ÇANKAYA UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

CENG 407 – Software Design Description

Artificial Intelligence Based Art Gallery Mobile Application

Team Members:

Mehmet Emre KILINÇ 202111058

Mertcan ZAFER 202011076

Batuhan ÖZER 202011072

Emre Şahin DEMİRBAŞ 202011020

Tunahan GÜLTEKİN 202011005

Table of Contents

1. Introduction

1.1 Purpose

This Software Design Document (SDD) describes the architecture and system design of a mobile application designed to empower users to create artistic content using artificial intelligence (AI). The application transforms user-provided prompts into visually compelling images and accompanying narratives. This document is intended for stakeholders, including project managers, developers, and potential investors, to outline the technical approach, design decisions, and system functionality. By fostering a clear understanding of the application's structure and features, this document serves as a guide for successful implementation and future enhancements.

1.2 Scope

The mobile application leverages advanced AI models to enable users to generate unique images and associated stories based on user-provided textual prompts. Additionally, the application integrates social media functionalities, allowing users to follow others, view, like, and comment on artworks. To foster engagement, it offers in-app challenges that encourage creativity and community interaction.

The primary goals of the project are to:

1. Create a dynamic platform for sharing, appreciating, and critiquing user-generated content.
2. Stimulate user creativity through interactive and gamified challenges.

Key objectives and benefits include:

- Enhanced Creativity: Enable users to express themselves artistically through intuitive AI tools.
- Community Building: Facilitate a supportive community for art enthusiasts and creators.
- Engagement and Retention: Promote sustained user interaction through innovative challenges and social features.

This project aims to provide a unique blend of artistic empowerment and social connectivity, appealing to a broad spectrum of users ranging from hobbyists to digital art enthusiasts.

1.3 Overview of the Document

This document provides a comprehensive design overview for the software system being developed. It outlines the architecture, design components, and user interface aspects to ensure clarity and alignment among all stakeholders. The document is structured as follows:

- **System Overview:** Provides a high-level description of the system, including its objectives and functionality.
- **Architecture and Design:** Includes detailed diagrams for architecture, classes, and entity relationships (ER). This section defines how the system components interact with each other and with external systems.
    - **3.1 Architecture Diagram:** Visual representation of the system's high-level architecture.
    - **3.2 Class Diagram:** Illustrates the structure and relationships of the system's classes.
    - **3.3 ER Diagram:** Defines the system's data model, focusing on entities and their relationships.
    - **3.4 System Modelling:** Includes activity and sequence diagrams to demonstrate the system's behavior and workflows.
- **User Interface Design:** Describes the visual and interactive aspects of the system, ensuring usability and alignment with user requirements.

This document serves as a blueprint for the development process, guiding the implementation, testing, and future scalability of the system.

2. System Overview

The proposed mobile application is a comprehensive platform designed to merge artistic creativity with social connectivity. By utilizing advanced artificial intelligence (AI) models, the system enables users to generate high-quality images and accompanying narratives based on textual prompts. This innovative functionality forms the core of the application, providing an accessible medium for users to explore and express their creativity.

General Functionality:

The application integrates key features to provide a seamless and engaging user experience:

AI-Driven Content Generation:

- Using advanced AI models, users can transform textual prompts into unique images and narratives, enabling anyone, regardless of artistic skill, to create original content.

Social Networking Features:

- Users can follow others, view, like, and comment on content, and curate personal galleries to showcase their creations.

Interactive Challenges:

- The app offers gamified challenges, such as themed contests and time-limited tasks, to inspire creativity and foster community engagement through recognition and rewards.

Context and Background

The development of this application is driven by the vision of transforming simple image generation into the creation of true art. While other applications focus solely on generating images, this platform elevates the creative process by also generating a narrative for each image, thus turning the output into a complete work of art.

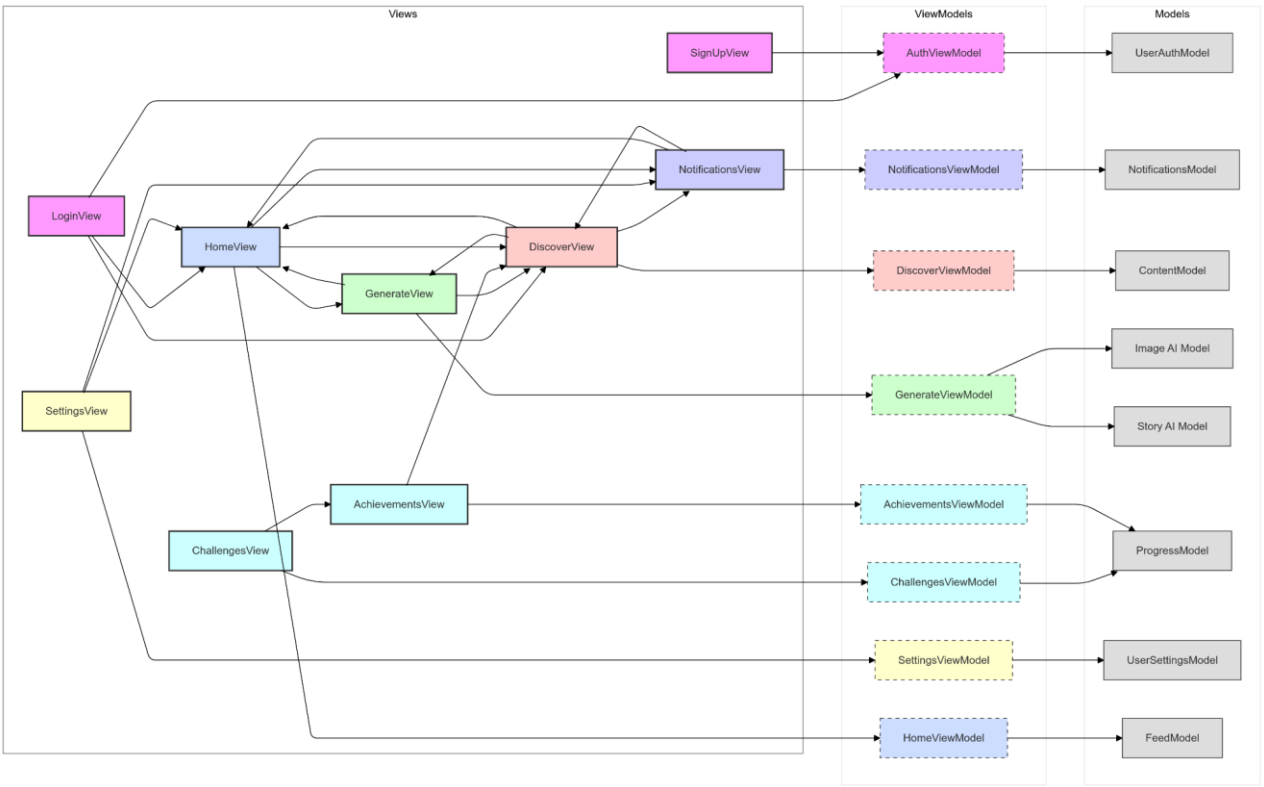
The integration of both visual and textual elements sets this project apart from competitors, offering a unique value proposition: the ability to create both an image and a story from a single prompt. This dual-generation approach allows users to craft more meaningful and expressive art, bridging the gap between visual and literary creativity.

The application also emphasizes sharing and community interaction. Users can share their artworks, receive feedback, and engage in discussions about the narratives behind each piece. This fosters a collaborative environment where users can appreciate and critique each other's creations. By combining AI-driven imagery, narrative creation, and social features, the app connects users and inspires creativity.

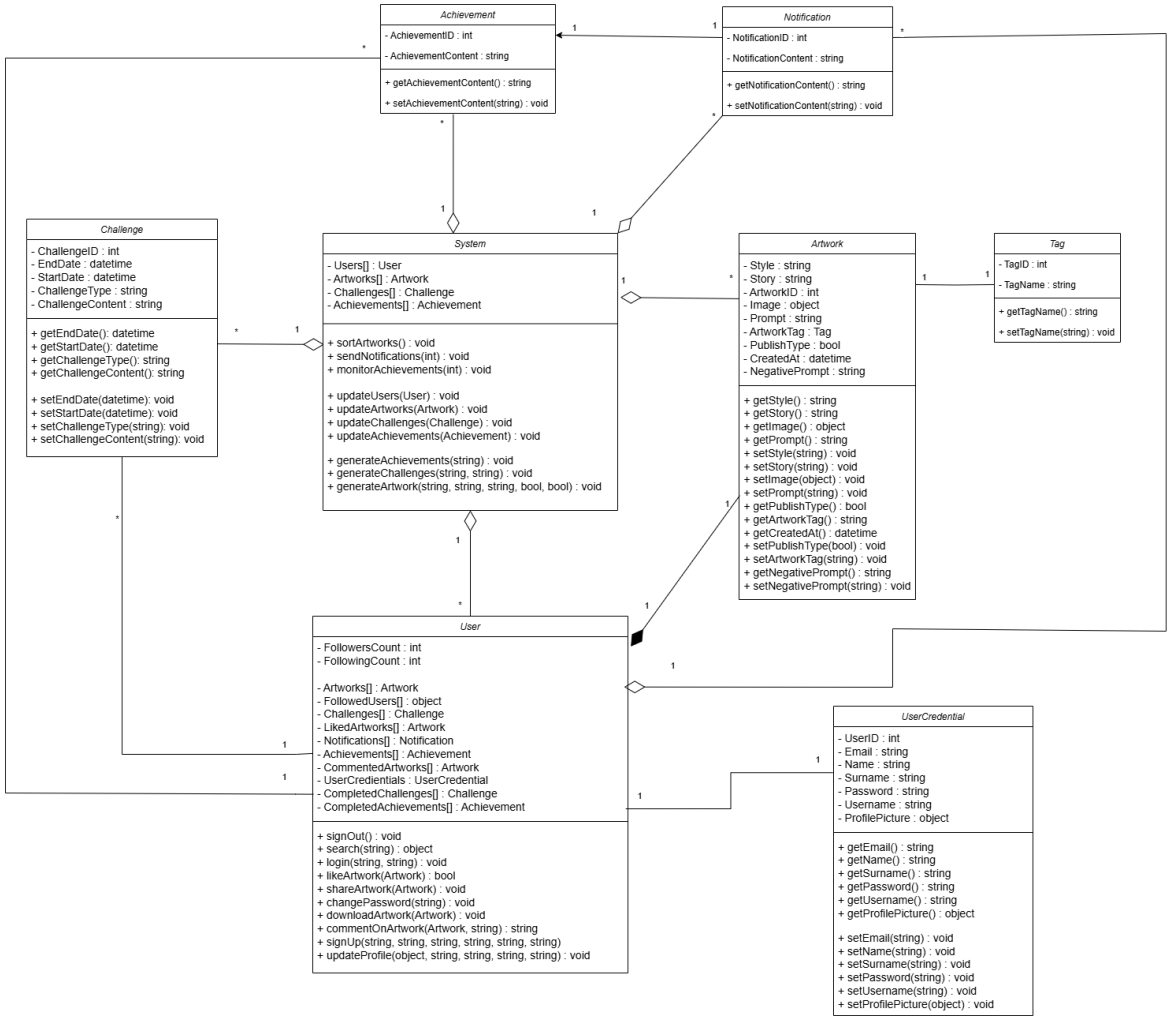
3. System Architecture

3.1 Architecture Diagram

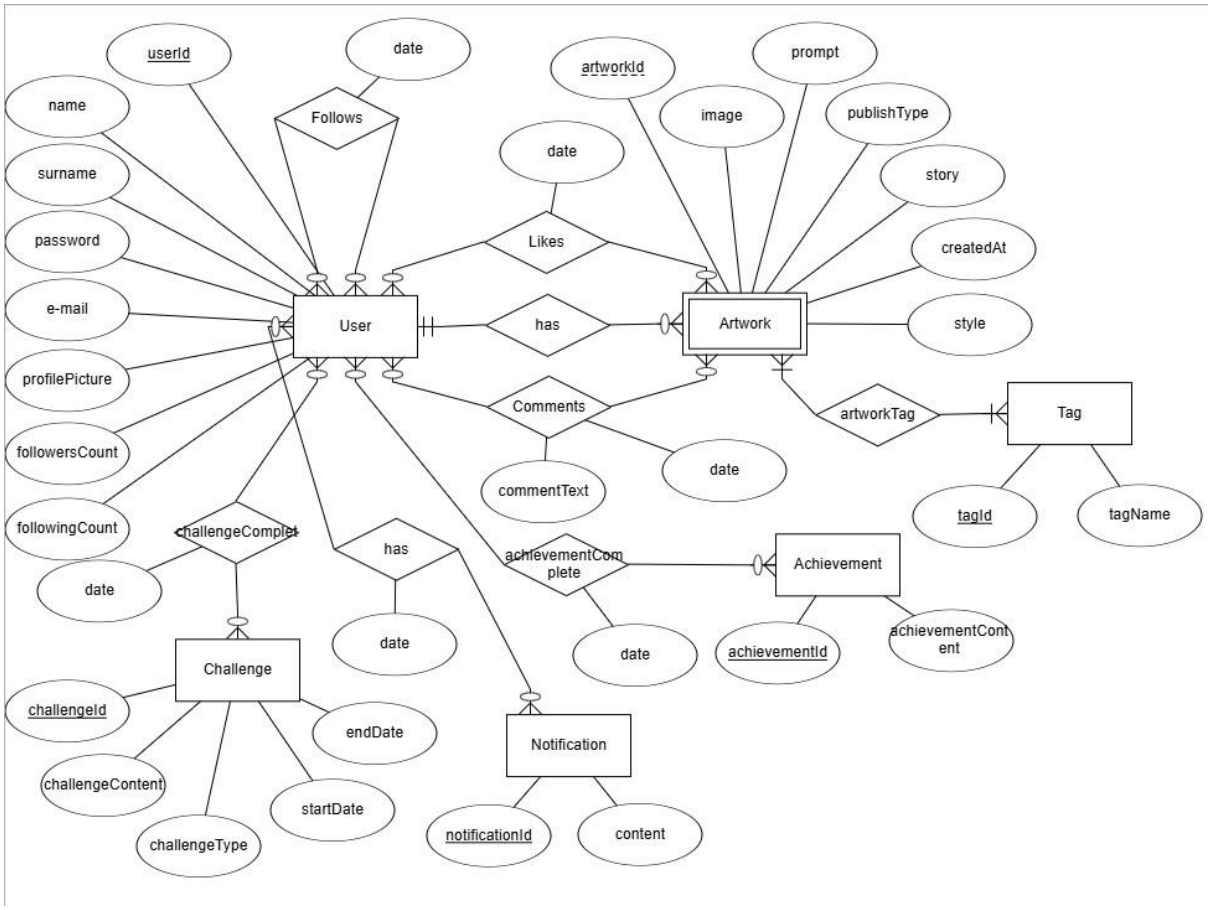
Our project follows the MVVM (Model-View-ViewModel) architectural pattern, ensuring a clear separation of concerns between the user interface and business logic. This approach enhances code maintainability, testability, and scalability, making it well-suited for complex applications.



3.2 Class Diagram



3.3 ER Diagram



3.4 System Modeling

3.4.1 Sequence Diagram

3.4.1.1. Authentication and User Account Management

Covers Login, Sign-Up, sending and confirming verification codes, and the confirmation page.

Diagram 1

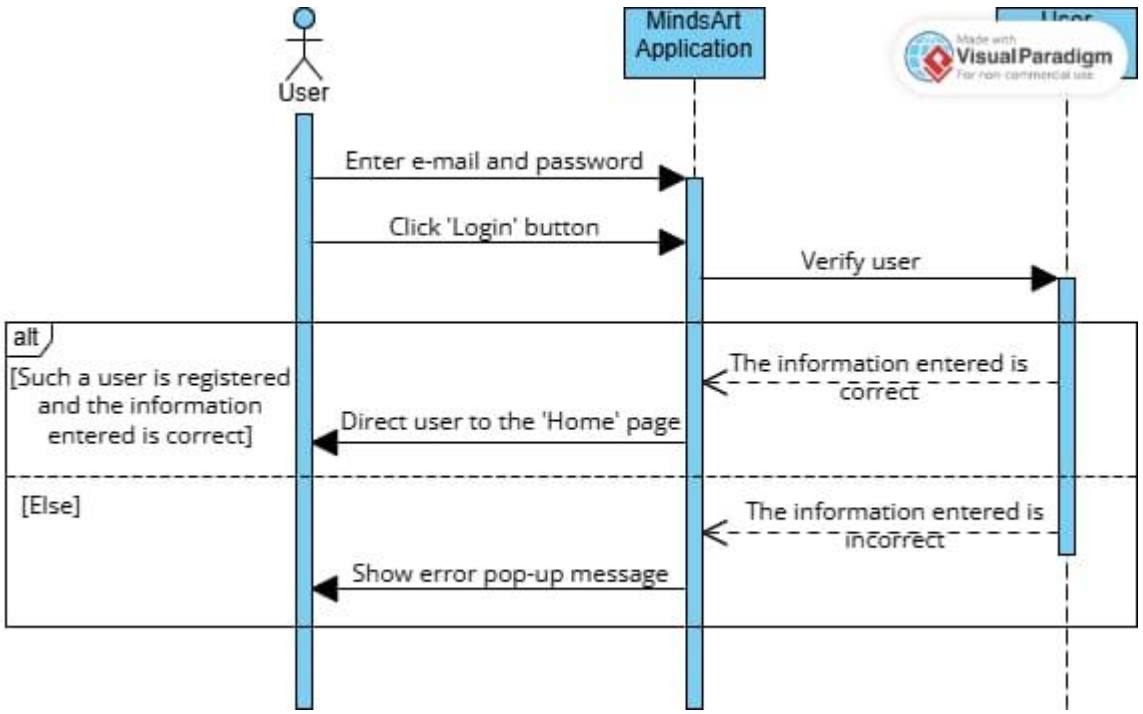
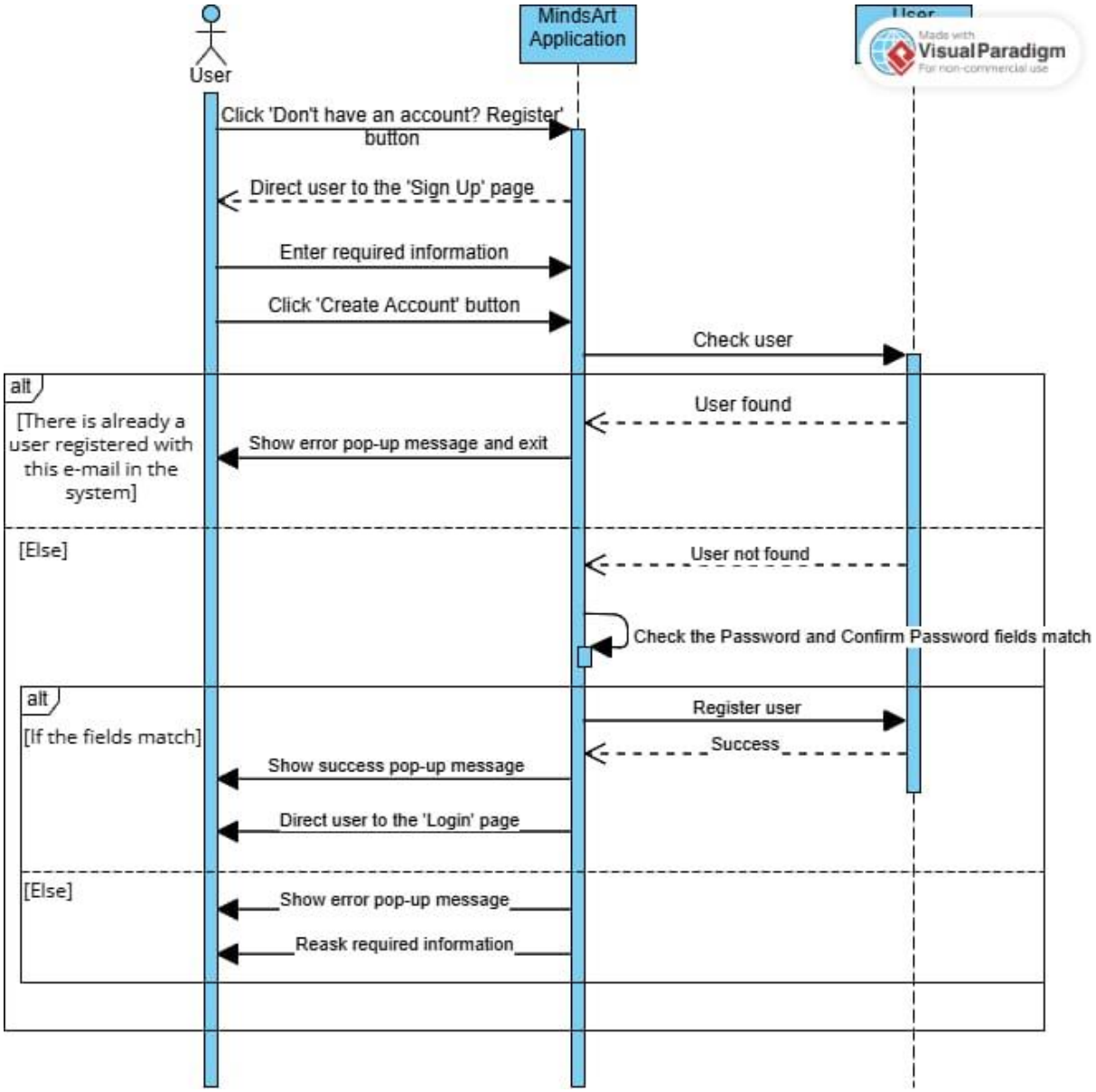
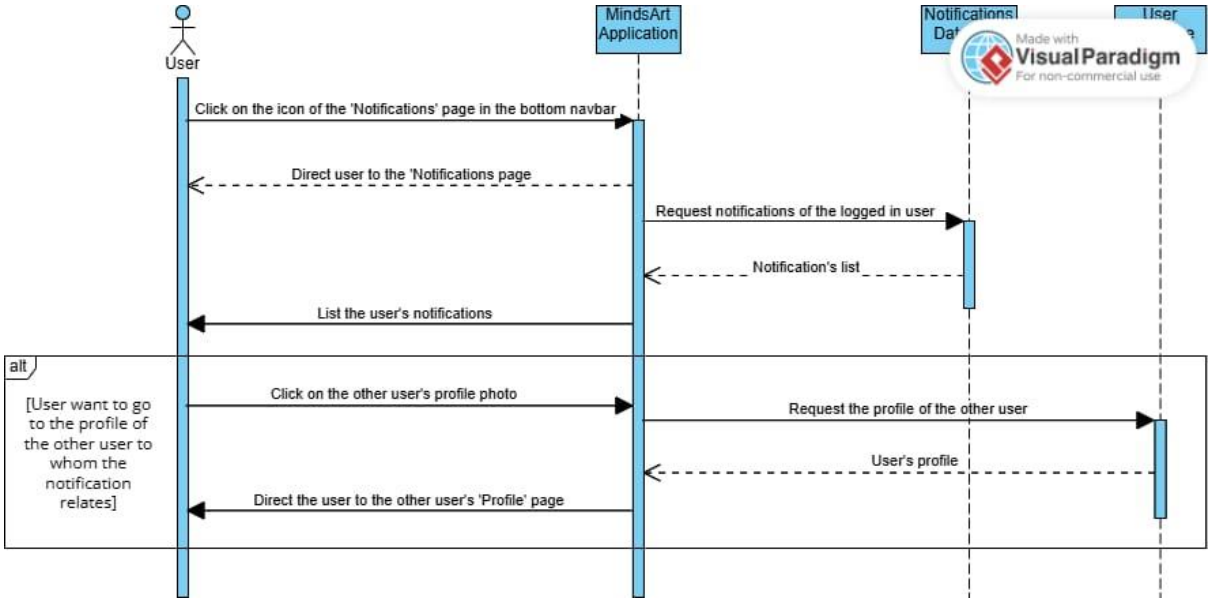


Diagram 2


User
MindsArt Application
User
Click 'Don't have an account? Register' button
Direct user to the 'Sign Up' page
Enter required information
Click 'Create Account' button
Check user
alt
[There is already a user registered with this e-mail in the system]
User found
Show error pop-up message and exit
[Else]
User not found
Check the Password and Confirm Password fields match
alt
[If the fields match]
Register user
Success
Show success pop-up message
Direct user to the 'Login' page
[Else]
Show error pop-up message
Reask required information
Made with Visual Paradigm
For non-commercial use

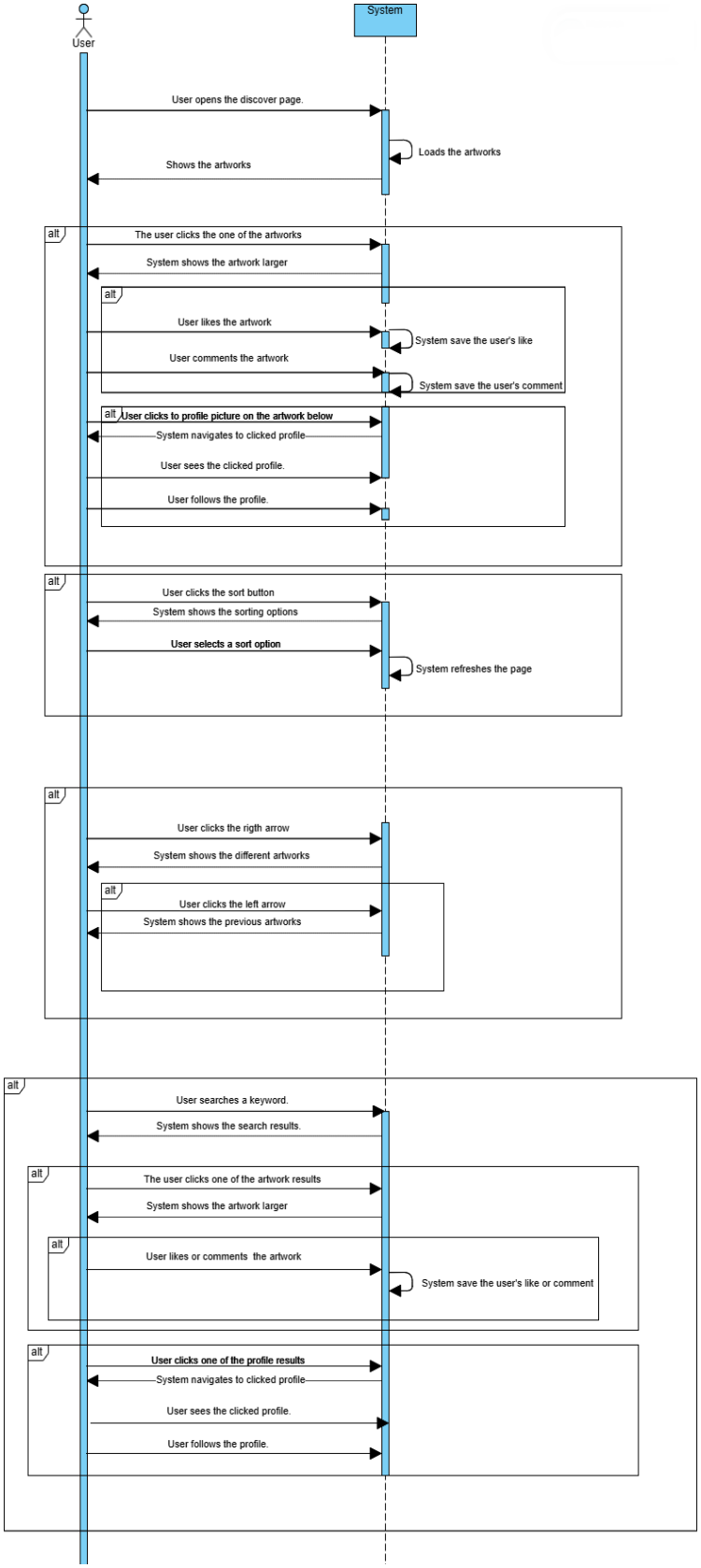
3.4.1.2. Notifications Management

Design and functionality of the notifications page.



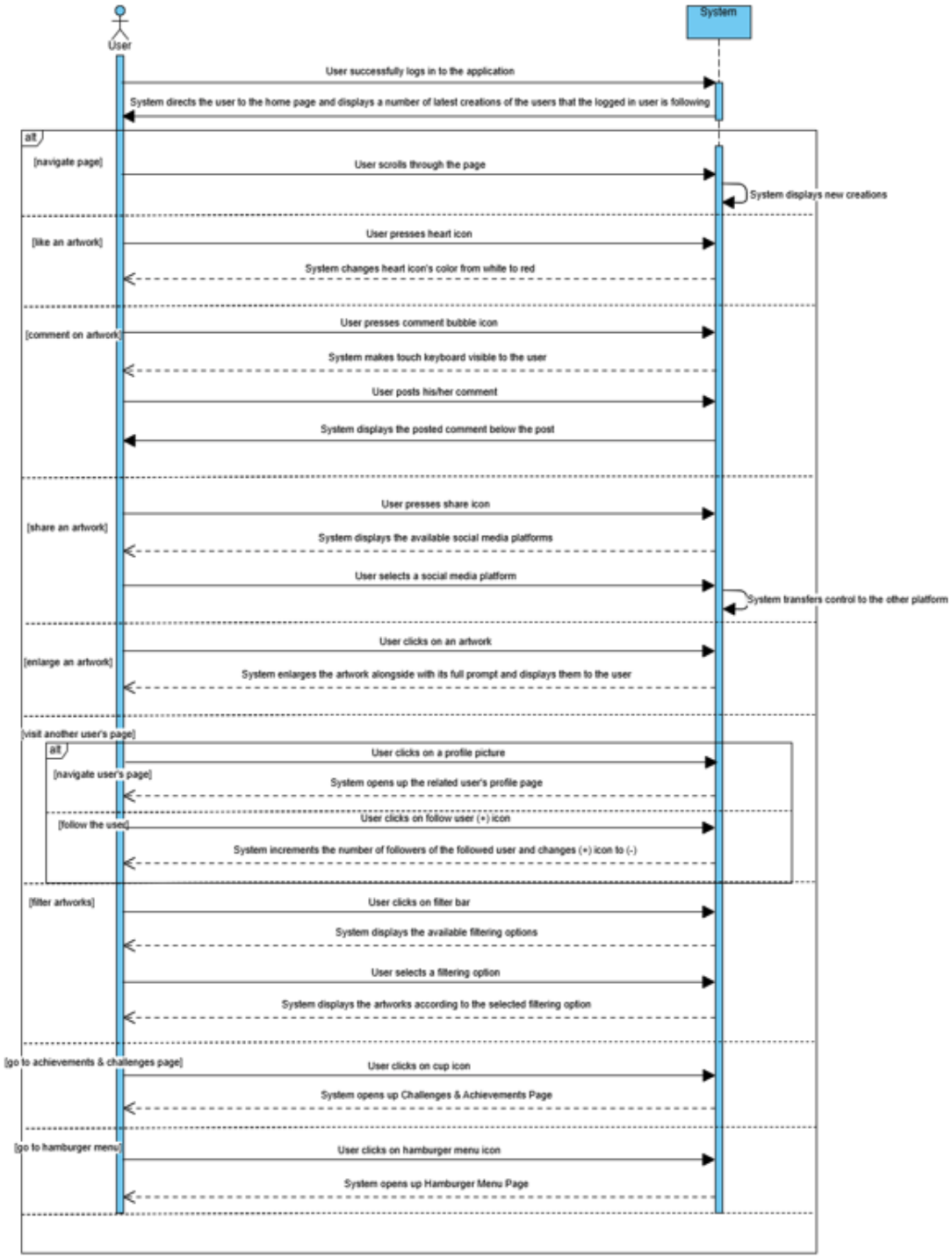
3.4.1.3. Search and Profile Navigation

Covers the search page, search result page, and basic profile navigation.



3.4.1.4. Home and Profile Interaction

Covers the home page, selected item view on the home page, and basic profile navigation



3.4.1.5. Creative Content Generation

Features related to generating artwork and storytelling, including the artwork result page.

Diagram 1

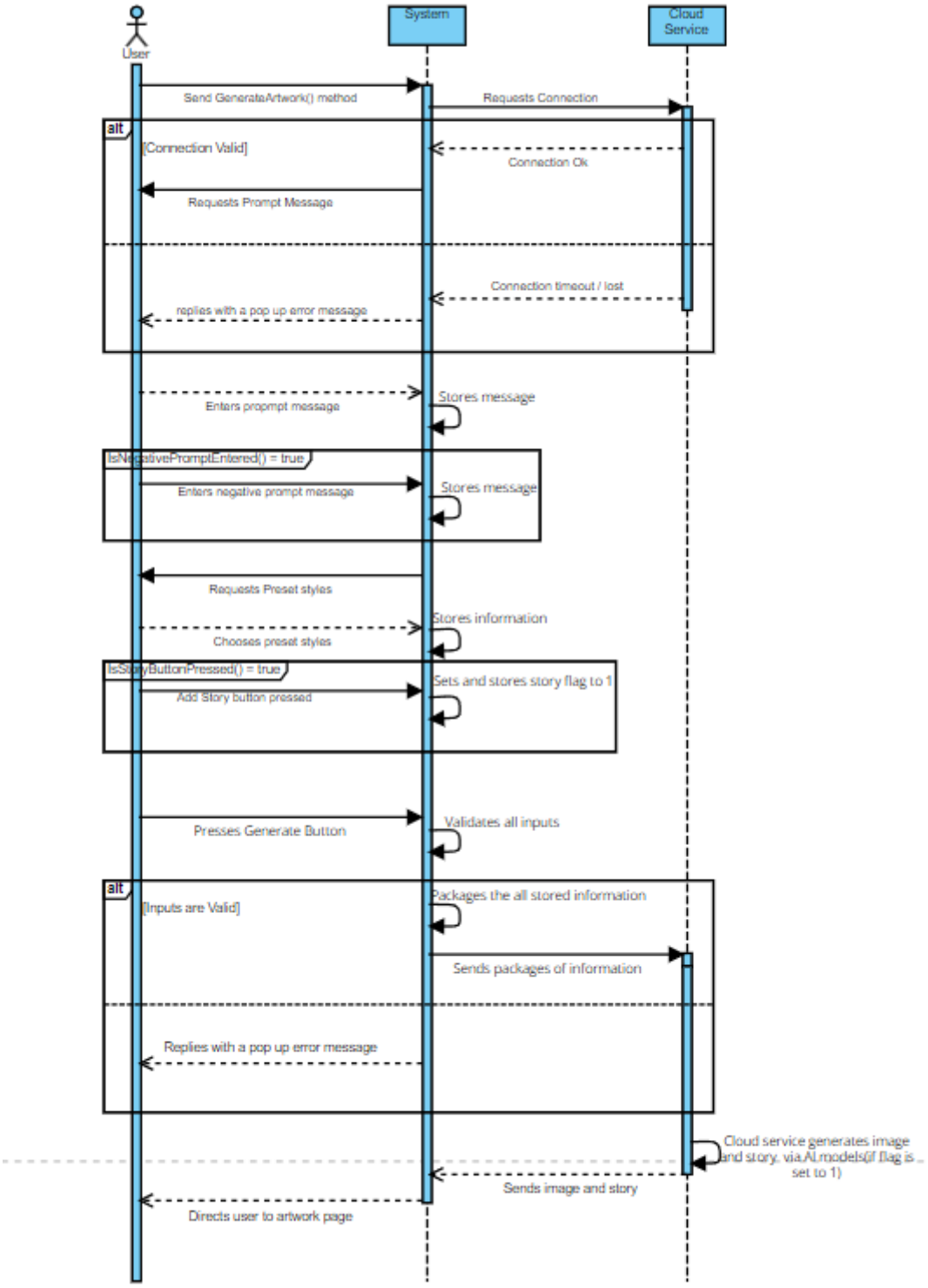
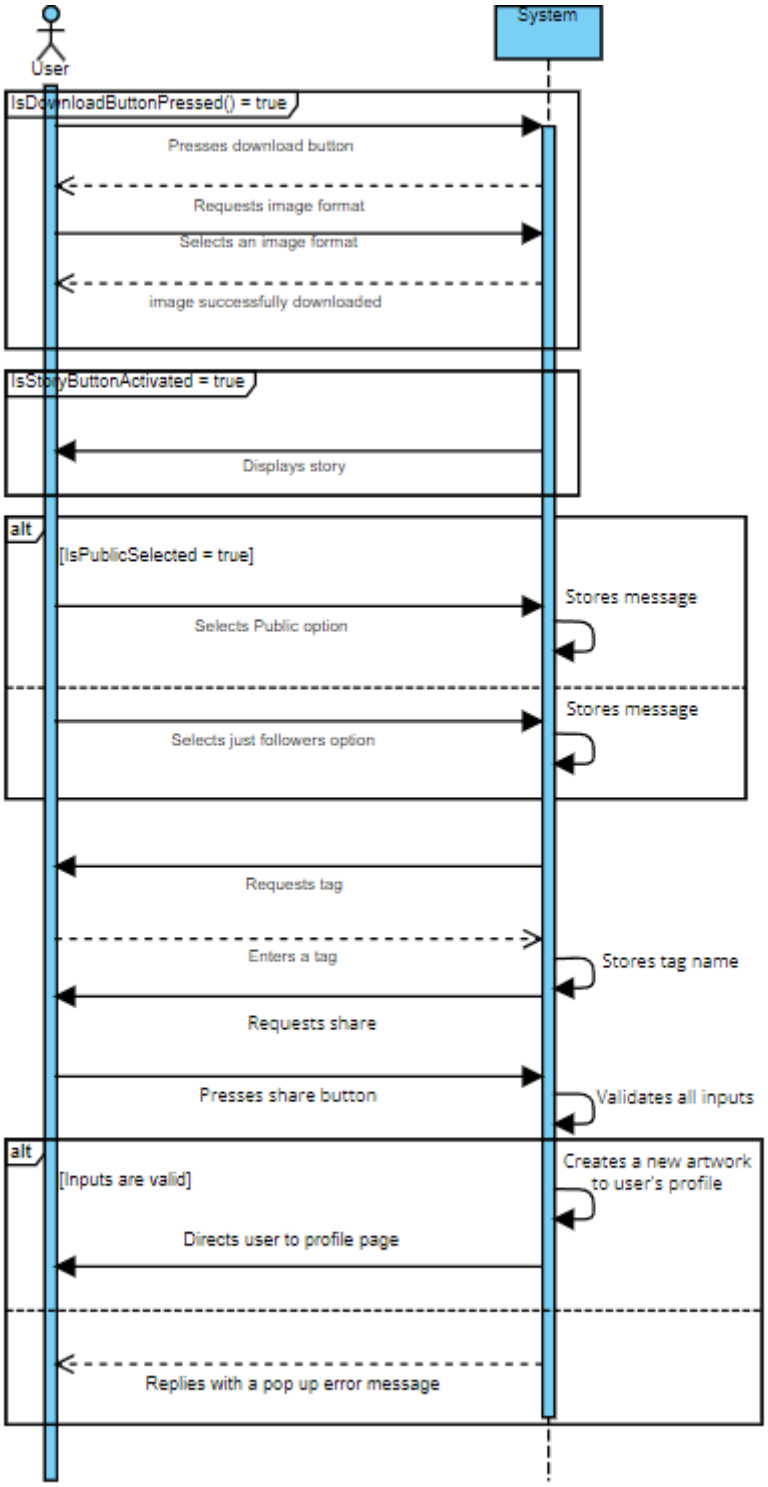
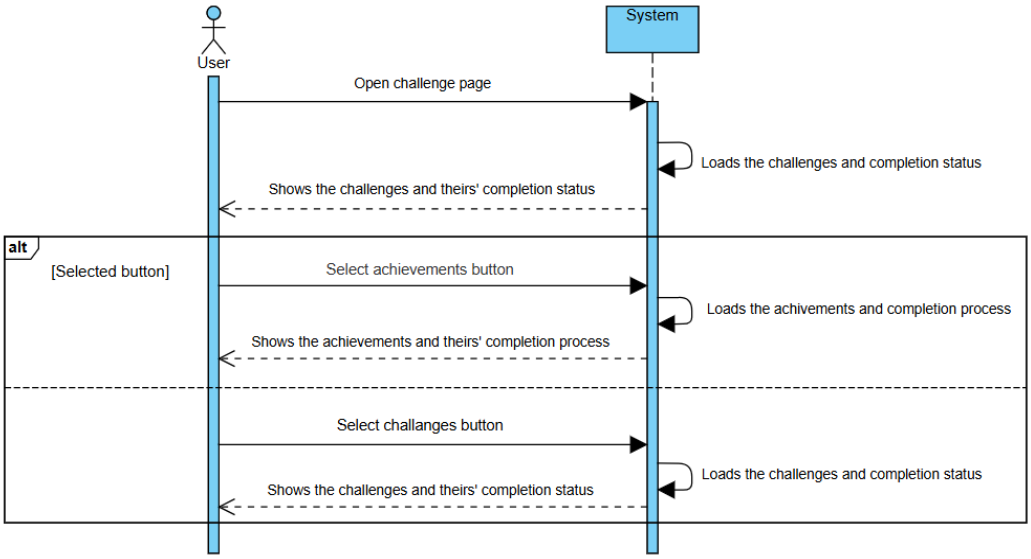


Diagram 2


User
System
IsDownloadButtonPressed() = true
Presses download button
Requests image format
Selects an image format
image successfully downloaded
IsStoryButtonActivated = true
Displays story
alt
[IsPublicSelected = true]
Selects Public option
Stores message
Selects just followers option
Stores message
Requests tag
Enters a tag
Stores tag name
Requests share
Presses share button
Validates all inputs
alt
[Inputs are valid]
Creates a new artwork to user's profile
Directs user to profile page
Replies with a pop up error message

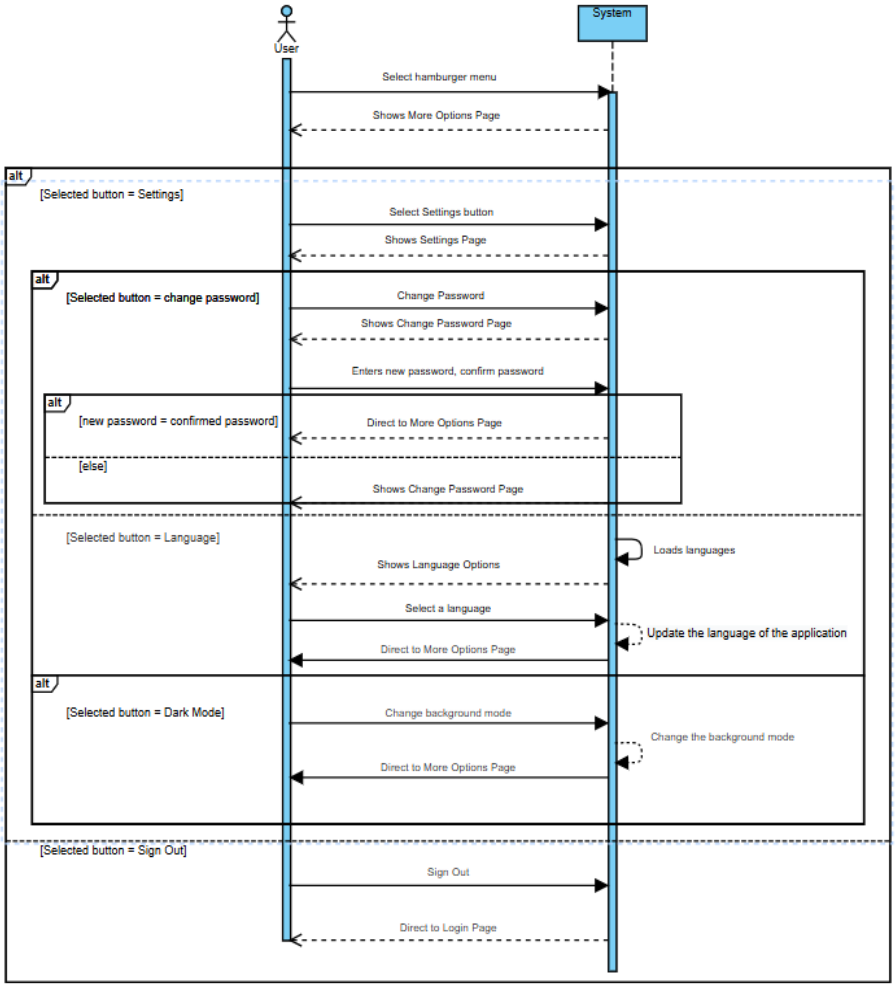
3.4.1.6. Challenges and Achievements

Design and functionality of the challenge page and the achievements page.



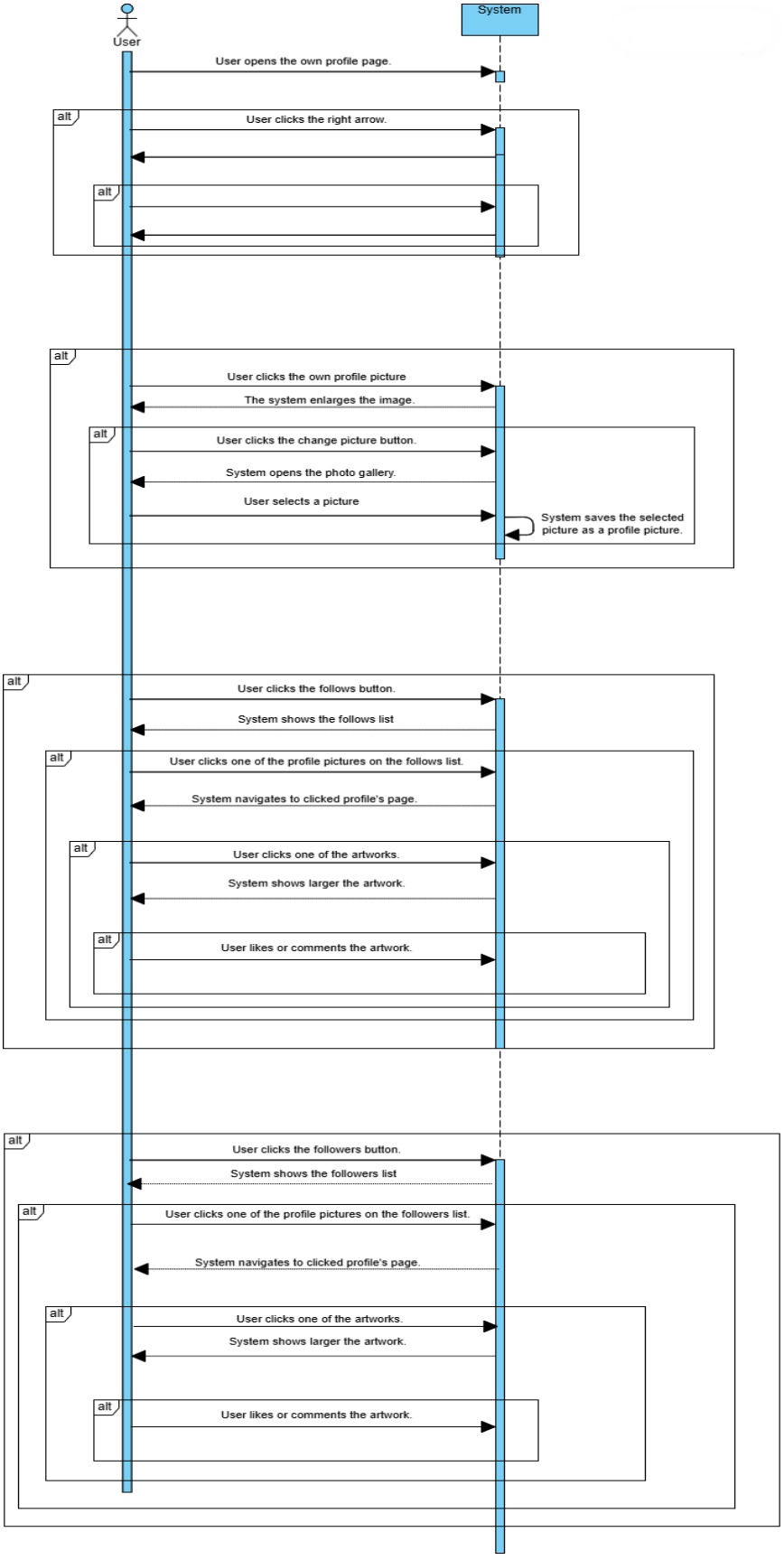
3.4.1.7. User Settings and Navigation

Covers the hamburger menu, settings page, and changes password functionality.



3.4.1.8. Personal Profile Management

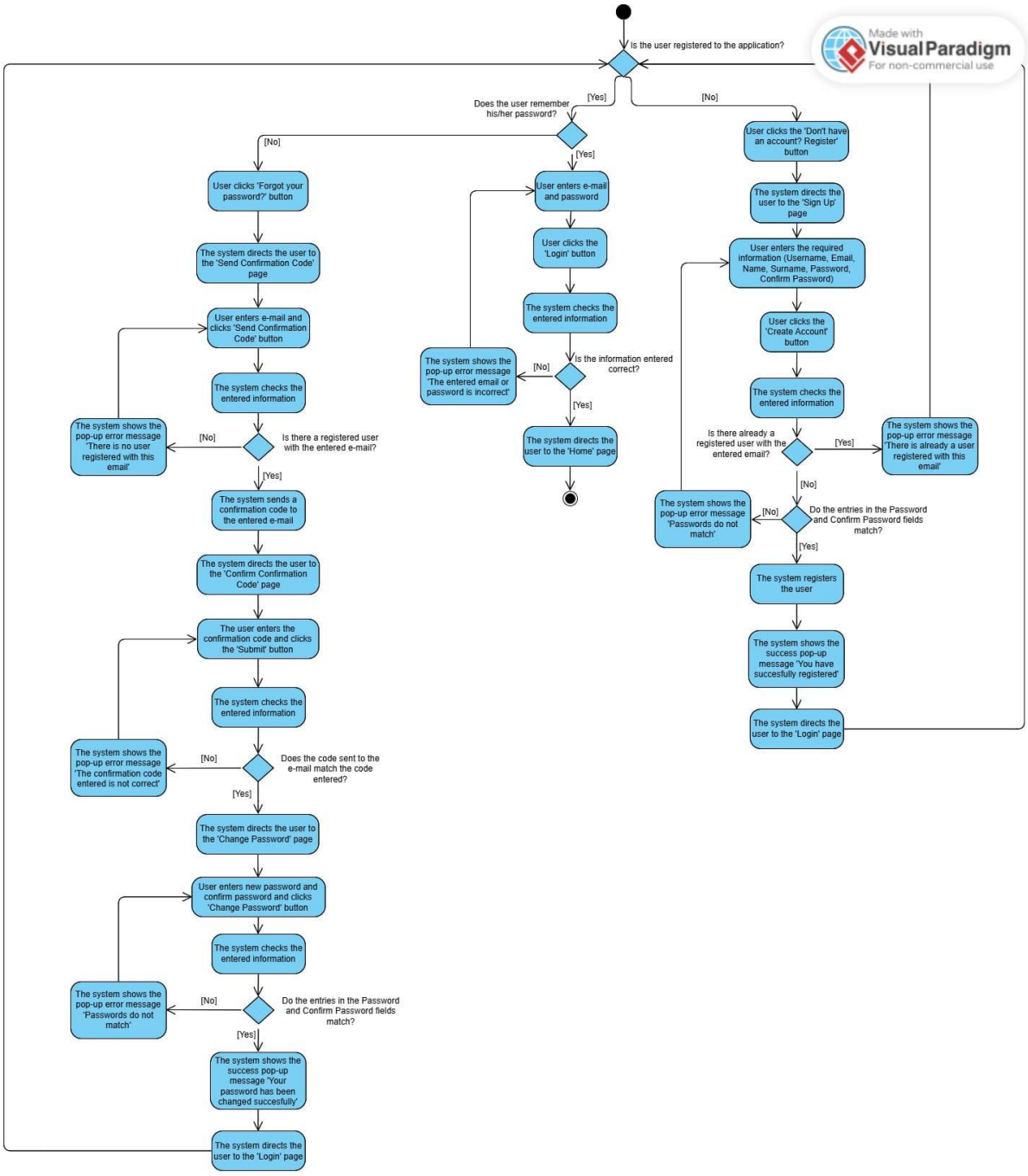
Features related to the user's profile page.



3.4.2 Activity Diagram

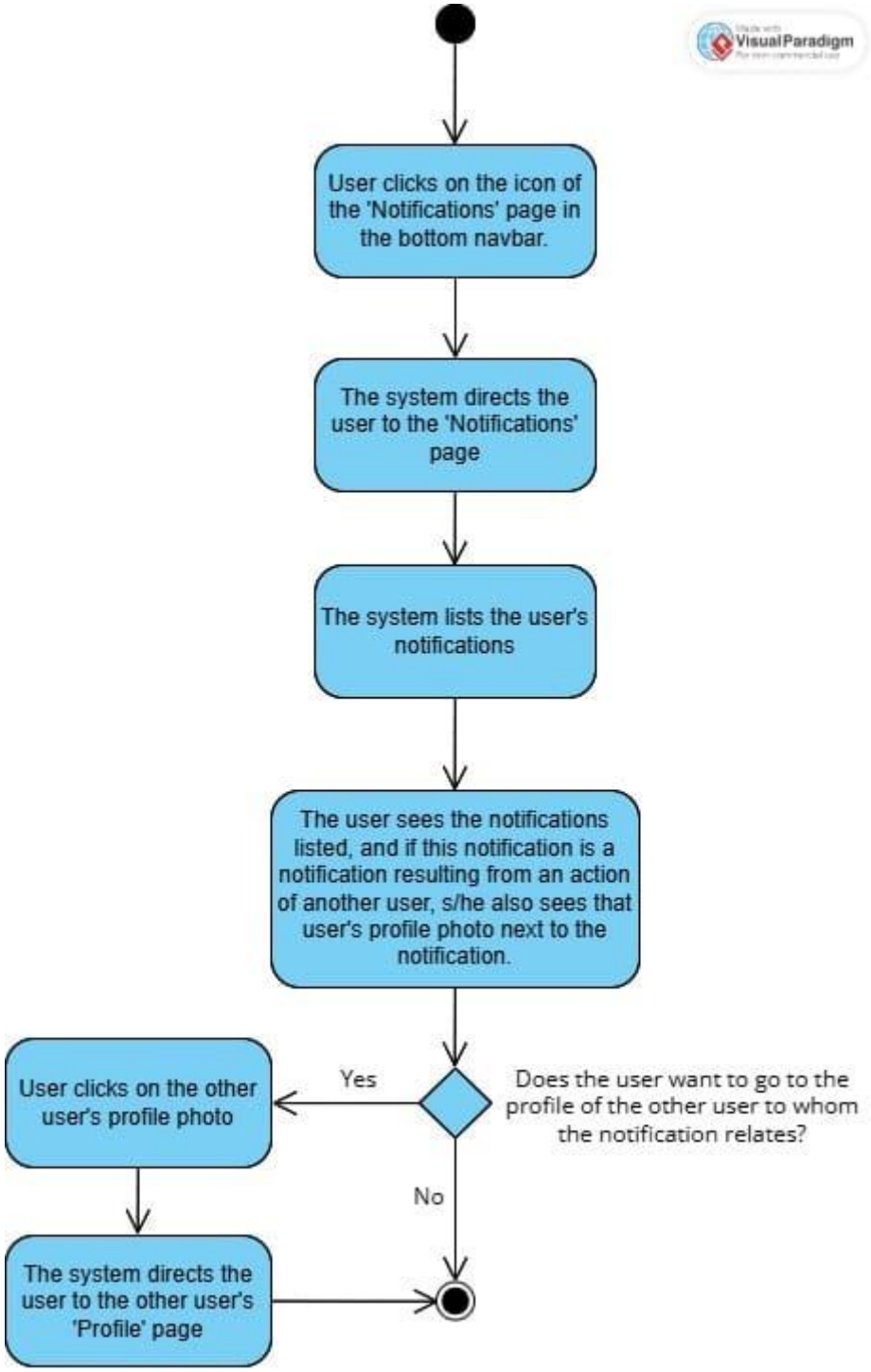
3.4.2.1. Authentication and User Account Management

Covers Login, Sign-Up, sending and confirming verification codes, and the confirmation page.



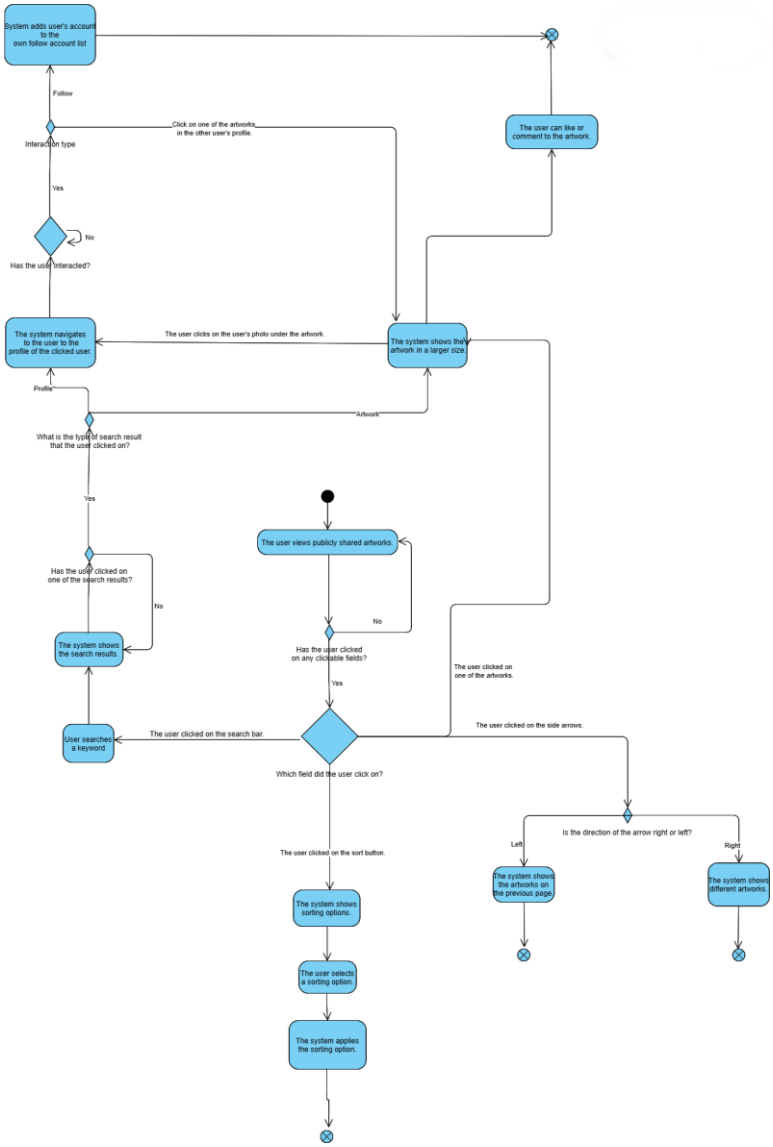
3.4.2.2. Notifications Management

Design and functionality of the notifications page.



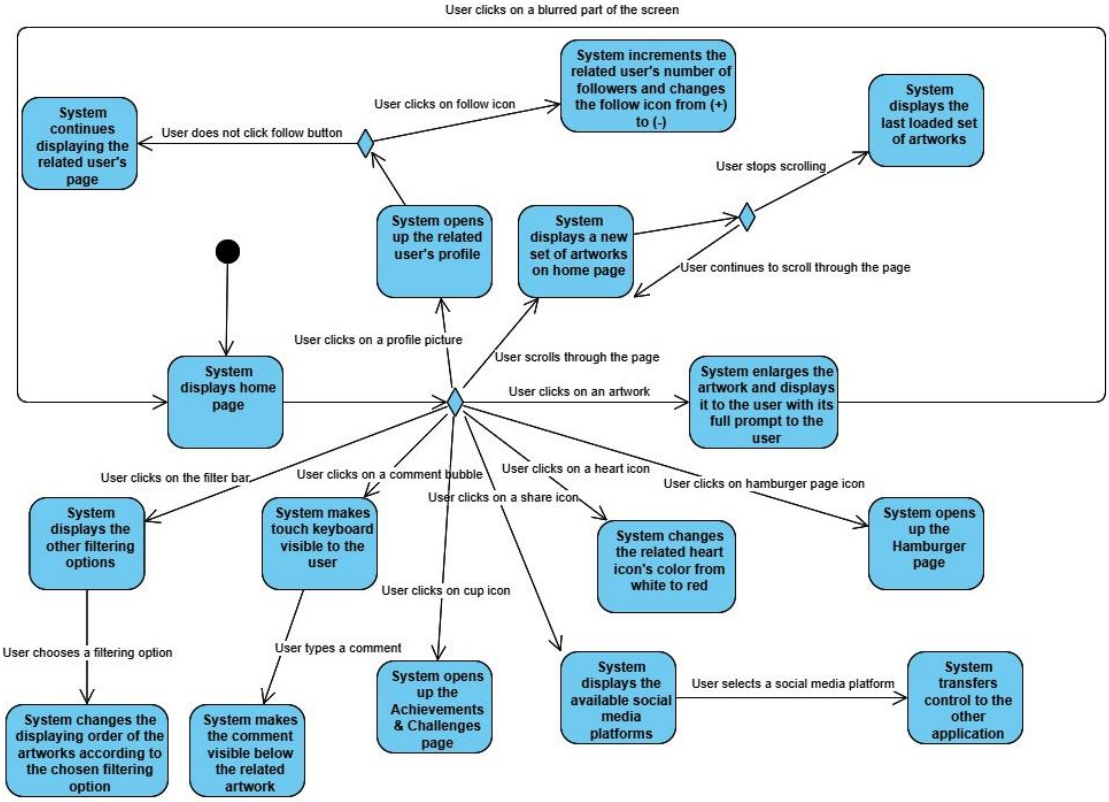
3.4.2.3. Search and Profile Navigation

Covers the search page, search result page, and basic profile navigation.



3.4.2.4. Home and Profile Interaction

Covers the home page, selected item view on the home page, and basic profile navigation



3.4.2.5. Creative Content Generation

Features related to generating artwork and storytelling, including the artwork result page.

Diagram 1

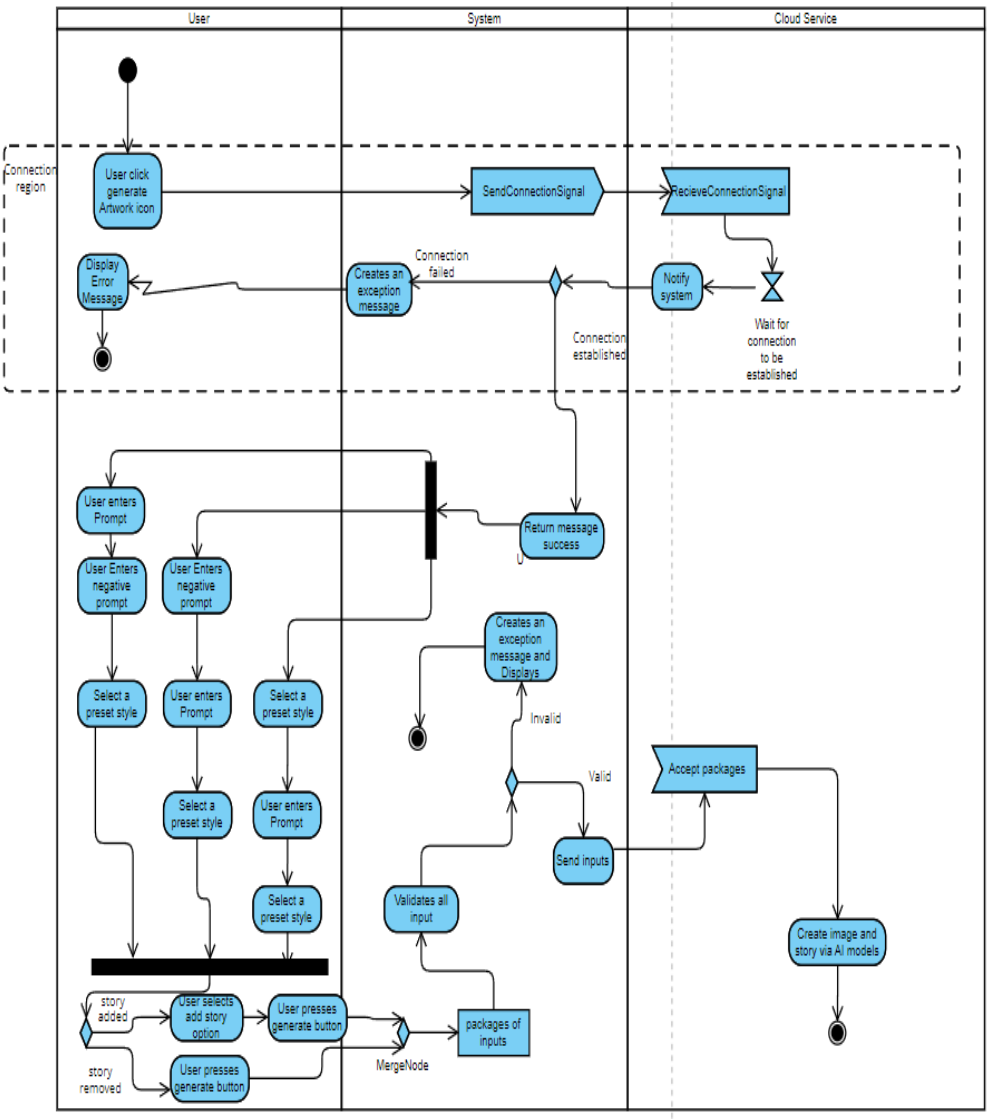
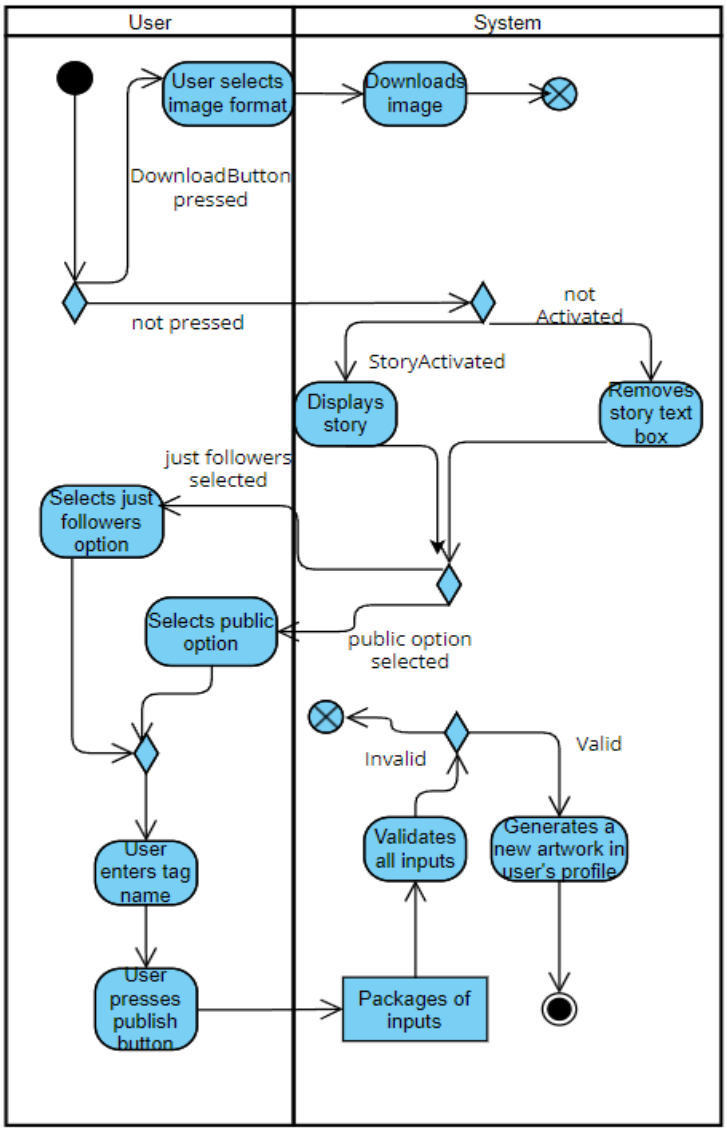
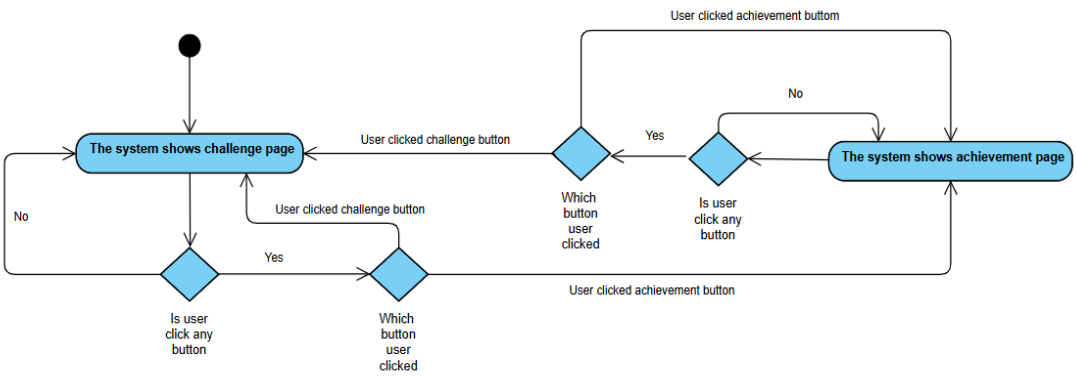


Diagram 2



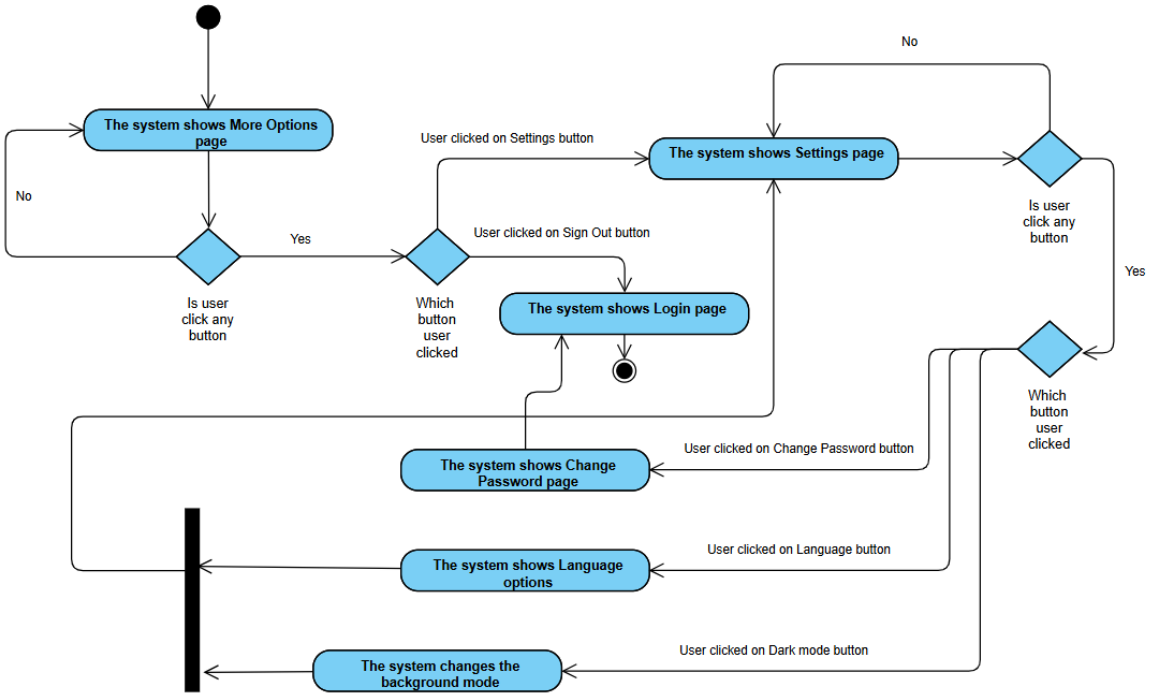
3.4.2.6. Challenges and Achievements

Design and functionality of the challenge page and the achievements page.



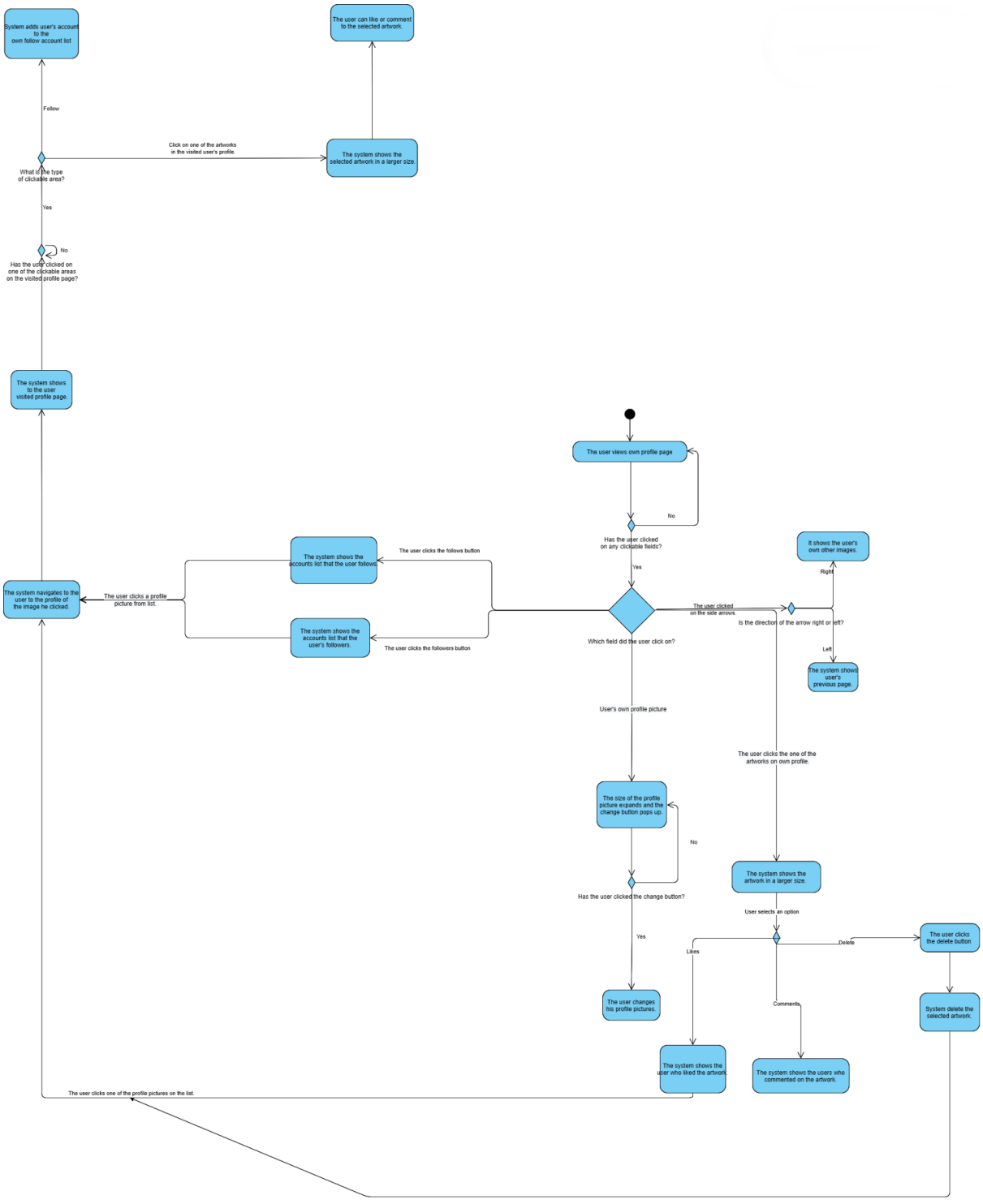
3.4.2.7. User Settings and Navigation

Covers the hamburger menu, settings page, and changes password functionality.



3.4.2.8. Personal Profile Management

Features related to the user's profile page.



4. User Interface Design

In this section we have provided the screenshots of our application user interface. An interactive form could be found here: https://www.figma.com/proto/bNAy2sTH5T2GsjlaQSplI7/Free-AI-Art-Generator-App-(Community)?node-id=2250-1851&p=f&t=7XOqqQxlv1CI3VyM-0&scaling=min-zoom&content-scaling=fixed&page-id=2250%3A957&starting-point-node-id=2250%3A1851&show-proto-sidebar=1

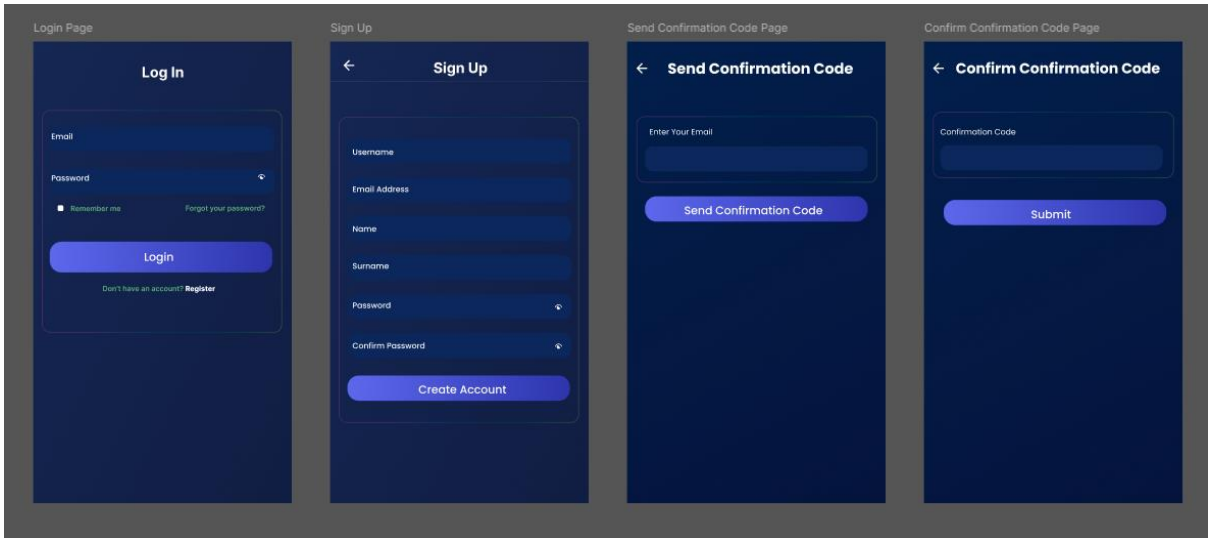


Figure 1 - Login Page

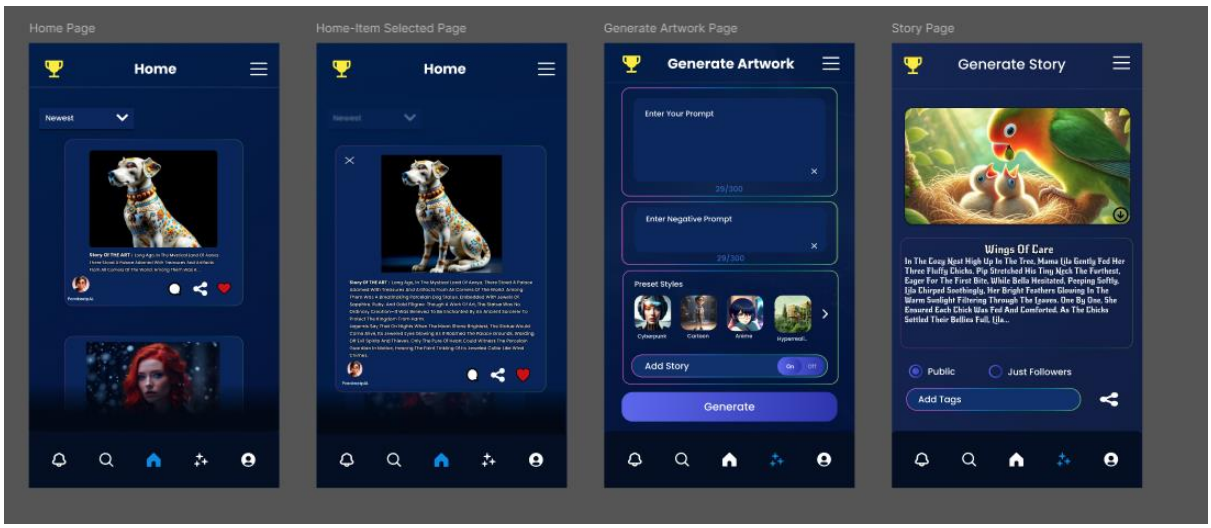


Figure 2 - Home and Generate Artwork Pages

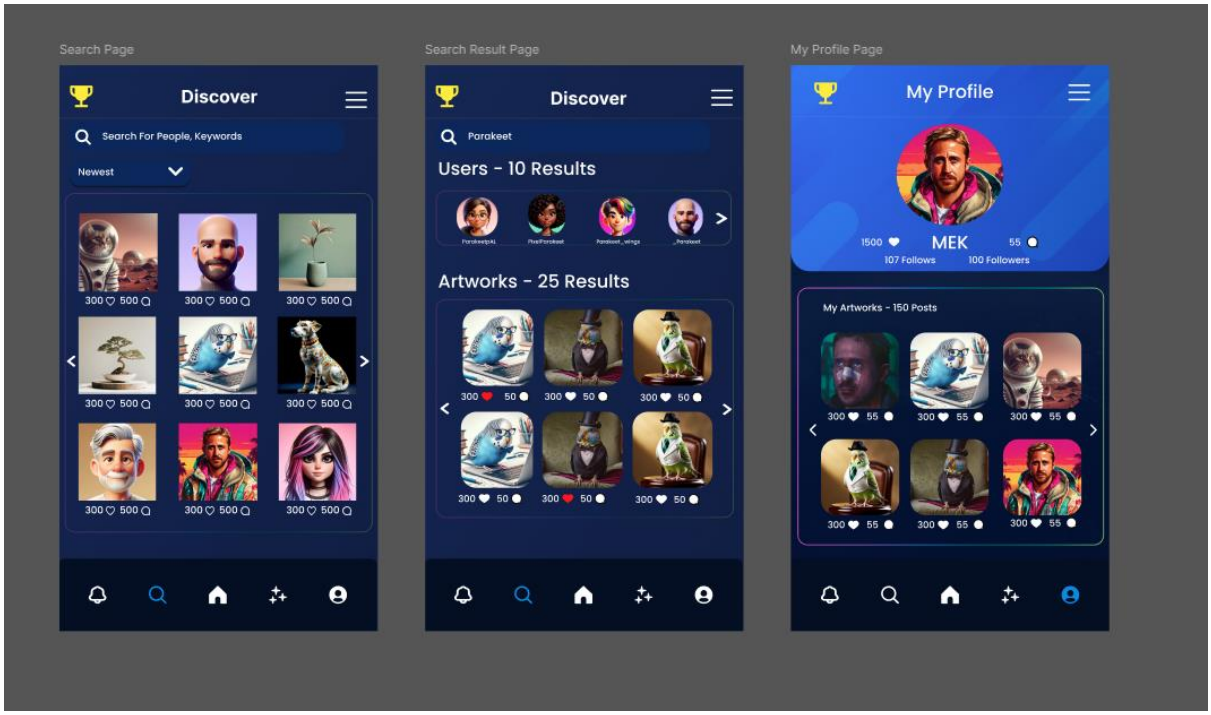


Figure 3 - Search and Profile Pages

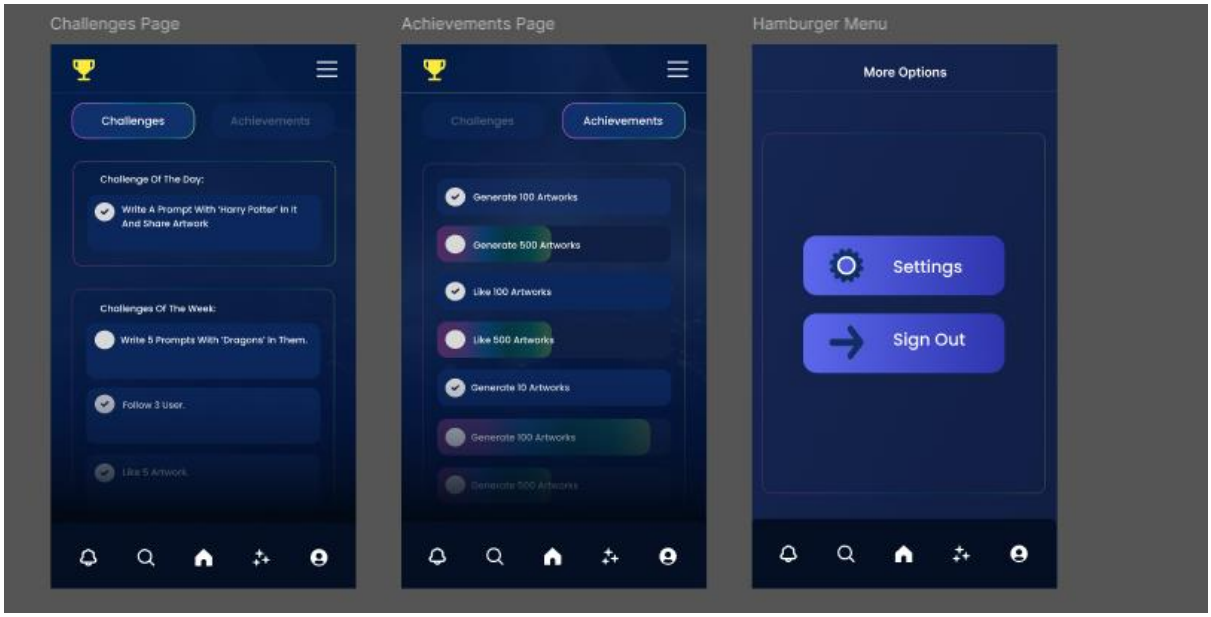


Figure 4 - Challenges & Achievements and Hamburger Pages

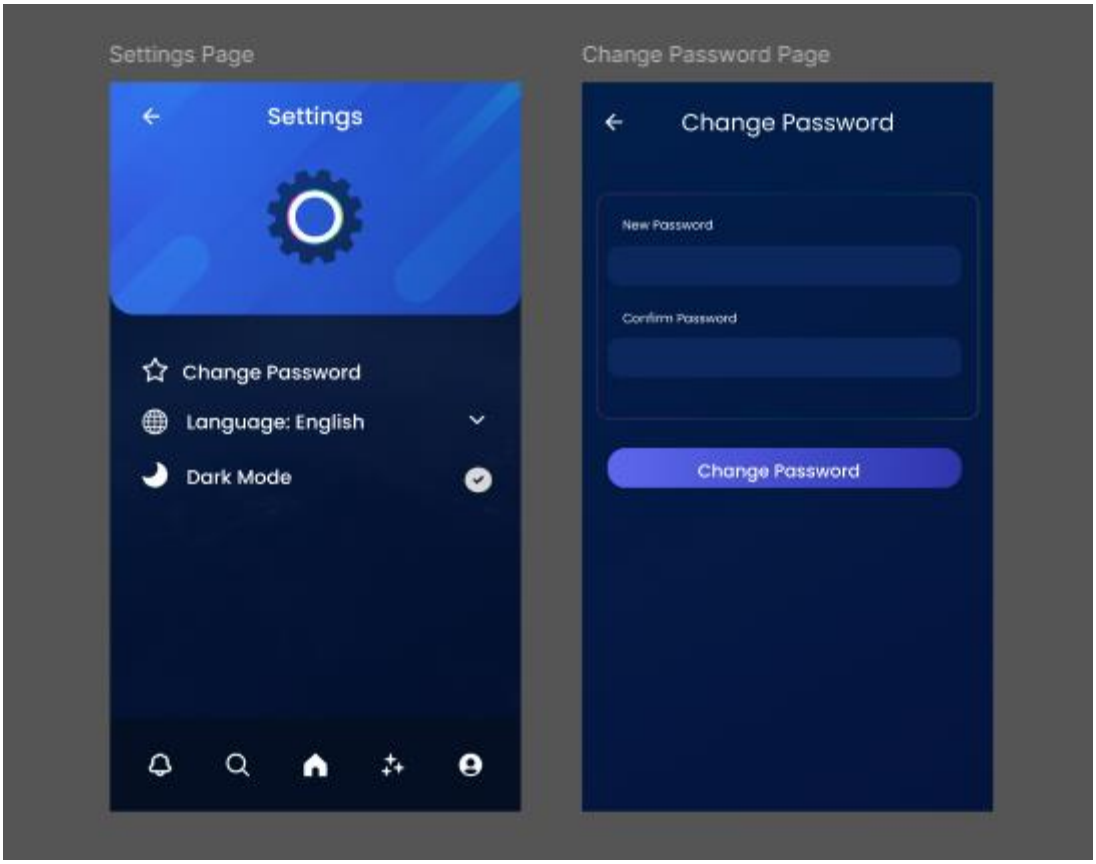


Figure 5 - Settings and Change Password Pages

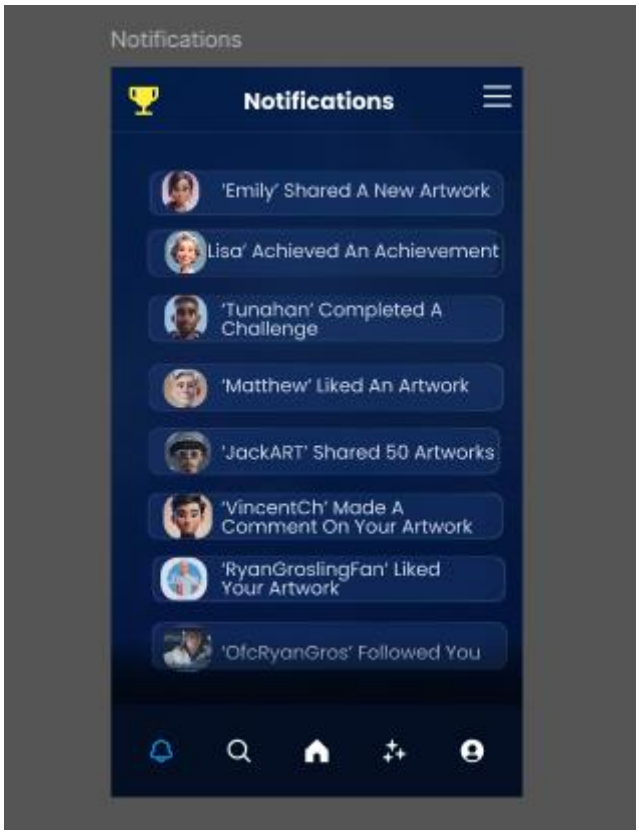


Figure 6 - Notifications Page