University of Applied Sciences and Arts Northwestern Switzerland
School of Engineering

Creative AI Selfie App

Find yourself in a story

Project 5

Figure 1: AI generated (ChatGPT, 2025)

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Abstract

The stationary installation "AI Selfie Box" at the Enter Technikwelt museum in Solothurn offers visitors an interactive opportunity to create stylized and creative portraits using Artificial Intelligence (AI). However, the system's reliance on a multi-camera setup limits access to on-site participants only. This project aimed to overcome this limitation by transforming the functionality of the Selfie Box into a mobile application based on a single smartphone camera setup.

A Mixed-Methods Design was employed, including methods such as observational studies, market research, and usability testing. React Native and Supabase were selected for their scalability and cross-platform development capabilities, ensuring the app could reach a broader audience across different devices. Usability testing validated the app's design and functionality, confirming that users could effectively upload photos and generate AI- generated images with ease.

The project resulted in the successful development of a functional mobile application that allows users to upload their selfies and generate AI- generate images in various styles. Additionally, a high-fidelity prototype was designed to improve the app's user experience. While the app is fully functional, the prototype serves as a conceptual framework for future design implementation.

Keywords:

Mobile app development, Generative AI, Image processing, User-centric design, Cross-platform development, React Native

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Hava Fuga

Table of Contents

List of Tables

List of Figures

1 Introduction

Artificial intelligence (AI) is revolutionizing creative applications, enabling innovative user experiences. A prime example of this is the AI Selfie Box, an installation at the Enter Technikwelt Museum in Solothurn. By combining advanced generative AI with a multi-camera setup, this system takes users on a journey where they capture photos in a photobooth-like box and then create stylized portraits, transforming their images into imaginative works of art. However, its physical, stationary nature limits accessibility, making it only available to museum visitors.

In this project, IP5, the focus is on creating a mobile application that replicates the AI Selfie Box's capabilities while utilizing only a smartphone. The app allows users to upload images and generate high-quality, stylized portraits, providing a seamless and accessible experience. By transforming the stationary system into a mobile solution, the project aims to make the creative potential of AI available to a wider audience.

To achieve this, several methodologies were employed. An observational study was conducted at the Enter Technikwelt Museum to analyse the functionality of the AI Selfie Box and understand how visitors interact with it. This involved observing the process of capturing images, the user journey within the photobooth, and the overall user experience. Insights were gathered on the strengths and limitations of the existing system, such as its multi-camera setup and the structured process of generating images

Following this, a market research study was undertaken to explore existing mobile applications that incorporate generative AI features. The analysis focused on identifying best practices, such as intuitive interfaces, customization options, and efficient workflows, as well as pinpointing gaps in current solutions. This step helped to benchmark the proposed app against existing tools, ensuring its features were both competitive and user centric.

Additionally, design research was conducted to explore generative AI design principles and patterns that could be applied to the app. This included studying successful implementations of generative AI in other contexts, as well as examining user interface patterns that support creativity and personalization. Combining these insights, a detailed concept for the application was developed. This concept included wireframes and a structured outline of the app’s functionality, ensuring it addressed user needs effectively.

For the implementation of the mobile application, React Native was chosen as the development framework due to its ability to create cross-platform applications efficiently. The Expo framework was utilized to streamline the development process, providing pre-built modules and tools that supported rapid prototyping and testing. Supabase was employed as the backend solution for database management and storage, ensuring scalability and efficient handling of user-generated content, such as uploaded selfies and AI-generated images.

The primary focus during the implementation phase was to test the feasibility of generating high-quality, stylized images directly from a mobile application. Unlike the AI Selfie Box at the museum, which relies on a multi-camera setup, the mobile app only used the smartphone itself. The goal was to determine whether the same results could be achieved without the need for the complex and stationary hardware of the original system. The app was built with functional, generative components, prioritizing functionality over visual design during this phase.

Once the implementation confirmed that it was possible to generate AI-enhanced images using a mobile app, the project moved on to the design phase. This step involved conducting design research to explore the best practices and patterns for applications utilizing generative AI. Various elements were analysed, including user interface layouts, customization options, and interaction flows, to identify both effective and ineffective approaches.

The first iteration of the design was developed, incorporating insights from the research and aiming to create a user-friendly and engaging interface. Following the initial design, usability testing was conducted with a group of ten participants. These tests provided valuable feedback on the app's functionality, ease of use, and overall user experience. Based on this feedback, the design was refined to better address user needs and preferences, ensuring that the app not only performed its intended function but also provided a seamless and enjoyable experience for its users.

In summary, this project successfully demonstrated the feasibility of generating stylized images using only a mobile app, eliminating the need for the stationary, multi-camera setup of the AI Selfie Box. While the implementation focused on functionality, additional work remains to fully integrate the refined design into the app. Future steps include completing the design implementation, enhancing the user interface, and conducting further usability tests to ensure the app meets the highest standards of user experience. These tasks are planned to be addressed in the bachelor thesis, building upon the foundation established in this project to deliver a polished and fully functional application.

2 Theoretical Foundations

The theoretical foundation for this work combines insights and concepts from prior research, establishing a basis for understanding and contextualizing the project's objectives and methods. This section outlines relevant definitions, explores prior work in generative artificial intelligence, and discusses how these elements contribute to the development of the AI-based selfie app

2.1 Definitions

In the following subsections, terms will be defined that will be used throughout this paper and are important for understanding the topics discussed.

2.1.1 Artificial Intelligence

Artificial intelligence (AI) is a foundational field within computer science and engineering, dedicated to the development of systems or machines capable of mimicking intelligent human behaviour. These systems are designed to execute tasks that typically necessitate human cognitive functions, such as problem-solving, decision-making, learning, and understanding natural language (Russell & Norvig, 2021). A crucial aspect of AI is the ability to acquire knowledge autonomously. This is achieved through extracting patterns from raw data, often facilitated by machine learning (Goodfellow et al., 2015a).

2.1.2 Machine learning

Machine learning (ML) is a key area of artificial intelligence. It involves teaching computers to learn patterns and relationships from data without being explicitly programmed. Machine learning works by analyzing examples and observations to make predictions or decisions (Bishop, 2006). Machine learning is a multi-disciplinary field having a wide-range of research domains one of them is artificial intelligence (Alzubi et al., 2018).

2.1.3 Deep Learning

Deep Learning is a specialized subset of machine learning that utilizes multi-layered neural networks to model complex patterns in large datasets. Inspired by the human brain's structure, these deep neural networks automatically learn hierarchical feature representations, making them particularly effective in tasks such as image and speech recognition (Zhang et al., 2018).

Deep Learning is closely related to machine learning and artificial intelligence as part of a nested hierarchy, where artificial intelligence represents the overarching goal of creating intelligent systems, machine learning serves as the approach to achieving this through data-driven learning, and Deep Learning provides the tools for tackling highly complex problems (Goodfellow et al., 2015b). This relationship is illustrated in Figure 2, emphasizing the layered nature of these fields and their interconnected roles in advancing intelligent systems.

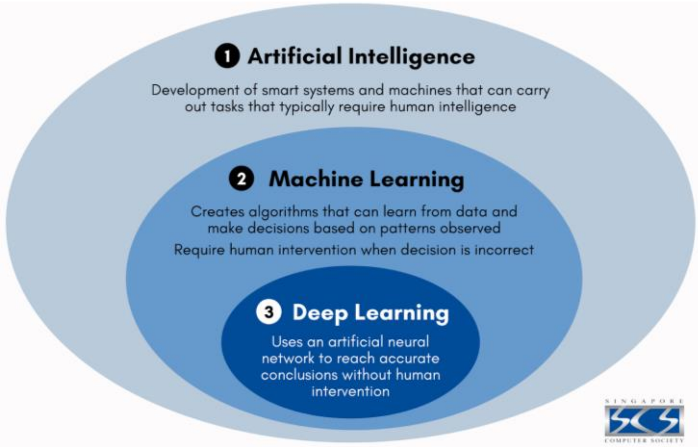

Figure 2: Relation AI, ML Deep Learning (SCS, 2021)

2.1.4 Prompts

A prompt, in the context of artificial intelligence, refers to the input or instruction provided to an AI system to guide its response or behaviour. It acts as a query or directive that initiates the AI model's task, such as generating text, answering questions, or performing specific functions (Zamfirescu-Pereira et al., 2023).

2.1.5 Application Programming Interface

An Application Programming Interface (API) serves as a structured set of protocols designed to facilitate communication and data exchange between various software components. By leveraging APIs, developers integrate smaller, modular pieces of code to build robust, secure, and user-focused applications that efficiently meet functional requirements (Postman, n.d.).

2.1.6 AI-Selfie-Box

The term AI-Selfie-Box refers to an interactive AI-powered installation developed by a team from the Institutes for Data Science and Interactive Technologies at FHNW and exhibited at the Enter Technikwelt museum in Solothurn. The installation uses five cameras to capture photos of visitors and create a 3D model of the subject. Based on selected prompts, an AI model generates personalized images, transforming the individual into fantasy characters such as Lego characters, superheroes, astronauts, children, seniors, or figures from historical eras (Hochschule für Technik und Umwelt, n.d.).

2.1.7 Amazon Web Services and Simple Storage Service

Amazon Web Services (AWS) is a comprehensive cloud computing platform that offers a wide array of services, including computing power, storage options, and networking capabilities (*Amazon Web Services (AWS)*, n.d.). One key feature includes Simple Storage Service (S3) for scalable storage (*Amazon S3*, n.d.).

2.2 Generative

Generative Artificial intelligence (GenAI) represents a transformative innovation in the field of technology, characterized by its ability to create new content derived from existing data. Leveraging advanced algorithms and machine learning techniques, GenAI enables the generation of text, images, music, and other media, fostering creativity and innovation across a wide range of applications (Gozalo-Brizuela & Garrido-Merchán, 2023). Unlike conventional AI, which primarily focuses on analysing and classifying data, generative AI models are designed to produce original outputs that mimic the style or structure of their training data (Gozalo-Brizuela & Garrido-Merchan, 2023).

2.2.1 Generative AI Models

The foundation of generative AI lies in its models, which are trained to learn the underlying patterns of a dataset and generate new instances that closely resemble the original data. Over the past few years, several types of generative models have been developed, each with unique mechanisms for producing data (Bengesi et al., 2023).

Generative Adversarial Networks (GANs) consist of two neural networks operating in tandem: a generator, which synthesizes data samples intended to mimic a target distribution, and a discriminator, which assesses whether a given sample originates from the true distribution or was generated. This adversarial training process drives both networks to improve iteratively—the generator becomes increasingly adept at creating realistic samples, while the discriminator sharpens its ability to distinguish real data from generated samples. This dynamic results in the production of highly realistic data that approximates the true distribution (Goodfellow et al., 2020).

Variational Autoencoders (VAEs) compress input data into a compact latent representation that encapsulates its essential features. The model then reconstructs the data by sampling from this latent representation. VAEs balance two objectives: ensuring accurate reconstruction of the original data and maintaining a smooth, predefined structure for the latent space. This balance allows VAEs to generate new data that is similar to, but not identical to, the original training data (Kingma & Welling, 2022).

Diffusion models are a class of generative models that create data by reversing a noise-adding process. During training, the model learns how data transitions through increasingly noisy versions, enabling it to predict and remove noise at each step. In the generation phase, the model begins with random noise and iteratively denoises it, reconstructing original data from the learned reverse process. This approach has proven effective in generating high-quality data across various domains (Chang et al., 2023).

2.2.2 Applications and Advancements in AI Image Generation Systems

The integration of Generative AI and diffusion models has significantly transformed the landscape of AI image generation systems. Notably, models such as DALL-E and Stable Diffusion have emerged as leaders in this domain, showcasing their ability to produce high-quality images from textual descriptions (Wang et al., 2024; Bianchi et al., 2023).

The synergy between GenAI and diffusion models has led to innovative applications across various fields. In the medical domain, for example, diffusion models have been employed to generate synthetic images for training purposes, addressing data scarcity issues (Lin et al., 2023; Shavlokhova et al., 2023). Similarly, architectural design has benefited from these technologies, where students utilize generative models to explore preliminary design concepts (Dortheimer, 2023). The ability to generate high-resolution images from simple text prompts has also found applications in the creative arts, enabling artists and designers to experiment with new visual ideas (Bianchi et al., 2022; Yuan, 2024).

In the context of this project, these AI image generation systems form the theoretical foundation for developing an innovative application: an AI-based selfie app that generates stylized images. By leveraging the capabilities of models such as Stable Diffusion, this project utilizes their ability to produce high-resolution, customizable outputs from user-provided selfies. This approach addresses limitations in personalization and stylistic variety found in traditional image editing tools, offering a more engaging and tailored user experience.

By drawing on insights from existing research, this project aims to answer key questions more effectively. It explores how AI systems can create visually appealing and contextually appropriate images that meet individual preferences. Additionally, it evaluates the technological choices needed to balance creative flexibility with computational efficiency. By building on the progress of established models and applying them to a novel use case, this work not only highlights the practical applications of generative AI but also demonstrates its scientific validity. This connection between prior research and the proposed system ensures that the project is innovative, well-informed, and methodologically robust.

3 Background

This chapter provides an overview of the current state of research related to the AI-Selfie-Box project. It includes its development, functionality, and the underlying AI technologies powering its image generation capabilities. The aim is to situate the project within the broader context of existing literature and technological advancements. This is achieved by addressing both its innovative contributions and its limitations.

3.1 AI Selfie Box

The final side of the AI-Selfie-Box, located at the back, is equipped with two large screens that display the real-time status of photo processing (see Figure 8). This interface provides a clear and user-friendly way for individuals to monitor their progress. For each visitor, their icon is displayed, which progresses through various stages on the screen. When the icon appears under the 'done' section, it means that their photos have been processed and they can begin to generate images.

3.1.1 Photobooth Functionality and Design

The photobooth's design demonstrated a clear intent to streamline the user journey through intuitive interfaces and interactive elements. Each of the photobooth's sides served a distinct purpose, creating a cohesive user experience. The AI-Selfie-Box is housed in a sleek, modern black structure with four distinct sides, as depicted in Figure 3.

Figure 3: AI Selfie Box

Upon approaching the installation, visitors are greeted by an informative front panel, shown in Figure 4. This side introduces the AI-Selfie-Box, displaying credits for its creators and a visual breakdown of the process. The visual guide prepares visitors for the interaction, breaking it down into straightforward steps: entering the booth, capturing images, and receiving a unique code to access the AI-generated results.

Figure 4: AI Selfie Box - Front Panel

The interior of the booth has been designed to facilitate optimal image capture, as illustrated in Figure 5. Within the booth, visitors will find a single chair positioned around which are five cameras, each strategically angled to capture a different perspective of the visitor. Between these cameras are four elongated light panels as shown in Figure 6, providing consistent illumination to ensure high-quality images. At the front of the chair, a touch screen acts as the primary interface for navigating the photo-taking process. A pullable curtain encloses the booth, creating a neutral backdrop to minimize distractions and enhance image consistency.

Figure 5: AI Selfie Box – Step 1 outside

Figure 6: AI Selfie Box – Step 1 inside

When visitors are seated, they can initiate the process by selecting their preferred language (English, German, or French) from the interactive screen. The screen then displays a live video from the front-facing camera, complete with an outline to assist the visitor in positioning themselves correctly (Figure 7). This ensures the captured images align with the system's requirements.

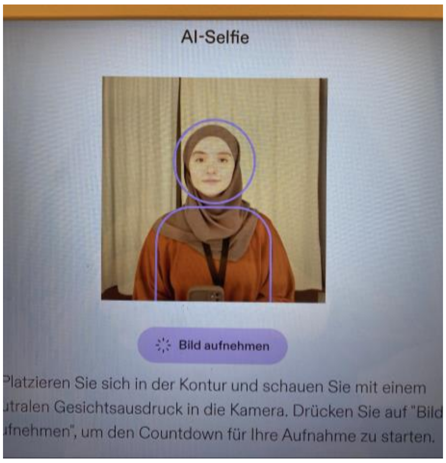

Figure 7: AI Selfie Box – Image taking progress - positioning outline

Once the image capture process begins, a countdown timer provides a brief period for visitors to prepare before the cameras commence image capture. The captured images are immediately displayed for review, as illustrated in Figure 8. Visitors can retake the photos until satisfied. Finalized images are processed to meet the AI model's specifications, ensuring high-quality input data.

Figure 8: AI Selfie Box – Image taking progress - Displayed captured images

Following image confirmation, the system generates a unique code linked to the session. This code, displayed with an icon on the screen (Figure 9 and Figure 10), is essential for accessing the AI-generated images. Users are encouraged to save the code as it cannot be recovered once lost.

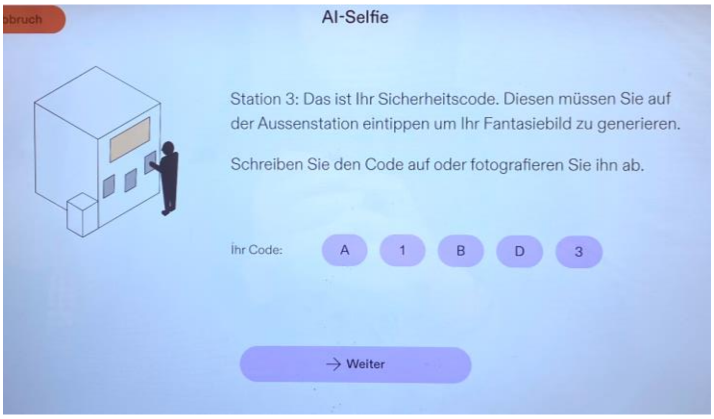

Figure 9: AI Selfie Box – Image taking progress - Display code

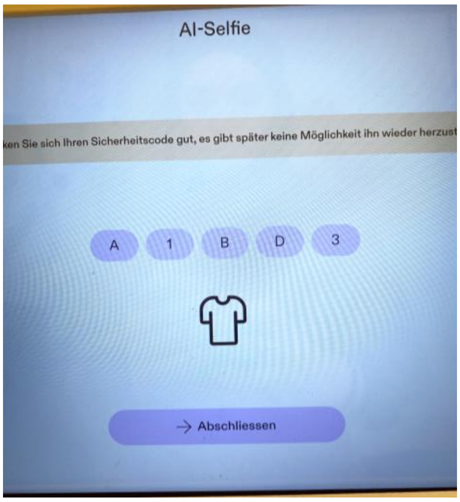

Figure 10: AI Selfie Box – Image taking progress - display code and icon

The third side of the AI-Selfie-Box includes a Q&A panel designed to engage users during the waiting period. This interactive feature provides a series of trivia questions and answers related to AI technology displayed on a big screen placed above that mirrors the screen of the touch screen below (Figure 11). The Q&A not only educates but also serves to keep users entertained while their photos are processed, enhancing the overall experience. By addressing common questions and providing insights into AI, the quiz serves not only to entertain but also to help dispel potential fears or uncertainties about artificial intelligence (Hochschule für Technik und Umwelt, n.d.).

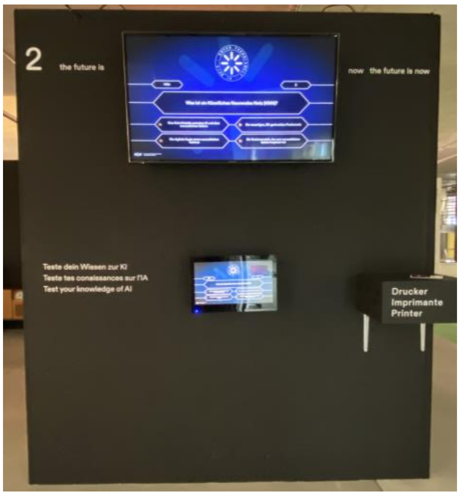

Figure 11: AI Selfie Box – Step 2 Q&A

The final side of the AI-Selfie-Box features two large screens that display the real-time status of photo processing (Figure 12). These screens provide a visual representation of each visitor's progress, using an intuitive interface that shows their icon's advancement through the stages of processing. Once the processing is complete, visitors proceed to generate their AI-enhanced images using three iPads located below the screens. The iPads are positioned at different heights to accommodate visitors comfortably, ensuring accessibility for all.

Figure 12: AI Selfie Box – Step 3 - Image generation

3.1.2 Prompt Selection and Image Generation

The prompt selection process begins when visitors enter the unique code provided after their photo session (Figure 13). This code grants access to their captured images and initiates the customization phase. Visitors first select one of four thematic worlds: Time Travel, Futuristic Vision, Fantasy, or Gaming (Figure 14). Each world defines a distinct aesthetic style and thematic concept, shaping how the AI-generated images will appear.

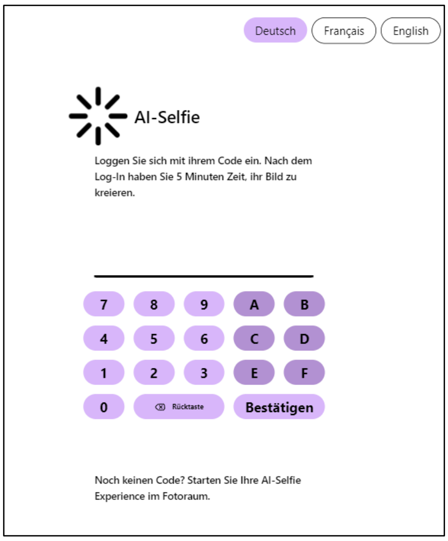

Figure 13: Prompt station – Login (own screenshot taken from a local development environment of the Prompt Station application)

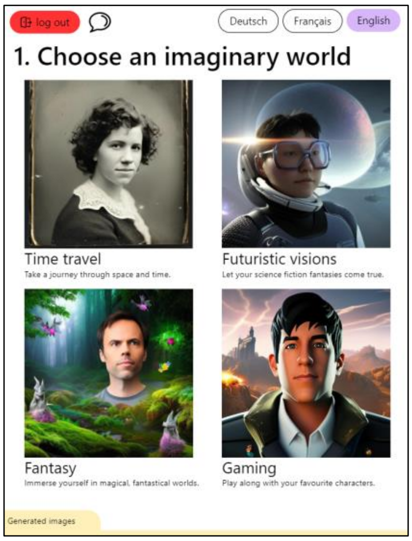

Figure 14: Prompt station – World selection (own screenshot taken from a local development environment of the Prompt Station application)

After choosing a thematic world, visitors can further refine the outcome by selecting additional parameters, such as Scenery, Prompts, and Art Style as shown in Figure 15. These options allow for detailed customization of elements like the environment or artistic rendering, ensuring diverse and personalized outputs. Furthermore, visitors are given the option to choose a preferred gender presentation for their avatar. They can select male or female representations, or leave the choice neutral, allowing the AI to generate an image without a specified gender influence. For those seeking a more adventurous result, an option labelled “Extra Creative” is available, which enhances the artistic interpretation by generating more imaginative and experimental images.

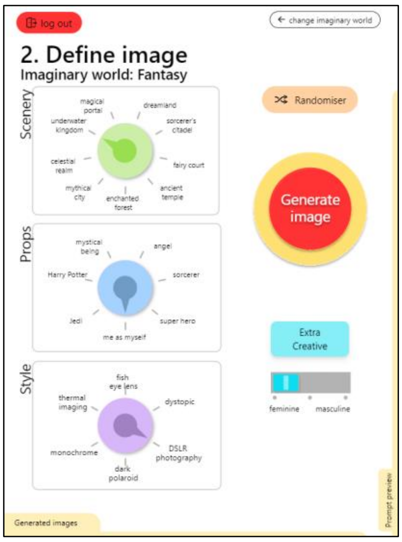

Figure 15: Prompt station – Additional prompting (own screenshot taken from a local development environment of the Prompt Station application)

Once the prompts are finalized, the AI generates three images simultaneously. The brief waiting period of approximately one minute is displays the images loading before results are ready (Figure 16). The generated images are presented in a sliding tab, allowing visitors to return to the prompt selection screen and further refine their choices or try new combinations as shown inFigure 17.

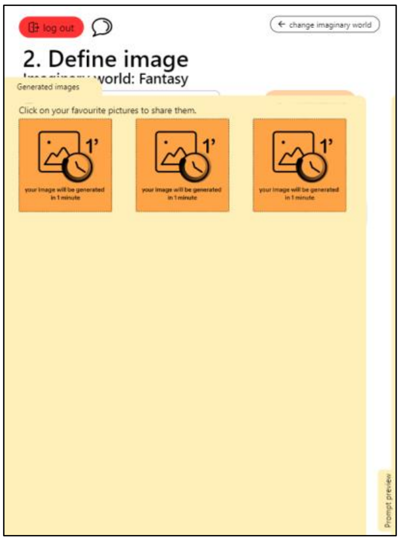

Figure 16: Prompt station – Loading screen generated images (own screenshot taken from a local development environment of the Prompt Station application)

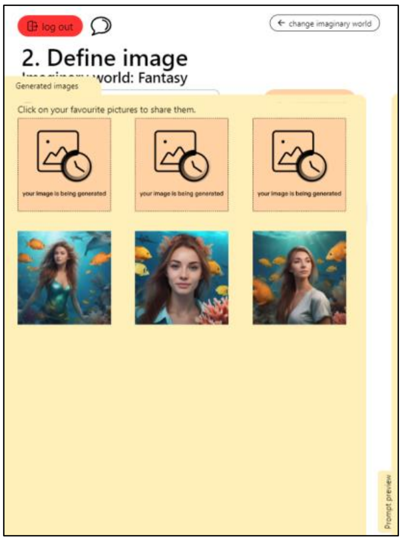

Figure 17: Prompt station – Result generated images (own screenshot taken from a local development environment of the Prompt Station application)

When visitors are satisfied with a particular image, they can select that image and view it in detail in the Share Image screen as shown in Figure 18. In that view they can view the Prompt preview (Figure 19) or print it directly at the booth. Additionally, they have the option to send digital versions of their images via email as shown in Figure 20. After the process is completed, the system prompts them to log out, ensuring that the booth is ready for the next visitor.

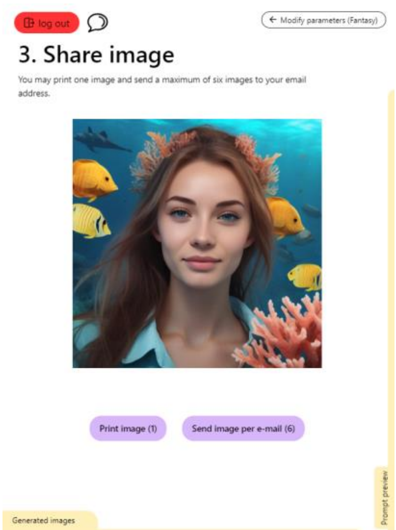

Figure 18: Prompt station – Share selected image screen (own screenshot taken from a local development environment of the Prompt Station application)

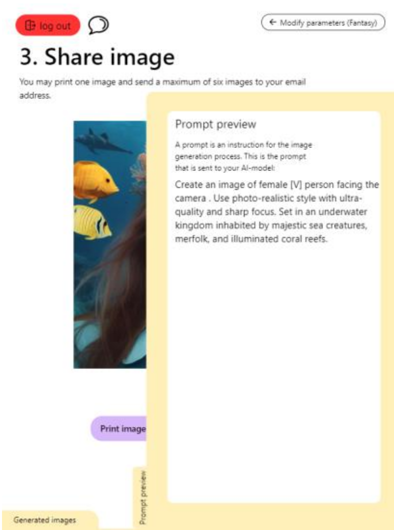

Figure 19: Prompt station – Prompt preview selected image screen (own screenshot taken from a local development environment of the Prompt Station application)

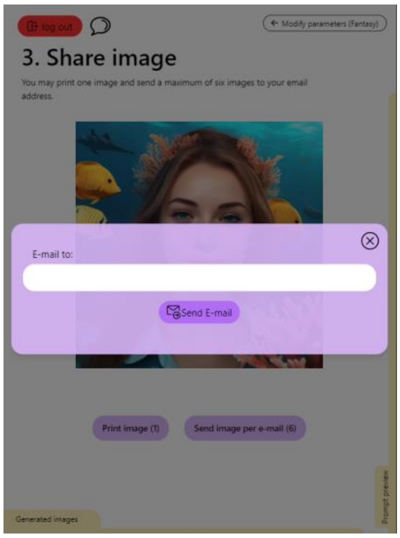

Figure 20: Prompt station – Share vie E-mail selected image screen (own screenshot taken from a local development environment of the Prompt Station application)

3.1.3 Image Generation with Stable Diffusion

The AI Selfie Box leverages Stable Diffusion XL as the primary AI model for generating images (*Stable Diffusion XL*, 2022). Additionally, DreamDiffusion an innovative framework designed to generate high-quality images is utilized for image personalization to enhance user-specific outputs (Bai et al., 2023). The model is hosted on Amazon Web Services (AWS). Through the provided API, images can be uploaded, and the image generation process can be initiated. The generated outputs are securely stored in an Amazon S3 bucket (*Amazon S3*, n.d.).

4 Methods

This chapter employs a Mixed-Methods Design, combining qualitative and quantitative approaches to investigate the development and evaluation of an AI-based selfie application. It includes an observational study, market research, technology evaluation, and usability assessments.

4.1 Agile Project management

Agile project management was applied to ensure flexibility, adaptability, and continuous delivery. The project followed core Agile principles: prioritizing working solutions, fostering trust, and embracing change (Beck et al., 2001). A digital board in Jira was used to manage tasks, visualize progress, and maintain transparency. Regular reviews and iterative cycles enabled steady progress and timely adaptations.

4.2 Observational Study

This chapter outlines the methodological approach employed to document and analyse the "AI Selfie Box" photobooth at the Enter Museum in Solothurn, Switzerland. The observational study was conducted to systematically capture how the installation operated and how visitors interacted with it. Observational methods, as described by Apaolaza et al. (2013), are particularly effective for understanding user behaviour and environmental context in real-world scenarios.

A qualitative, unstructured observational approach was adopted, emphasizing the documentation of user interactions, system usage, and environmental factors. This flexible method allowed for comprehensive insights into the photobooth's operation and user engagement (Fetters & Rubinstein, 2019). Observations were recorded through detailed field notes and photographs, serving as both visual and contextual supplements (Creswell, 2013).

Real-time observations were conducted to identify patterns in user interaction and evaluate how the design supported or hindered the intended user experience (Kim et al., 2008). Particular attention was given to spontaneous verbal feedback, which often revealed users' immediate impressions, frustrations, or satisfaction with the system. Additionally, non-verbal cues such as body language and gestures were noted to provide further insight into the user experience (Norman, 2013).

To ensure reliability, triangulation was employed by conducting observations at different times of the day and targeting diverse visitor groups. This method aimed to capture a wide range of user behaviours and interactions (Hashemi et al., 2016). The recorded data were thematically structured, enabling systematic analysis and alignment with the study's objectives.

4.3 Market Research

The methodology for the market research conducted as part of this thesis focused on an analysis of existing AI-powered selfie applications. The primary objective was to examine these applications to gain insights into their functionalities, user interface design, user experience, and overall app flow. This research aimed to inform the conceptualization and development of a new AI selfie app tailored to user needs and preferences (Assi et al., 2021).

Structured qualitative approach was employed to conduct the analysis. First, a comprehensive identification of existing AI selfie applications was undertaken by exploring popular app stores, specifically the iOS App Store (*App Store*, n.d.) and Google Play Store (*Google Play*, n.d.). The selection criteria focused on applications that either specialized in AI image generation or included it as a secondary feature.

Three primary applications were selected for in-depth analysis: Picart (*Picsart AI*, n.d.), Dawn AI (*Dawn AI - AI Avatars*, n.d.), and Snow (*SNOW - AI Profile*, n.d.). Each application was systematically explored through hands-on analysis, focusing on their AI-based features. The examination included the entire user journey, starting from the onboarding process and proceeding to the generation of AI-enhanced images.

Emphasis was placed on evaluating specific features such as style options, photo input flexibility, notification systems, and personalization capabilities. The findings from this analysis were synthesized to identify patterns, best practices, and areas for improvement that could guide the design of the proposed AI selfie app.

4.4 Technology Research and Selection

The selection of technologies for developing the AI-based selfie app involved a systematic evaluation of three cross-platform frameworks: Flutter (*Flutter on Mobile*, n.d.), React Native (*React Native*, n.d.), and Kotlin Multiplatform (*Kotlin Multiplatform*, n.d.). The analysis focused on their ability to address the required key features. These frameworks were analysed based on their performance attributes, long-term scalability, development efficiency, and ability to meet the project’s requirements.

React Native was chosen as the framework for its robust ecosystem, JavaScript-based development, and strong community support. Its ability to create natively rendered mobile applications aligns with the project’s emphasis on usability. Additionally, React Native's integration with Expo documentation streamlined the development process by providing preconfigured templates, state management, and routing functionalities (*Get Started with React Native · React Native*, 2024; *Introduction*, n.d.).

For database integration, Supabase as selected due to its scalability and its ability to handle the data of the application. Supabase's integrated storage capabilities and seamless API setup made it a suitable choice for managing the project's data efficiently (Supabase, n.d.-a, n.d.-b).

The development of the application was carried out using IntelliJ IDEA as the primary coding environment. An Android emulator form Android Studio was used to test and simulate the app throughout the development process (JetBrains, n.d.; Android Developers, n.d.).

The implementation of the mobile application utilized EAS Build, a service provided by Expo, to streamline the build and deployment process for both Android and iOS platforms. This approach was chosen due to its capability to manage cross-platform development efficiently, ensuring a seamless integration of platform-specific features without requiring significant modifications to the codebase. EAS Build facilitated the automation of complex tasks such as code signing and dependency management, reducing the potential for errors and expediting the development cycle (Expo, 2024). By leveraging this service, the project benefited from a consistent and reliable build process, aligning with the goal of delivering a polished and functional application within the constraints of the project timeline.

4.4.1 Utilized Libraries

The project primarily utilized libraries from the Expo ecosystem to simplify and streamline development. For image selection, the expo-image-picker library was employed, allowing users to choose images directly from their device galleries (*ImagePicker*, n.d.). To facilitate saving the generated images back to the user's gallery, expo-media-library (*MediaLibrary*, n.d.) and expo-file-system (*FileSystem*, n.d.) were integrated, ensuring efficient and reliable storage functionality.

Face detection was implemented using the React Native ML Kit library (*ML Kit | Face Detection*, n.d.), which was selected due to its ability to detect faces and get their facial landmark like their eyes, eyebrows, lips, and nose. This functionality was critical to ensuring the quality of images sent to the AI for further processing.

4.5 Development Process

The development of the AI-based selfie app followed an agile, iterative methodology, which supported incremental progress and continuous refinement. By dividing the application into smaller, manageable components, functional features were delivered in stages, enabling regular feedback and alignment with project requirements.

The architecture followed the Model-View-Controller (MVC) pattern, which ensured a clear separation of concerns between the user interface, business logic, and data management layers (Davis, 2008). For handling data operations, the repository pattern was implemented to decouple the business logic from the underlying data storage (Ampatzoglou et al., 2013). API integration employed a facade design, simplifying interactions with external services by providing a consistent abstraction while encapsulating underlying complexities (Freeman et al., 2004).

React Native's component-based architecture facilitated the development of reusable and modular components. The application of SOLID principles further ensured that components adhered to single-responsibility rules, making the codebase easy to extend and maintain (Gary McLean Hall, 2017).

Jest was chosen as the testing framework due to its simplicity, speed, and wide adoption in JavaScript-based projects (*Jest*, n.d.). The modular architecture of the application aligned well with Jest's capabilities, enabling efficient and isolated testing of components (*Unit Testing with Jest*, n.d.).

4.6 Design Process and Principles

The design process of the application was rooted in research-based decisions, ensuring that the interface was both aesthetically appealing and functionally effective. The design and prototyping phases were carried out using Figma, a collaborative interface design tool. Figma enabled the creation of high-fidelity prototypes that allowed for iterative testing and refinements (*Figma Prototype*, n.d.).

4.6.1 Colour Scheme and Typography

The first step involved selecting typography and colour schemes. Typography decisions were guided by principles of readability and legibility, with a focus on simplicity. A modern sans-serif font was chosen for its clarity and suitability for mobile screens. This decision was informed by established user interface design guidelines emphasizing the importance of clear and accessible text in mobile applications (Hojjati & Muniandy, 2014). Similarly, colour choices were made to evoke engagement and align with the app’s creative and generative nature. Vibrant colours were used strategically to draw attention to interactive elements, while neutral tones provided balance and avoided visual fatigue. Research has shown that lively, vibrant colours and modern interfaces that are easy to navigate enhance the appeal of apps (Chan et al., 2017).

4.6.2 Design principles for Generative AI Features

The integration of design principles specific to generative AI played a pivotal role in shaping the application. These principles, as outlined by Weisz et al (2024) (Weisz et al., 2024)highlighted the importance of leveraging generative variability, aligning system behaviour with user expectations, and accommodating the inherent imperfections of generative outputs. The design intentionally harnessed the capacity of generative AI to produce diverse and customizable results, thereby enabling users to explore creative possibilities within the app (Weisz et al., 2024).

By focusing on simplicity and emphasizing core functionalities such as profile creation and image generation, the application adhered to mobile UX principles advocating for clarity and task-focused interactions. These decisions reflect a broader commitment to ensuring that the design supports user needs effectively and aligns with best practices in mobile application development (Pinchot, 2020).

4.7 System Usability Scale

The first prototype of the application was subjected to usability testing using the System Usability Scale (SUS) to assess its effectiveness, efficiency, and user satisfaction. The SUS questionnaire, a standardized tool comprising ten items rated on a five-point Likert scale, was administered following the completion of specific usability tasks (Brooke, 1995).

Ten participants seen in Table 1 were recruited for the usability study, each of whom was asked to perform two key tasks seen in Table 2. These tasks were selected as they represent the core functionalities of the application and are critical to its overall user experience.

Participant No.	Age	Gender	Branch of Occupation/Study
P1	28	Female	Technical Support
P2	24	Male	Zoology
P3	25	Female	Facility Management
P4	31	Male	Retail Management
P5	51	Female	Homemaker
P6	35	Female	UI/UX Design
P7	16	Female	Secondary Education
P8	18	Male	Apprenticeship in Biochemistry
P9	41	Male	Computer Science
P10	36	Male	Retail

Table 1: Participant Demographics (Age, Gender, and Branch of Occupation/Study)

Usability Task No.	Task Description
UT1	Create a new Profile
UT2	Generate images in the “Watercolour” style

Table 2: SUS - Usability tasks

Upon completing the tasks, participants were asked to rate their experience using the SUS questionnaire. The results provided a quantitative usability score, ranging from 0 to 100, with higher scores indicating better usability. This process enabled the identification of potential usability issues in the early stages of the design development, guiding subsequent refinements to the application.

5 Result

5.1 Observational Study Findings

The observational study at the Enter Museum revealed key insights into the "AI Selfie Box" photobooth's functionality, user experience, and operational challenges. These findings, derived from field notes, photographs, and real-time observations, are summarized below.

Visitors generally reported positive experiences with the "AI Selfie Box," appreciating the smooth and intuitive process of generating AI-enhanced images. The system's clear, step-by-step guidance helped minimize confusion and ensured a comfortable interaction for users. The inclusion of a quiz during the waiting period was well-received, offering entertainment while photos were processed. Visitors also appreciated the flexibility of exploring other parts of the museum during this time.

The unique login code feature, allowing users to return later to continue generating images, was noted as a convenient aspect of the system. However, some users expressed disappointment when logging out resulted in the loss of access to their previously generated images. This limitation highlighted the need for longer storage periods or session-saving features to improve user satisfaction.

Overall, the photobooth provided an engaging and educational introduction to AI technology, demonstrating a balance between entertainment and learning. However, areas for improvement were identified, particularly regarding image consistency and session retrieval.

5.2 Market Research Insights

The market research yielded valuable insights into the features and functionalities of AI-driven selfie applications, highlighting trends and identifying strengths and limitations that could inform the development of the proposed AI-powered selfie app. Through detailed exploration of the selected applications, Picsart, Dawn AI, and Snow, patterns in user experience, design principles, and feature integration were observed.

One of the central outcomes of the research was the identification of the significance of balancing complexity with simplicity in user interactions. During the AI Selfie Box field study and app exploration, it became apparent that an overload of prompts or customization options can overwhelm users. This finding aligns with the principle that too many choices may hinder the decision-making process and detract from user satisfaction (Ezenwoke & Adigun, 2021). Picart, Dawn AI and SNOW streamlined the selection process by offering predefined style categories, provided a more intuitive experience, reducing cognitive load while still allowing for creative exploration. In return the users get to generate multiple outputs to help produce the ones that fits their needs.

Another notable finding concerns the flexibility in photo input methods. The apps, such as Dawn AI and Picsart, allowed users to upload existing images directly within the app. This flexibility not only saved time but also provided users with more control over the quality and angles of their photos. Additionally, offering clear visual guidance on photo quality, so users get best possible outcomes.

The research also highlighted the importance of timely feedback during the image generation process. In Dawn AI, the implementation of a notification system that informs users once their images are ready proved to be a highly appreciated feature. This system allowed users to engage in other activities while waiting for the AI to complete its task, thereby enhancing convenience. Similarly, during the AI Selfie Box experience, users benefited from being able to explore other exhibits while awaiting the completion of their personalized images. Therefore, incorporating a similar notification feature in the new app would be advantageous, as it reduces idle time, ultimately contributing to a more seamless user experience.

Furthermore, the inclusion of a profile feature was identified as a crucial component for fostering long-term engagement. Apps like Dawn AI, which offer a persistent profile feature, allow users to store previously generated images and revisit them later. This capability not only enhances the personalization aspect of the app but also encourages repeated usage by providing a sense of continuity. In contrast, the AI Selfie Box did not retain generated images after the session, which limited users’ ability to revisit their creations. Consequently, integrating a profile feature that saves users’ images and allows for easy retrieval is good for the proposed application.

To summarize, the Table 3 below highlights the key features identified in the analysed applications. These features will be considered for implementation in the AI Selfie App to enhance user experience and engagement.

Feature	**Picsart**	**Dawn ai**	**Snow**
Variety of Style Options	Yes	Yes	Yes
Picture Guidelines	Yes	Yes	Yes
Image Quality Scanning	Yes	No	No
Instant Image Processing	No	No	Yes
Notification System	No	Yes	No
Profile for Saving Generated Images	No	Yes	Yes

Table 3: Market Research - comparison of key features

In conclusion, the results of the market research emphasize the need for a user-centric design that balances simplicity and creative flexibility, provides timely feedback, and ensures long-term engagement through persistent profiles. By leveraging the insights gained from existing applications and the AI Selfie Box field study, the proposed AI-powered selfie app can offer a differentiated, intuitive, and engaging user experience that meets the evolving expectations of its target audience.

5.3 AI Selfie App Concept

Building upon the findings from observational studies, comprehensive market research, and established design principles for generative AI applications, the conceptual framework for the AI Selfie App was developed to integrate key features and ensure a seamless user experience. This section outlines the foundational elements of the app, highlighting essential functionalities designed to enhance user engagement and accessibility.

5.3.1 AI Styles - Home/Explore Screen

The primary interface of the AI Selfie App is centred around two main tabs: the Home/Explore Screen and the Profile Screen. The Home/Explore Screen, as shown in Figure 21, is designed to showcase pre-selected AI styles, such as Watercolour, Celestial, Mermaid, and Ferrotype Vintage. These styles provide users with creative options for generating AI-enhanced images, catering to diverse aesthetic preferences. To encourage personalization and sustained user engagement, additional styles can be introduced over time, allowing the app to evolve with user demands.

The style selection process is enhanced through visually dynamic elements, including interactive images and animations, which are designed to build anticipation and excitement for users, as illustrated in Figure 22. This immersive approach ensures a visually engaging experience while maintaining ease of navigation. Users can choose to create a new profile or select an existing one, as shown in Figure 23.

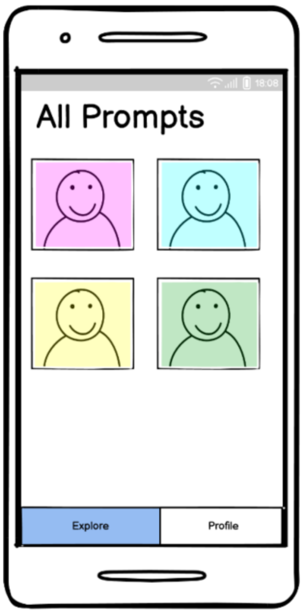

Figure 21: Wireframe Concept – Home screen

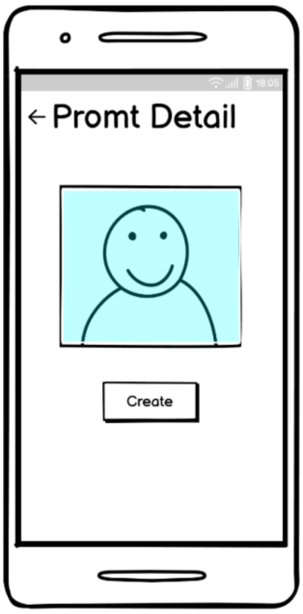

Figure 22: Wireframe Concept – Prompt detail screen

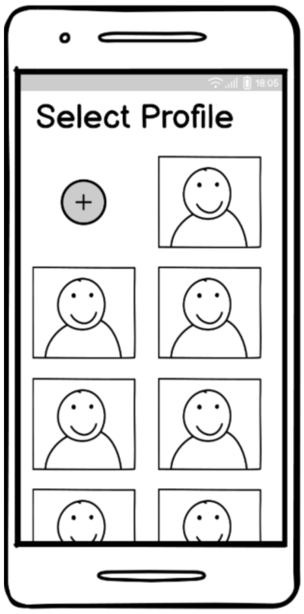

Figure 23: Wireframe Concept –Profile selection screen

5.3.2 Profile

The Profile Screen provides a centralized location for managing user profiles and generated images. As depicted in Figure 24 and Figure 25, this screen allows users to create, store, and manage their content effectively. The intuitive layout ensures that users can easily access previous outputs, with features designed to support multiple profiles within the app. The Profile Detail Screen, which provides an expanded view of individual profiles, enables users to revisit their generated images with ease.

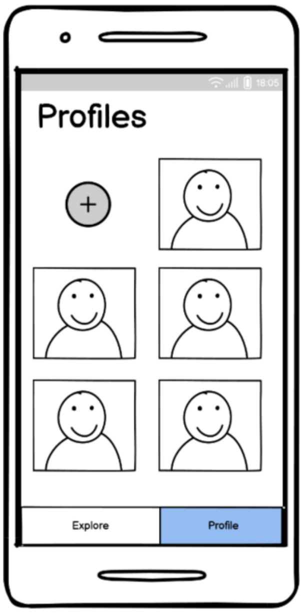

Figure 24: Wireframe Concept – Profile screen

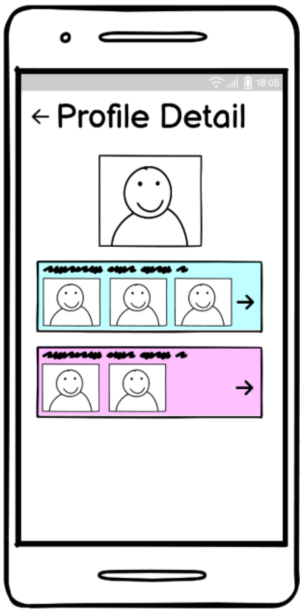

Figure 25: Wireframe Concept – Profile detail screen

5.3.3 Image Upload

A guided image upload process, as demonstrated in Figure 26, ensures high-quality results by providing users with instructions of acceptable and unacceptable images. This feature offers detailed guidelines, helping users understand critical factors such as proper lighting, facial visibility, and the exclusion of obstructions like sunglasses. These measures are designed to improve the accuracy and consistency of AI-generated outputs.

To further enhance the reliability of the image generation process, a picture verification step is included to ensure that uploaded images meet the required criteria. Unsuitable images, such as those with multiple faces or poor lighting, are flagged and excluded from processing, with users receiving visual feedback to guide them in uploading better images as shown in Figure 27.

The app also incorporates a notification system, allowing users to receive in-app and push notifications once their images are ready like shown in Figure 28. This feature minimizes idle time and enables users to engage with other areas of the app or leave the platform temporarily while their images are processed.

Eventually a number of generated images are listed as shown in Figure 29 for the user to eventually choose and save to their profile.

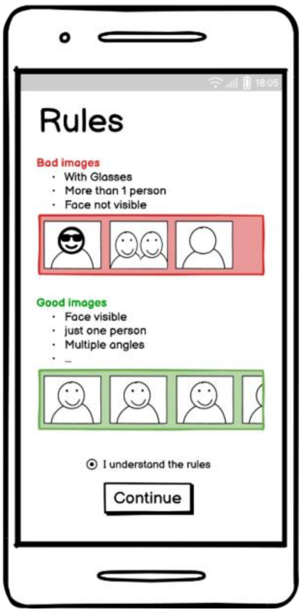

Figure 26: Wireframe Concept – Rules

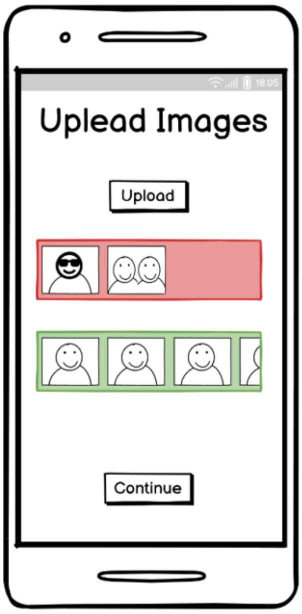

Figure 27: Wireframe Concept – Uploaded images screen

Figure 28: Wireframe Concept – Notification

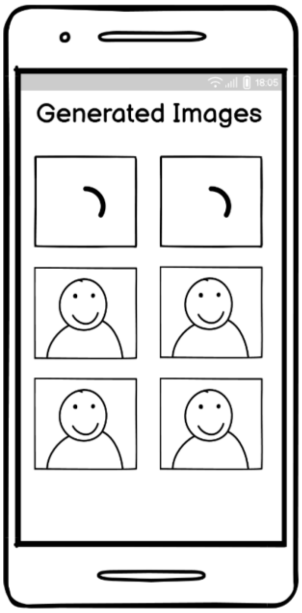

Figure 29: Wireframe Concept – generated images

5.4 Development

This section outlines the technical implementation of the AI Selfie App, detailing the system architecture, database and storage integration, AI model interaction, image upload and validation process, and the overall app design. Each subsection delves into the specific components and methodologies employed to build the application.

5.4.1 System Architecture and Design

The system is implemented using a layered architecture that adheres to the Model-View-Controller (MVC) pattern, with the addition of the Repository and Service patterns. How these elements interact with each other is illustrated in Figure 30, which depicts the components and their relationships, with each component labelled by number.

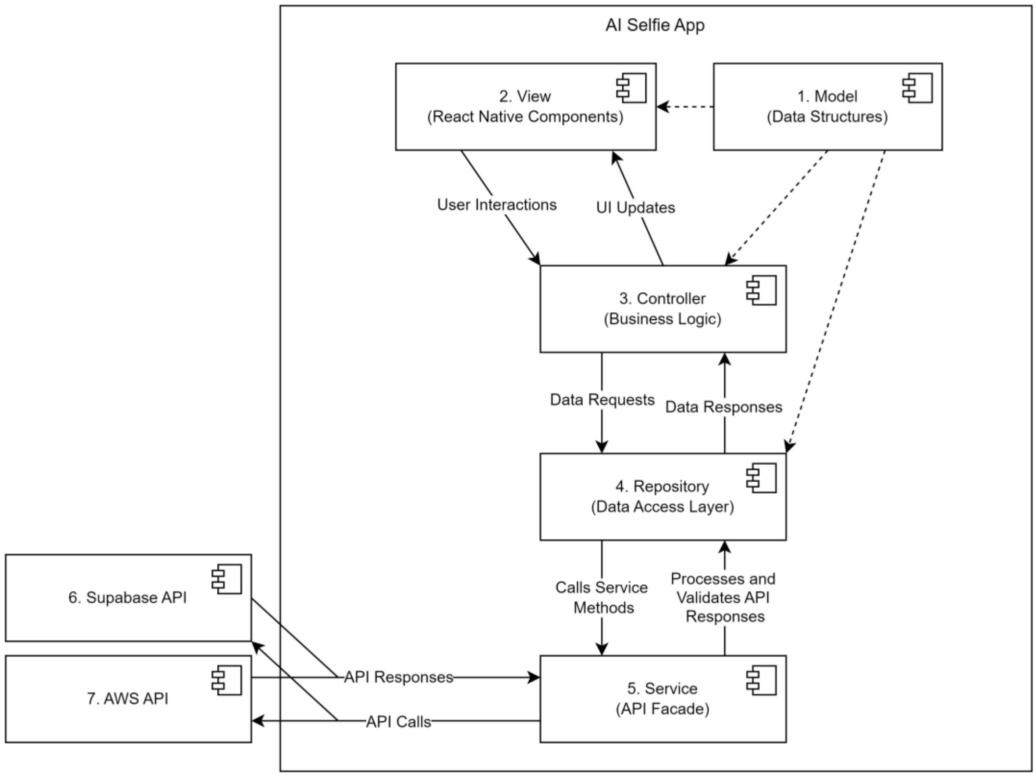

Figure 30: Component diagram – AI Selfie App

The View, as shown as number one in Figure 30, consists of React Native components. These components are responsible for the user interface and user interaction. They render the data received from the Controller and capture user inputs. These inputs are then passed to the Controller for processing. The View is the only layer directly visible to the end user and acts as the entry point for user interactions with the application.

The Model, represented as number two in Figure 30, defines the structure of the data used within the system. It is implemented using TypeScript types and interfaces, ensuring type safety and consistency. The Model remains passive and does not perform any operations. It serves as a schema for the data that flows between other parts of the architecture.

The Controller, represented as number three in Figure 30, serves as the central processing unit for the application. It handles all business logic and acts as a mediator between the View and the underlying data layers. For instance, when a user triggers an action in the View, the Controller processes the input, determines the necessary operations, and communicates with the Repository to fetch or modify data. After processing the data, the Controller sends the updated information back to the View for rendering.

The Repository, denoted as number four in Figure 30, provides an abstraction for data access. It includes methods for fetching, saving, and updating data. The Repository interacts solely with the Service layer, delegating all external API calls to it. This ensures that the data access logic is centralized and decoupled from the specifics of API communication.

The Service, shown as number five in Figure 30, acts as a facade for external API interactions. It encapsulates all the complexity of communicating with external systems, such as constructing API requests, managing authentication, and handling errors. These methods ensure that the Repository can work with a consistent interface, irrespective of the underlying API.

The External APIs, including Supabase as number six and AWS as number seven in Figure 30, provide the external backend functionalities required by the application. Supabase and AWS are treated solely as external API connections, and only the Service layer interacts directly with them.

5.4.2 Database and Storage with Supabase

The database and storage system were implemented using Supabase, with the schema comprising four primary tables: Prompt, Profile, Image, and Selfie. As illustrated in the schema diagram in Figure 31, with each table labelled by number.

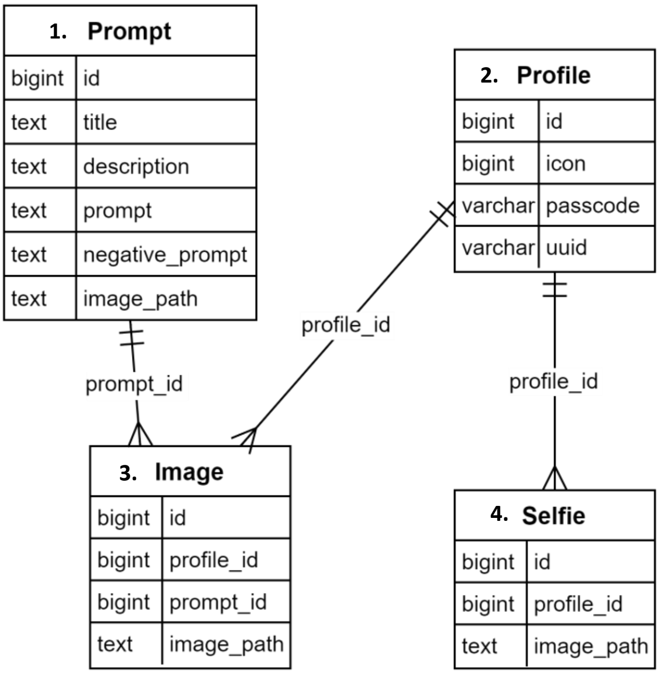

Figure 31: Database schema diagram

The Prompt table, labelled as number one in Figure 31, stores information related to predefined AI styles used in the application.

The Profile table, shown as number two in Figure 31, represents user-specific data and serves as the central entity linking user-related information across the schema.

The Image table, labelled as number three in Figure 31, handles metadata for AI-generated outputs, maintaining associations with both user profiles and prompts.

The Selfie table, labelled as number four in Figure 31, stores references to user-uploaded selfies and links these to the corresponding profiles.

Supabase's storage system complements the database by managing user-uploaded selfies and AI-generated images. Each file stored in the system is associated with a unique identifier that links it to its corresponding database entry, ensuring consistency and traceability throughout the application. The storage system's directory structure is logically organized to align with user profiles and their associated files, as illustrated in Figure 32. The storage system employs a hierarchical structure, with each profile ID serving as the root folder. Within each root folder, subfolders are designated for user selfies and AI-generated images. This organization facilitates efficient file management and retrieval, supporting seamless integration with the database.

```
Profile/
    Id/
        Selfies/
            [All user-uploaded selfies filename is 01
            and up since only once can selfie be up-loaded]
        Images/
            [All AI-generated images filename is date.now()]
```

Figure 32: Supabase Storage - Directory structure

Connections to both the database and storage systems are established using the Supabase API. The Supabase client is configured with the project's unique URL and public API key, ensuring secure and reliable communication. Interactions with the database and storage are separated into two dedicated files: supabase-database.ts and supabase-storage.ts. Both files utilize the Supabase client to perform operations specific to their respective domains. The implementation of the client is demonstrated in the code snippet from the file supabase-client.ts, as shown in Figure 33.

```
/**
 * Initializes the Supabase client with the specified configuration.
 */
const supabase: SupabaseClient<Database, 'ai_selfie_app'> = createClient(
    Config.supabaseUrl,
    Config.supabaseKey,
    { db: { schema: 'ai_selfie_app' } },
);
```

Figure 33: Code - supabase-client.ts

5.4.3 AI Model API

The integration of the AI Model API was implemented using a structure similar to the setup with Supabase. The API itself originates from the AI Selfie Box and serves as the foundation for handling AI-related operations.

The interaction with the AI Model API is facilitated through two files: aws-client.ts and aws-service.ts. The aws-client.ts file is responsible for configuring the API connection and handling low-level setup tasks. The aws-service.ts file provides a higher-level abstraction, encapsulating the REST operations required for interacting with the API.

As depicted in the component diagram in Figure 30, repositories have access exclusively to the aws-service.ts file. This design ensures that all API-related operations are mediated through the Service layer, maintaining a clean separation of concerns and abstracting the specifics of API interaction from the rest of the system.

5.4.4 Image Upload and Face Detection

The image selection was implemented using the Expo Image Picker library (*ImagePicker*, n.d.). As demonstrated in the code snippet in Figure 34, , the library was configured to allow users to select only images from the device’s gallery, with support for multiple image selection.

```
const result :ImagePickerResult = await ImagePicker.launchImageLibraryAsync({
    mediaTypes: ['images'],
    allowsMultipleSelection: true,
});
```

Figure 34: Code snippet - ImagePicker in image-picker.tsx

Before users can proceed with selecting and uploading images, a modal was implemented to display guidelines for acceptable and unacceptable images. As illustrated in Figure 39, this modal informs users about the importance of proper lighting, visible and unobstructed faces, and the exclusion of accessories such as sunglasses.

The face detection was implemented using the React Native ML Kit library (*ML Kit | Face Detection*, n.d.). Using the URI of the selected image, the library identifies all faces in the image and detects their facial landmarks. For this project, the primary requirement was to ensure that the eyes were visible, which was determined by evaluating the eyes' openness. The ML Kit library provides attributes, rightEyeOpenProbability and leftEyeOpenProbability, for each detected face. These attributes use a scale ranging from 0 (closed or not detected) to 1 (fully open), as defined by ML Kit's classification system (*ML Kit | Classification*, n.d.). A threshold of 0.8 was established for eye openness based on initial tests conducted with the ML Kit library. This threshold was chosen because it consistently differentiated open eyes from closed eyes within the context of this application. Images that failed to meet the defined criteria, including those containing multiple faces, undetectable faces, or obscured facial features, were flagged and excluded from submission. Users were visually notified of these exclusions through a feedback mechanism, as depicted in the screenshot in Figure 35.

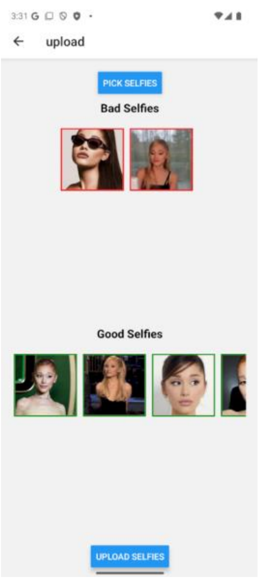

Figure 35: AI-Selfie-App: Selected images

5.4.5 Final Implementation

The implementation of the application was guided by the initial concept wireframe. Most of the screens and views were developed based on this wireframe, ensuring consistency between the conceptual design and the final product. The application is divided into two primary tabs: the Home/Explore screen and the Profiles screen. The Home screen displays the available AI styles, while the Profiles screen provides an overview of all user profiles, as illustrated in the captured screenshots in Figure 36 and Figure 37, respectively. All view components were implemented using reusable React Native components to promote modularity and maintainability.

Figure 36: AI-Selfie-App - Home screen

Figure 37: AI-Selfie-App - Profiles screen

Figure 38: AI-Selfie-App - Profile seleciton modal

A new profile can be created by selecting the box with the plus icon, as depicted on the Profiles screen in Figure 37 , or within the profile selection modal, as illustrated in Figure 38 . This action redirects the user to the upload interface. Before the upload begins, a modal, shown in Figure 39 , outlines the guidelines for acceptable selfies. Once the user accepts the guidelines, the gallery is opened, allowing for the selection of multiple images simultaneously.

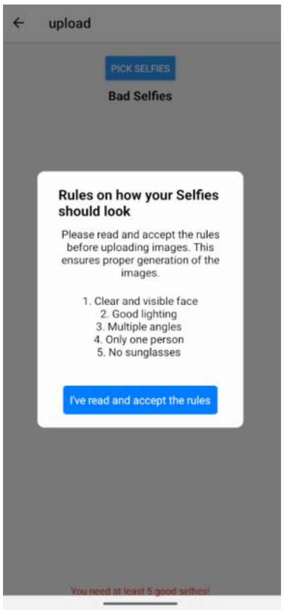

Figure 39: AI-Selfie-App: Rules modal

After the images are selected, face detection is performed in the background. The application visually separates the selfies based on quality, with acceptable selfies highlighted in green and unacceptable ones in red, as previously shown in Figure 35. Users are required to select at least five good selfies to proceed. Once this criterion is met, the user can upload the images. After the upload is completed, the user is redirected to the Profiles screen, as shown in Figure 37 , where the newly created profile is displayed with a message indicating that the AI model is still in the training phase.

When the AI training process is complete, users can begin generating images. On the Home/Explore screen, as shown in Figure 36, users can select an AI style. A trained profile can then be chosen from the modal, which is depicted in Figure 38 , and the desired gender neutral, female, or male can be selected, as shown in Figure 40. Once all selections are confirmed, the image generation process begins, producing four images at a time. Users can continue generating additional images or select and save specific ones, as illustrated in Figure 41.

After saving the images, users are redirected to the profile detail page, as shown in Figure 42, for the respective profile. This page displays all the generated images for each AI style. Specific images can be viewed in detail and saved to their device gallery, as depicted in Figure 43. This workflow ensures that the generated content is easily accessible and organized within the application

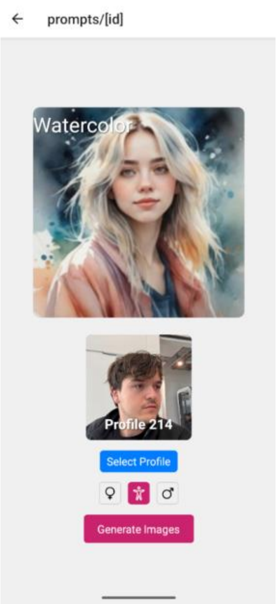

Figure 40: AI-Selfie-App – Profile & gender selection

Figure 41: AI-Selfie-App – Generated images

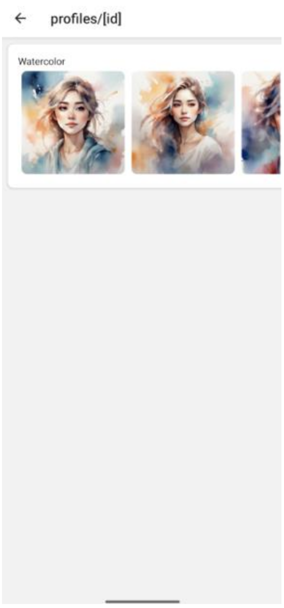

Figure 42: AI-Selfie-App – Profile detail view

Figure 43: AI-Selfie-App – Generated image detail view

5.4.6 Testing

The testing phase focused on critical parts of the application, specifically the service files responsible for API connections and the helper files that handled various utility functions, such as data conversions. These components were identified as essential for ensuring the reliability and functionality of the system.

Unit tests were created to validate the functionality of these files. For the service files, the tests ensured proper communication with external APIs, verifying that requests were constructed correctly, and responses were processed as expected. The helper files were tested to confirm the accuracy and consistency of their operations, such as image data conversion.

All tests were executed successfully, with the results confirming the correctness of the implemented logic and the stability of the tested components, as seen in the screenshot of the test results in Figure 44.

```
Test Suites: 6 passed, 6 total
Tests:       18 passed, 18 total
Snapshots:   0 total
Time:        1.011 s, estimated 2 s
Ran all test suites.
```

Figure 44: Jest test results

5.5 Design

This section provides an overview of the design decisions, usability test results, and the final design prototype of the AI Selfie App. It highlights the style choices that shaped the app's visual identity, the findings from the System Usability Scale (SUS) evaluation, and the outcomes of the final design iteration.

5.5.1 Style Decisions

For the AI Selfie App, Poppins and Inter were chosen as the primary typefaces due to their suitability for modern digital interfaces. Poppins, with its geometric sans-serif design, provides a clean and contemporary aesthetic ideal for headers (*Poppins*, n.d.). Inter, specifically designed for optimal screen readability (*Inter Font Family*, n.d.). Together, these typefaces were selected for a to enhance both functionality and visual appeal.

The colour palette as shown in Figure 45 was selected to achieve a balanced yet visually engaging interface. A soft off-white background and dark brown font colour were used to reduce eye strain and create a minimalistic appearance. Vibrant accents, including pink, light blue, orange and purple, were employed to highlight interactive elements, contributing to an intuitive and user-friendly design.

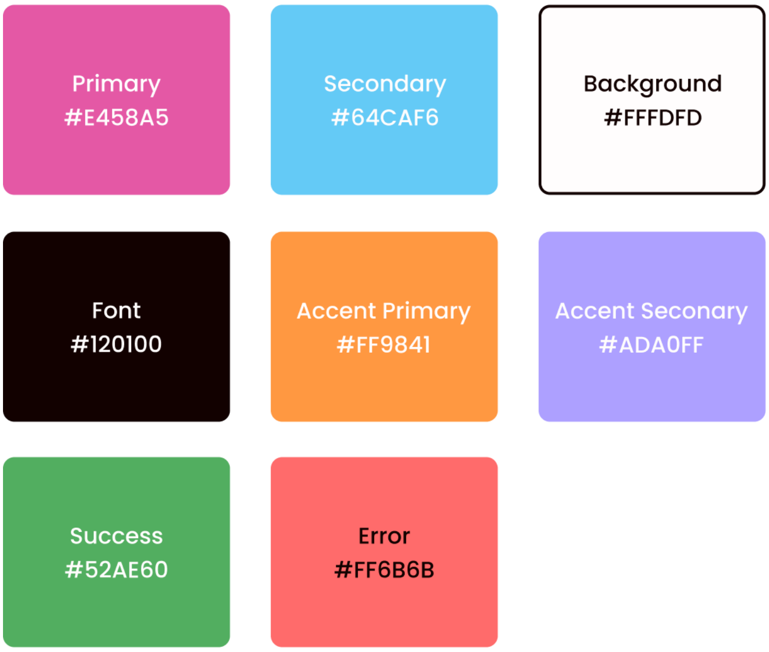

Figure 45: Colour palette

5.5.2 SUS Usability Results

The usability of the AI Selfie App was evaluated using the System Usability Scale (SUS) with ten participants. The overall SUS score was calculated at seventy-three, surpassing the benchmark of sixty-eight and indicating above-average usability (Lewis & Sauro, 2018). This result demonstrates that the app effectively meets user needs and expectations. An analysis of individual SUS questions, as shown in Table 4 and their results shown in Figure 46 offered deeper insights into the app's performance. Statements such as "I thought the app was easy to use" and "I felt very confident using the app" received high scores, confirming that participants generally found the app intuitive and accessible. Conversely, negatively phrased items like "I think I would need the support of a technical person to use this app" scored low, further reinforcing the app's positive usability perception.

However, the question "I found the app unnecessarily complex" revealed some disparities among participants. While most users found the app straightforward, a few highlighted elements they considered less intuitive or overly detailed. Participant feedback identified specific areas where additional guidance, such as tutorials or onboarding tools, could improve the user experience. Variability was also noted in responses to the question, "I think that I would like to use this app frequently." While some participants gave high ratings, others provided lower scores, indicating differing levels of engagement and potential use cases for the app.

Nr.	Question
1	I think that I would like to use this App frequently.
2	I found the App unnecessarily complex.
3	I thought the App was easy to use.
4	I think that I would need the support of a technical person to be able to use this App.
5	I found the various functions in this App were well integrated.
6	I thought there was too much inconsistency in this App.
7	I would imagine that most people would learn to use this App very quickly.
8	I found the App very awkward to use.
9	I felt very confident using the App.
10	I needed to learn a lot of things before I could get going with this App.

Table 4: SUS questions

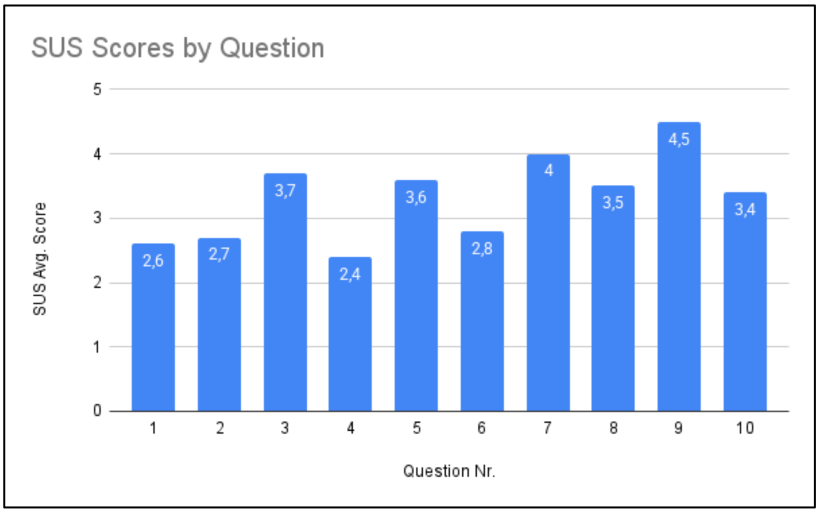

Figure 46: SUS average scores by question

5.5.3 Final Design Result

The final design represents the culmination of the iterative development process and incorporates feedback obtained from usability testing. Based on these insights, a high-fidelity prototype was created using Figma, refining the user interface and ensuring a user-centric experience. This section presents the final design with screenshots of the application’s key features, showcasing the polished interface and its functionality.

The order in which the screens are presented follows the natural user flow through the application, providing a clear understanding of how users interact with the app.

When the application is opened, the first screen displayed is the Home/Explore screen, where users can view all available AI styles. This screen serves as the starting point for exploring the app's capabilities and is shown in Figure 47. By clicking on an AI style, users are directed to the AI style detail view, as illustrated in Figure 48. This screen provides additional information about the selected style and includes a dynamic, moving background, adding an engaging and visually appealing element to the user experience.

From this view, users can proceed to select a profile. When doing so, the profile selection modal is displayed, as seen in Figure 49. This modal allows users to choose an existing profile or create a new one, facilitating seamless navigation between the app's features.

A new profile can be created by clicking on the box with the plus sign, which initiates the profile creation process. The first screen in this process is the guidelines modal, as shown in Figure 50. This modal provides users with detailed instructions on what constitutes a good selfie, including descriptions of acceptable photo qualities, such as proper lighting, visible and unobstructed faces, and the absence of accessories like sunglasses. Example images illustrating good selfies are also included for clarity. Additionally, the guidelines highlight what types of selfies to avoid, accompanied by corresponding example images of unacceptable photos.

After accepting the guidelines, users are directed to the upload selfie screen, depicted in Figure 51. This screen informs users that they must select at least five selfies to proceed. Upon clicking the upload button, the device's gallery is opened, allowing users to choose multiple selfies for submission.

After the user selects their selfies, the application automatically assigns each image to one of two categories: good selfies or not-so-good selfies. This categorization is displayed on the same screen, as shown in Figure 52 and Figure 53. The good selfies are prominently displayed at the top of the screen, while the bad selfies are shown in a smaller format below. This layout provides a clear and visual distinction between the two categories, helping users quickly identify the quality of their selected images. On this screen, users can take further actions, such as removing any of the good selfies they no longer wish to include. Also, two buttons are available: one for uploading additional selfies and another for continuing with the process. To proceed, users must ensure they have selected at least five good selfies.

Upon clicking continue, a pop-up modal appears with a message indicating that the selfies are being uploaded. This loading screen, as depicted in Figure 54, provides feedback to the user, ensuring clarity during the upload process. After the upload is complete, the user is redirected to the profile screen, where the newly created profile is now displayed. However, the profile is shown with a grey overlay and a label indicating "AI training," along with the estimated remaining minutes until the training is complete.

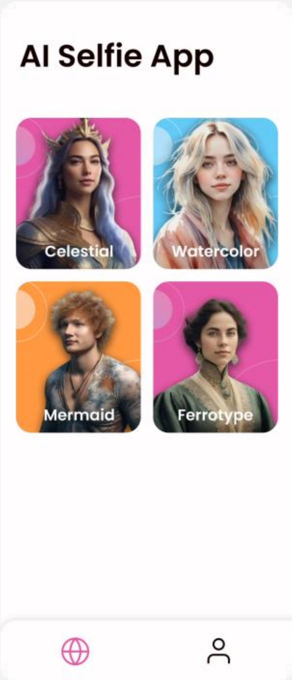

Figure 47: Design - Home/explore screen

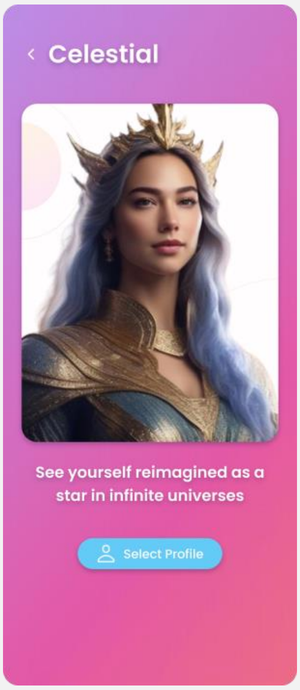

Figure 48: Design - AI style detail view

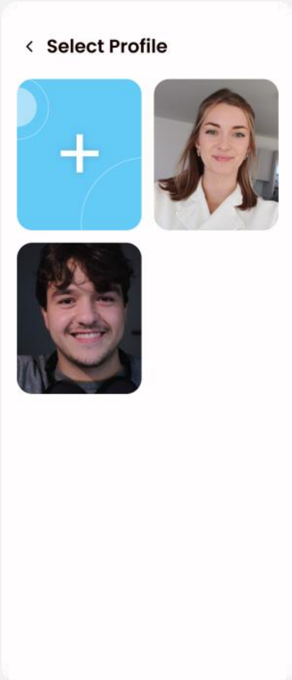

Figure 49: Design - Profile selection modal

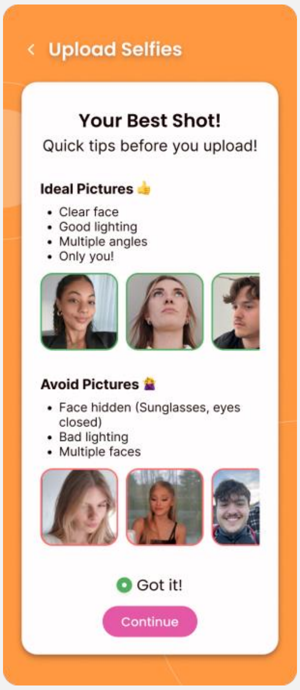

Figure 50: Design - Guidelines modal

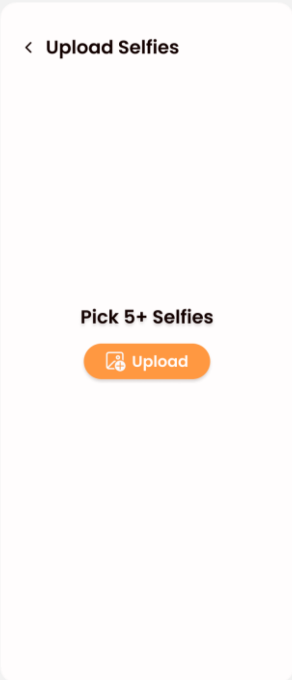

Figure 51: Design - Upload selfies screen

Figure 52: Design - Uploaded selfies assigned (good

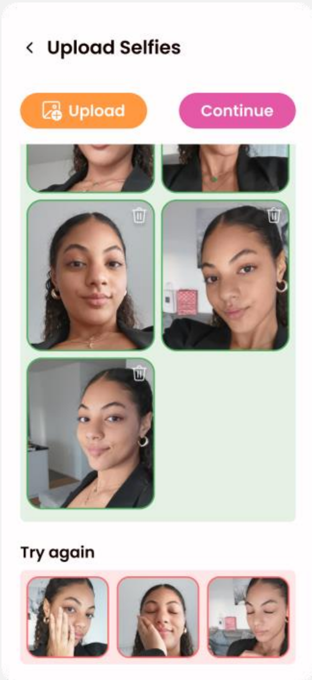

Figure 53: Design - Uploaded selfies assigned (good & bad)

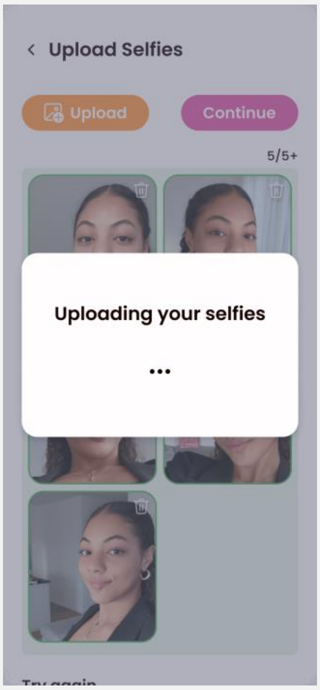

Figure 54: Design - Uploading selfies loading screen

The image generation process begins when the user selects an AI style and a profile that has completed its training. Once both selections are made, the user is directed to the image generation screen, as shown in Figure 55. On this screen, the application generates four images at a time. While the images are being generated, placeholders are displayed with a loading indicator, accompanied by a message informing the user that the process takes approximately one minute.

After the first set of four images is generated, the user can start reviewing and selecting the ones they prefer. Any generated images that do not meet the user’s expectations can simply be left unselected, as shown in Figure 56. Users also have the option to generate additional images if they wish to explore more variations before making their final selection, as shown in Figure 57 and Figure 58. Once the user has chosen their desired images, they can save these images, completing the generation process.

The Profiles screen, as shown in Figure 59, displays an overview of all user profiles. From this screen, users can select a profile to navigate to its detail view. In the Profile Detail screen, depicted in Figure 60, all generated images associated with the selected profile are listed. These images are grouped by their respective AI styles, simplifying organization and making it easier for users to locate specific outputs. To streamline navigation, these groupings are referred to as collections.

Within the Profile Detail screen, users can choose to view an entire collection, as shown in Figure 61. This view displays all generated and saved images for a specific AI style, offering a focused exploration of the outputs. Users can then open individual images from the collection for a closer look, as illustrated in Figure 62. In the single image view, users can navigate through the images using a slider, allowing closer exploration of the entire collection. From this view, users have several options: they can download individual images, download all images in the collection at once using one of the provided buttons, or generate additional images for the selected AI style.

With the diverse colour palette, the design was enhanced to emphasize its artistic and visual appeal. This included the implementation of gradient backgrounds and patterns, which introduced subtle artistic elements to the interface.

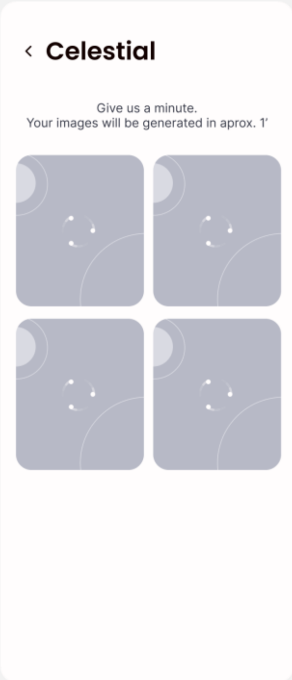

Figure 55: Design - Image generation screen, step 1

Figure 56: Design - Image generation screen, step 2

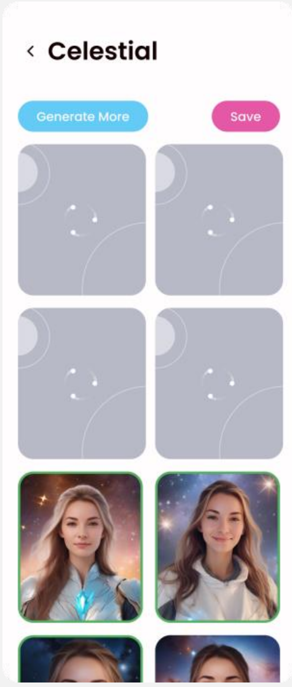

Figure 57: Design - Image generation screen, step 3

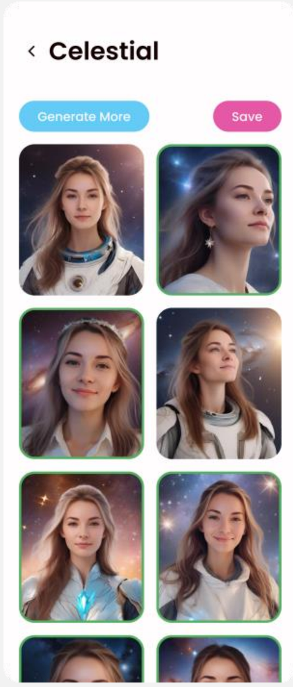

Figure 58: Design - Image generation screen, step 4

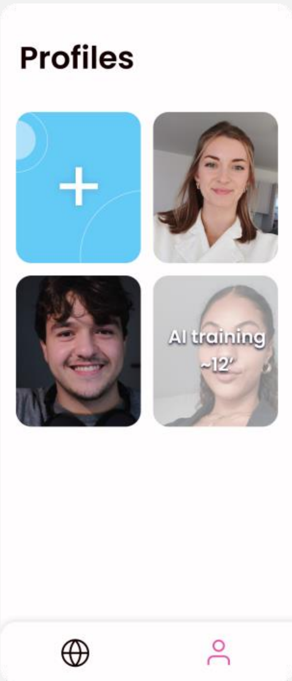

Figure 59: Design - Profiles screen

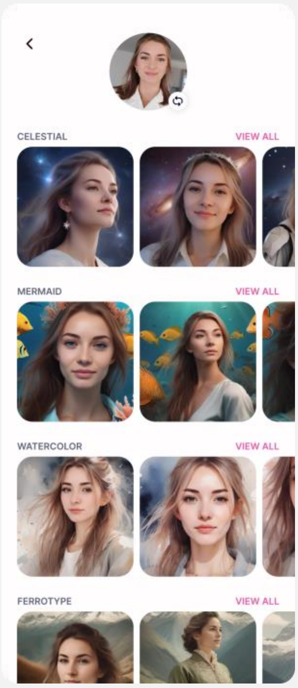

Figure 60: Design - Profile detail screen

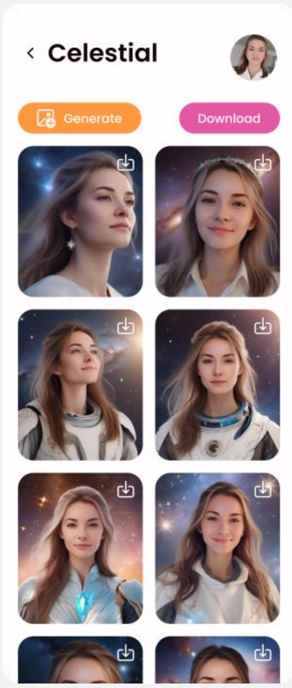

Figure 61: Design – Collection screen

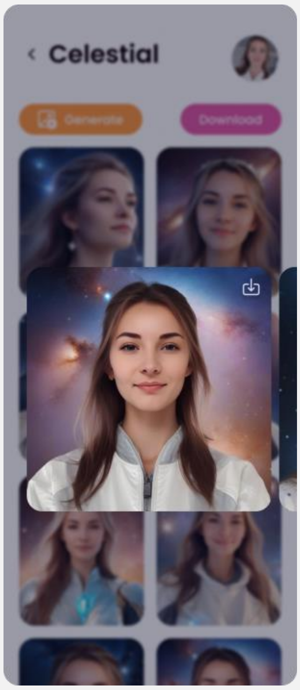

Figure 62: Design – Generated image detail screen

6 Discussion

This chapter evaluates the implementation and design outcomes of the project, assessing how effectively they address the identified objectives and project-specific questions. Additionally, limitations and future improvements are discussed to guide further development.

6.1 Implementation

The implementation of the system demonstrates a robust and extendable architecture, particularly through the use of the MVC pattern and the repository design. These design choices facilitated flexibility and modularity, enabling potential extensions with minimal changes to the core business logic. During the development and design phases, it was observed that introducing a new entity, such as a collection linking images and prompts, could improve functionality. Although this feature was not implemented due to time constraints, the current architecture supports seamless integration of such additions in the future.

Supabase proved to be a reliable backend solution, and its integration with the repository pattern enhanced maintainability. By separating concerns between the service and repository layers, the system achieved greater adaptability, ensuring that changes in data storage mechanisms would not disrupt the overall system's functionality.

The inclusion of a face detection library was critical in validating the viability of the image submission process. This mechanism ensured that user-uploaded images met the necessary quality criteria before being passed to the AI model, effectively addressing input suitability without requiring additional resources. Without this step, alternative approaches would have been needed, potentially increasing complexity.

The deployment process utilized EAS Build to generate functional builds for Android devices, enabling testing across various platforms. However, iOS deployment was restricted due to app signing requirements, limiting cross-platform testing. Despite this constraint, the system's functionality was successfully validated on Android devices.

Overall, the implementation aligns with the objectives outlined in project question A, demonstrating that the transition from a multi-camera setup to a single smartphone camera was feasible. The integration of face detection ensured that image quality was maintained, confirming the app's capability to adapt to this simplified hardware configuration.

6.2 Design Prototype

The usability evaluation using the System Usability Scale (SUS) revealed a score of 73, surpassing the benchmark of 68. This indicated that the design effectively met user expectations for intuitive navigation and overall usability. Positive feedback emphasized the app's intuitive flow and smooth functionality. However, variations in responses to specific questions highlighted areas for refinement. While most users found the app engaging, some noted a lack of tutorials, which could enhance accessibility for first-time users.

Initial usability evaluations using the SUS provided valuable feedback, highlighting areas for design refinement. While results for certain questions, such as user willingness to engage with the app frequently, varied among participants, these differences were attributed to personal preferences rather than usability issues.

For example, participants who rated lower explained that their scores were based on limited personal relevance rather than dissatisfaction with functionality. This nuanced feedback emphasizes the importance of considering user context when interpreting usability metrics.

One limitation in the final design prototype was the absence of a gender selection feature during image generation, which reduced personalization options. While this omission was not critical to functionality, addressing it in future iterations would improve alignment with user expectations.

Overall, the design strategies address project question B by ensuring an intuitive and engaging prompt selection and image generation process. The app's aesthetic and usability align with user needs, while the SUS results validate the effectiveness of the implemented design principles.

6.3 Future Work

Several planned features remain to be implemented, such as a notification system to minimize idle time during image processing. This enhancement would allow users to engage with other activities while awaiting completion of their images, improving overall user convenience. Additionally, restricting profile visibility to those uploaded by the same device would address privacy concerns, fostering greater user trust and control.

Conducting the UES-SHORT evaluation is recommended to gain deeper insights into user engagement and identify further areas for refinement. These insights, combined with iterative adjustments to the prototype, will support the transition to a finalized version that meets both functional and usability standards. By addressing the identified limitations and incorporating user feedback, the system will continue to align with its objectives and provide an intuitive and engaging experience.

7 Conclusion

The focus of this work was to conceptualize, design, and implement a mobile application for generating AI-enhanced selfies, addressing specific challenges related to user engagement, design, and technical feasibility. The project aimed to transition from a multi-camera AI Selfie Box setup to a single-camera solution, ensuring intuitive user experience and high-quality outputs, while incorporating modern design principles and usability testing.

The key objectives of the project were successfully achieved. A robust and scalable architecture was implemented, leveraging the MVC pattern and repository design to ensure flexibility and maintainability. The integration of a face detection library validated the hypothesis that high-quality images could be submitted directly by users, eliminating the need for complex hardware configurations. Additionally, Supabase was utilized as a reliable backend solution, and deployment to Android devices confirmed the functionality of the system. However, the iOS deployment could not be completed due to app signing constraints, limiting cross-platform validation.

In terms of design, the application effectively balanced visual appeal and usability. A diverse color palette, gradients, and artistic patterns contributed to the app's unique identity while maintaining an intuitive interface. Usability testing with the SUS revealed above-average scores, demonstrating that the app aligned with user expectations for functionality and accessibility. Nonetheless, areas for improvement, such as the inclusion of onboarding tools and the ability to select gender during image generation, were identified, indicating potential for future iterations.

While the project successfully met its primary objectives, some limitations were noted. Features such as a notification system and enhanced privacy controls remain incomplete but are documented for future implementation. Furthermore, the absence of a UES-SHORT evaluation limited insights into deeper user engagement metrics, which would provide valuable guidance for refining the prototype.

This project contributes to the broader understanding of how AI technologies can be adapted for creative and user-focused applications. By integrating technical reliability with artistic engagement, the app lays a foundation for continued exploration and innovation, which the bachelor thesis will build upon to further refine and enhance the intersection of AI and user experience.

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Declaration of Authenticity

«I the undersigned declare that all material presented in this paper project report is my own work and written independently only using the indicated sources. The passages taken verbatim or in content from the listed sources are marked as a quotation or paraphrased. I declare that all statements and information contained herein are true, correct and accurate to the best of my knowledge and belief. This paper or part of it have not been published to date. It has thus not been made available to other interested parties or examination boards.»

Thun, 17.01.2025

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Appendix

A Market Research - Detailed App Analyses