System

Lets users collect digital entries for each artifact. Reinforces the idea of curating a personal archive and encourages repeated exploration.

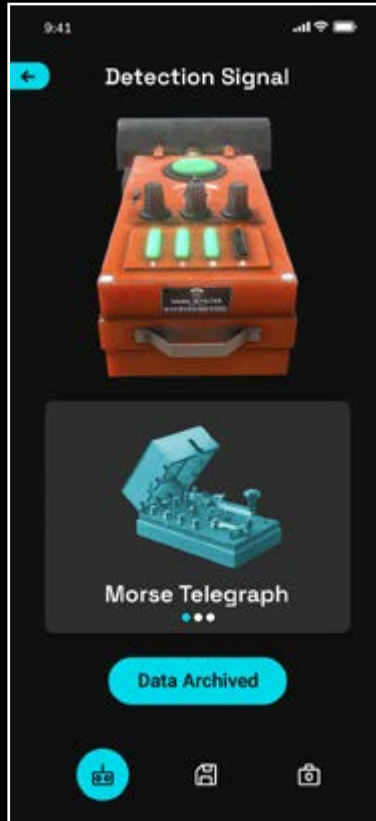
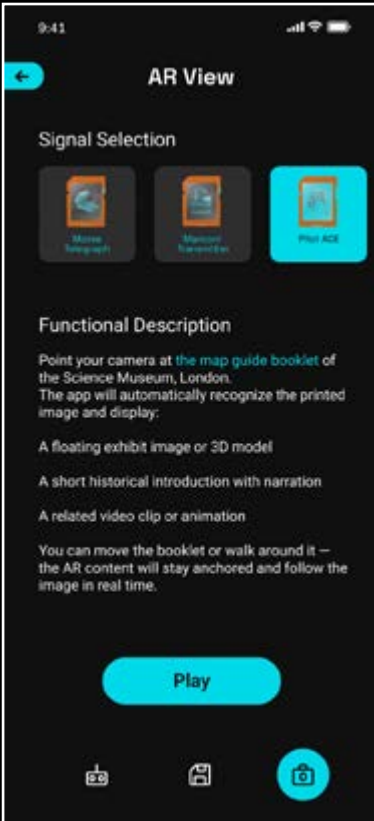
Content Structure Frame

guide
pages



Intro &
Gallery
pages

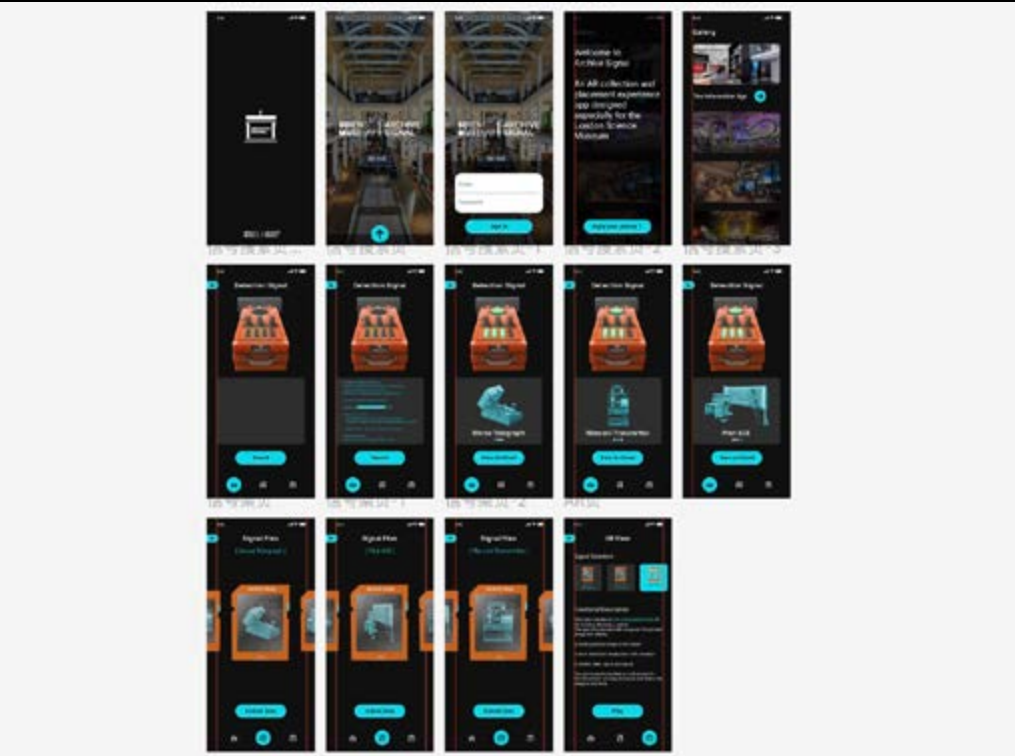
Show
case
pages



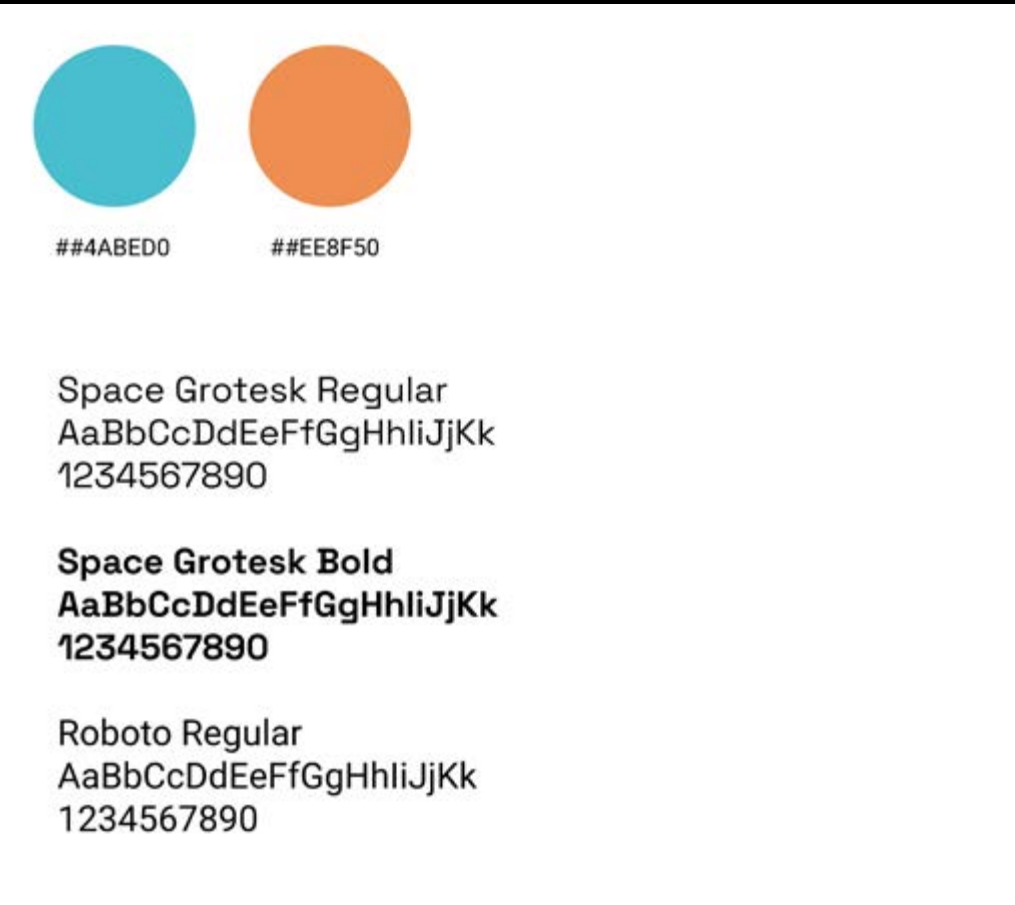
Find
Signals
pages

Final Outcome Display

Complete Interface Preview



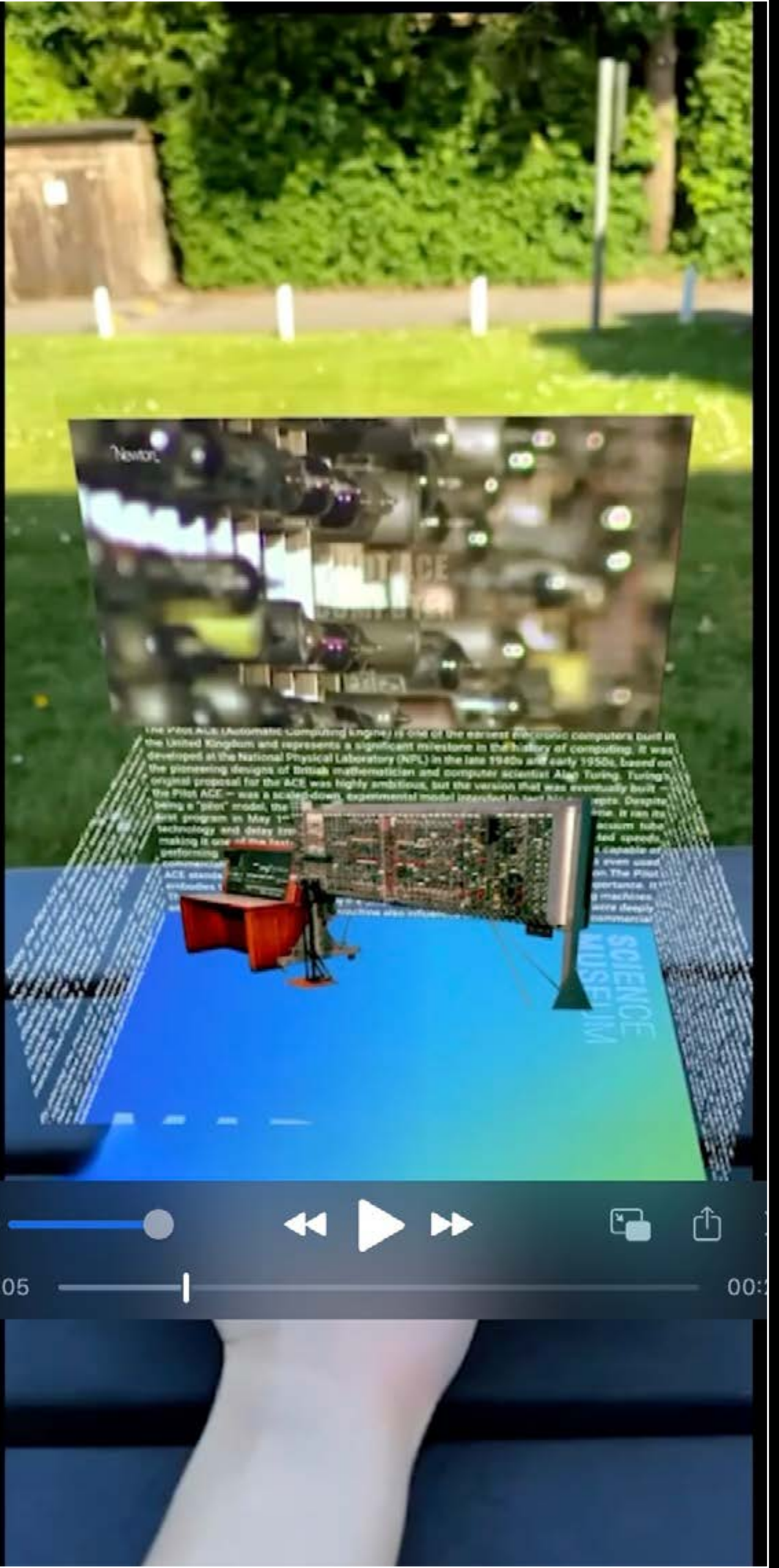
Color Schemes & Font Usage



Viewing link

<https://www.youtube.com/watch?v=cZZP7V8ncMo>

Functional Interaction Videos Display



User Testing & Interaction Feedback

Testing Objectives

Focus areas included

- 1. Understanding of abstract curatorial and technological themes through AR interaction
- 2. Intuitiveness and clarity of the app’s UI and gesture-based scanning flow
- 3. Emotional and narrative response to audiovisual content and artifact presentation

Interaction Test Scenarios

- 1. Scan the printed museum guidebook to trigger AR content
- 2. Tap on each artifact to activate layered media (image, video, audio)
- 3. Collect and review “Archive Cards” after interaction with each object
- 4. Navigate the UI to explore all three artifacts non-linearly
- 5. Observe transitions, visual tone, and audio timing during interaction
- 6. Provide feedback on visual style, interaction clarity, and overall engagement

Key Observations from Interaction Testing

Does the vertical scrolling structure support comprehension and pacing?
User Response – “Smooth and readable, felt like guided reading.”
Design Adjustment – No change Validated approach

Can users intuitively understand the meaning behind image transitions?
User Response – “Very clear metaphor for disappearance – the change is satisfying.”
Design Adjustment – Retained as a core visual interaction in the middle chapter.

Do artifact interactions feel rewarding and purposeful?
User Response – “Interesting surprise after scanning – felt rewarding.”
Design Adjustment – Added micro-feedback (glow + vibration) to reinforce discovery.

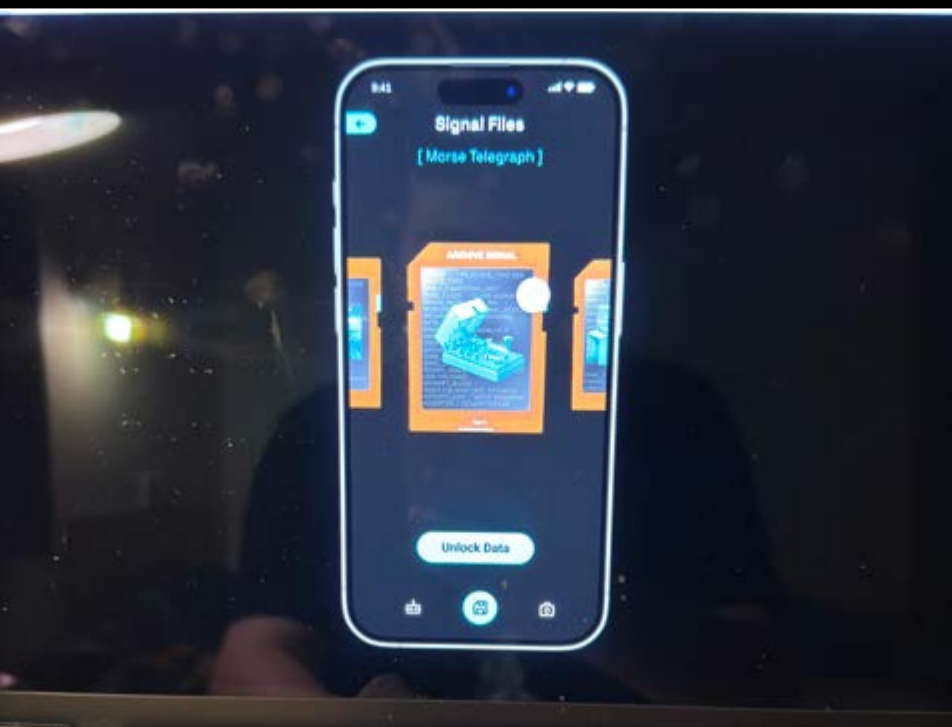
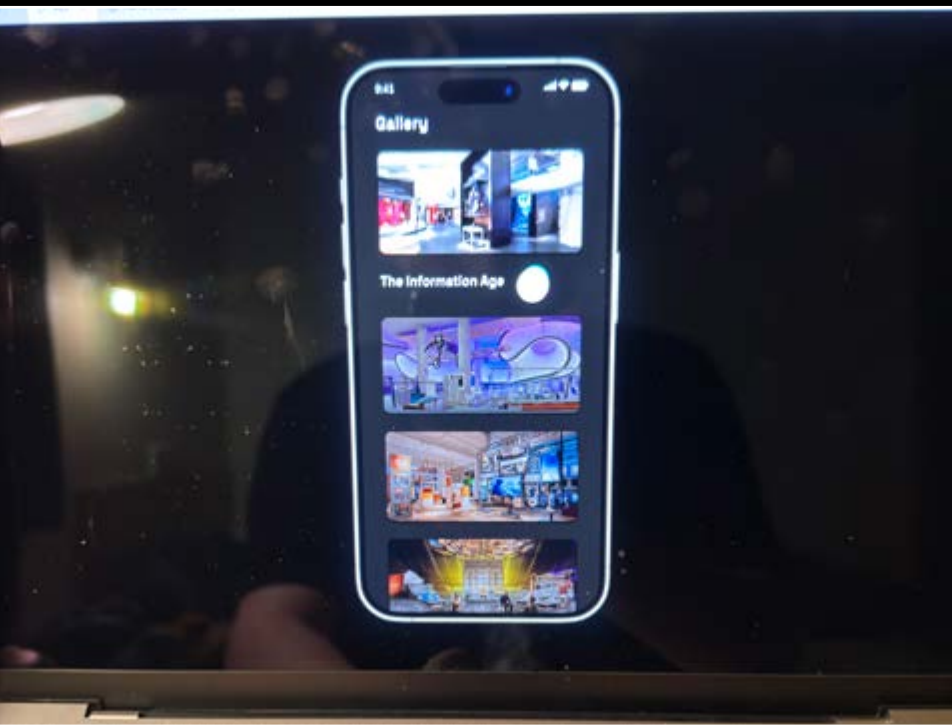
Reflections

User testing confirmed the effectiveness of combining camera-based AR interaction with a clean, non-linear interface rooted in discovery. Participants across different user types responded positively to the tactile act of scanning printed materials to uncover hidden content. The use of sound, minimal motion, and layered media was seen as engaging without overwhelming the experience.

Feedback also highlighted the importance of visual cues to support interaction clarity, especially for less tech-savvy users. Subtle enhancements — like glow effects, hover states, and micro-feedback — helped make key features more accessible.

Overall, the tests validated the decision to emphasize quiet responsiveness and conceptual coherence over flashy interaction, reinforcing the project’s archival tone and speculative narrative approach. The result is an experience that invites both active exploration and reflective engagement.

test footage



Tester - Yansong Wu

Age - 23-Year-Old

Background - Design graduate student

Critical Reflection

Design Purpose and Experience

The aim of Archive Signal is to transform how museum visitors encounter the Science Museum’s lesser-known communication artifacts. Instead of relying on labels, search boxes, or chronological timelines, the project turns the printed guidebook itself into an interface: users point their phone’s camera at selected pages and, through AR image recognition, “unlock” hidden layers of sound, video, and text.

This strategy serves two purposes. First, it surfaces objects that normally remain in storage or behind glass, giving them a new life in the visitor’s own hands. Second, it encourages an embodied, detective-like mode of engagement—users move, scan, and listen, piecing together fragments much as early operators once traced telegraph clicks or radio static.

The experience is deliberately quiet and monochrome, evoking archival documents and early terminal screens. Subtle hover states, faint glow cues, and soft ambient audio replace flashy animation, aligning with the reflective tone of Benjamin-inspired themes about loss, aura, and mechanical (now digital) reproduction. Interaction flows are non-linear: any page can be the entry point, and each scan reveals one of three artifacts—the Morse Telegraph Key, the Marconi 1.5 kW Transmitter, or the Pilot ACE computer. After discovery, users collect a digital Archive Card that stores media and context, building a personal catalogue that can be reviewed or shared.

User testing showed that both fast-scanning digital natives and slower, detail-oriented visitors could engage meaningfully, provided subtle clarity cues—glow, vibration, cursor change—signalled what could be tapped or explored. As a result, Archive Signal delivers a layered narrative that feels more like tuning a radio band than flipping through a brochure: with each scan, an unseen signal is recovered, heard, and archived anew.

What I Learned

Through this project, I learned how to translate abstract theoretical ideas into interactive experiences, using AR to bridge physical and digital layers. I gained insight into designing for different user types, balancing clarity with conceptual depth, and using minimal interaction to support narrative meaning. The process taught me how subtle design choices—timing, pacing, feedback—can shape how users interpret and emotionally connect with content.

Optimisation Directions

Future iterations could improve onboarding clarity for first-time users, including clearer visual cues and brief scanning instructions. The archive card system could be expanded into a customizable collection interface, allowing users to annotate or save reflections. Integrating multilingual audio and accessibility features would also broaden the app’s reach and inclusivity.

Personal Takeaway

This project challenged me to think beyond traditional UI and engage with speculative interaction grounded in theory. I learned how to build meaning through subtle feedback and how physical interaction—like scanning or pausing—can become narrative tools. It taught me to design not just for usability, but for presence, reflection, and interpretation.