GeotagAR

Stage 2 - Progress Report

02.02.2023

—

Mint Solutions
F29PD - Group 11
Heriot-Watt University

Student Declaration of Authorship

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Course code and name:	F29PD Professional Development
Type of assessment:	**Group**
Coursework Title:	Stage 2 - Progress Report
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PROJECT OUTLINE / INTRODUCTION

AIM

To develop an online social platform, which enables users to connect, create and share Augmented Reality (AR) based digital content.

OBJECTIVE

The objectives are as follows:

1. To provide a safe alternative to the metaverse.
2. Enable users to share content in an Augmented Reality format.
3. Enable people of different groups to discover shared areas of interest with other like minded people.
4. Enable users to place an AR model at a certain location for other users to view.
5. Enable users to interact with other users' content.
6. Enable users to explore and discover new places.
7. To act as a source of information about landmarks such as museums, monuments, Heritage centers, natural sites and even restaurants.

SCOPE

There is one system being developed - GeoTagAR. GeoTagAR will be developed in the form of an application, providing users with a way to connect and share AR-based content. The system will function as a scrapbooking platform, allowing users to capture moments in image, audio, or video format. These moments will be geotagged when shared. Additionally, users can select specific categories to be part of, which will consist of geocachers and historians. Each category provides users with extra features developed specifically for that category.

The Database(s) will store (but not limited to) –

- User information, media, analytics, likes, comments, achievements, group information and coordinates.

The primary purpose of the application is to act as an AR-based social media platform. Additionally, a promotional website for GeoTagAR will be developed.

ASSUMPTIONS

1. The app will have the user's login to place items in certain locations.

2. Users can see the comments left behind on their AR Memories despite not being at the location.

    2.1. Everyone can see messages left behind i.e., no age restrictions.

3. Once an account is set to a certain user type e.g., geocacher & historian, it cannot be changed.

4. If you delete your account, then all the AR memories placed are removed too.

5. Users will need to provide precise location data for the app to work.

6. Users can share locations to memories via a GPS marker.

STAKEHOLDERS

The prime stakeholders of the system are:

1. End-Users (General Users, Geocachers, Historians etc.)

2. Managers and other employees

3. Data analysts

4. Advertisers

5. Investors

DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Acronym	***Description***
F - UR	Functional - User Requirement
NF - UR	Non-Functional - User Requirement
F - SR	Functional - System Requirement
NF - SR	Non-Functional - System Requirement
App	Application

PRODUCT OVERVIEW

PRODUCT SCOPE

The scope of the project is a fully functional mobile application where it includes a database and a stand alone promotional website. The application is an online social scrapbooking platform for users to interact and share with one another by using Augmented Reality (AR). Initially the application was planned to be working for the targeted operating systems which are Android and IOS, due to limited resources with the MacOS, it was decided to first implement a working and a functional application for the Android systems.

The mobile application should contain an interactive user interface to allow users an easy experience. The main aim is to focus more on the functionality of the application with AR being utilized in order to develop the app, this was discussed from our client as some functionalities felt it should be worked on more in our previous working prototype. The primary target is for the general users to be able to utilize the functionalities of the application. The system should also provide a clean user interface to promote user friendliness and engagement.

The database should currently store all the relevant information about the user, media with the amount of likes and comments. The promotional company website built is strictly made to promote for marketing purposes and involve more public exposure for the application. The website will also provide a link for users outside the team to gain access to the application when it is ready for the users to use which will help for future usability evaluations and feedback.

SYSTEM ENVIRONMENT

FRONT-END AND BACK-END

The front end and the back end of the system is implemented using the mobile user interface framework “Flutter”, The focus in front-end is developed using Dart in Flutter as it provides an emulated interface for the mobile device, this helps the programmer to continuously modify the front end of the application if needed

Unity is the development tool that is being used to implement the AR features as it provides the necessary tools and assets in order to build an immersive AR experience in various platforms. Flutter being a cross platform can use its design implications allowing it to integrate or embed with Unity. The combination of Flutter and Unity gives a good foundation to create a working AR application.

The programming languages listed had been used to build the system:

C++

C#

Dart

JavaScript

JSON

The database used is Firebase Firestore Database as it is very flexible to use and can be set up with Android and IOS. Unity being the primary factor for implementing the AR features, the Firebase can be set up and configured with Unity

The Integrated Development Environment (IDE) used in order to build the system is Visual Studio Code as it provides many features where it usually cannot be found with other code editors. In order to coordinate the team's coding work, GitHub was decided as its web-based git repository hosting services which offers a good source code management functionality of git.

Android Studio, which is also another IDE with an emulator where it supplies the dependencies needed for an android platform, is used in order to test the app for different devices, as we are currently working for devices with an android operating system. It would allow the team to make any modifications if a bug were to arise while the app is being tested.

The website was built using EditorX, Wix.

FUNCTIONAL REQUIREMENTS

Provided below are the Functional Requirements that we developed during the Stage 1 of the project. Next to each requirement, we have placed checkboxes to depict all the functionalities that we have been able to implement so far. The empty checkboxes are for the functionalities we aim to implement by the end of the project.

ID	*Description*	Priority	Implemented
F-UR-1	ACCOUNT CREATION *F-UR-1.1 - The user must be able to create an account after providing the following details:* 1. First name (optional) 2. Last name (optional) 3. Username (mandatory) -linked to NF-SR-1 4. Password (mandatory) - linked to NF-SR-1 5. Password confirmation (mandatory) 6. Phone number (optional) 7. Email address (mandatory) 8. Date of birth (mandatory) 9. Gender (optional) 10. Account category selection (mandatory) - linked to NF-SR-18 10.1. Geocacher 10.2. Historian 10.3. General user ***F-UR-1.3**- The user is sent an email verification link which is sent to their email – Linked to **NF-SR7.9***	M	☑

F-UR-2	*The user must be able to login using the following credentials:* 1. Email (mandatory) 2. Password (mandatory)	M	☑
F-UR-3	*The user should be able to log out of the system.*	M	☑
F-UR-4	MEMORIES F-UR-4*.1 - The user must be able to create a memory.* *F-UR.4.2 - The user must be able to edit the following in a memory* - Title - Filters - Captions - Delete the memory F-UR-4.3 -*The user must be able to share content (photos or videos) as a Memory*	M	☑
F-UR-5	SCRAPBOOK *F-UR-5.1 - The user must be able to add/remove selected memories to a Scrapbook.* *F-UR-5.2 - The user must be able to create a scrapbook.* *F-UR-5.3 - The user must be able to edit/modify a scrapbook.* *F-UR-5.4 - The user must be able to delete a scrapbook.*	M	☐

F-UR-6	**GROUP** ***F-UR-6.1 –*** *The user must be able to create groups/communities for like-minded people* ***F-UR-6.2 –*** *The user must be able to join a group* ***F-UR-6.3 –*** *The user must be able to leave a group* ***F-UR-6.4 –*** *The user must be able to modify a group* - The user must be able to set the created group to public or private - The user must be able to switch group type to public or private - The user must be able to add members to a group ***F-UR-6.5*** *- The user must be able to delete a group created by them*	M	☐
F-SR-1	*The system must be connected to the internet*	M	☑
F-SR-2	*The system must have access to the GPS location of the user*	M	☑
F-SR-3	*The system must have access to the camera*	M	☑
F-SR-4	*The system must filter inappropriate and illegal content*	M	☐
F-SR-5	*The system should produce summary reports for platform managers concerning overall platform usage.*	M	☐
F-SR-6	*The system should enable memories to be grouped and organized based on:* 1. Physical Location 2. Groups that users can create	M	☐

F-SR-7	*The system must save any changes made by user in the database*	M	☑
F-SR-8	*The system must geotag Scrapbooks and Memories on the Map.*	M	☐

NON-FUNCTIONAL REQUIREMENTS

Provided below are the Non-Functional Requirements that we developed during the Stage 1 of the project. Next to each requirement, we have placed checkboxes to depict all the functionalities that we have been able to implement so far. The empty checkboxes are for the functionalities we aim to implement by the end of the project.

ID	Description	Priority	Implemented
NF-UR-1	FEEDBACK ***NF-UR-1.1*** *The user must be able to provide feedback/comments to posted memories.* ***NF-UR-1.2*** *The user must be able to view and add derivative annotations*	M	☑
NF-UR-2	*The user should be able to report messages if they deem it to be fake news or offensive.*	S	☑

NF-UR-3	***Profile Modification*** NF-UR-3.1 - *The user must be able to change the following account details* 1. Profile picture. 2. Account Username 3. Account password 4. First name 5. Last name 6. Phone number 7. E-mail 8. Date of Birth 9. Gender **NF-UR-3.2** *The user must be able to add a bio/sub-description.* **NF-UR-3.3** *The user must be able to set their preferred visibility on their profile.* 1. Visible to all 2. Visible to friends only		☑
NF-UR-4	*The user must be able to delete their memories*		☐
NF-UR-5	*The user must be able to add and remove other users as a "friend"*	M	☐
NF-UR-6	*The user must be able to block other users.*	M	☐
NF-UR-7	*The user must be able to schedule the date and time for posting a memory.*	M	☐

NF-SR-1	The system must allow users to create an account only if: 1. The username is unique 2. The username is 6 – 30 characters long 3. The username only consists of letters, numbers, and special characters like '('and ')'. 4. The password is 6 - 20 characters long 5. The password contains an uppercase character, a number, and a special character. 6. The password doesn't contain the first name, last name, or the username of the user 7. The password matches with the entered confirm password 8. The user agrees to the terms and conditions of the system.	M	☑
NF-SR-2	*The system must allow users to report misinformation and issues.*	M	☑
NF-SR-3	*The system must let the user edit/modify media (memories and scrapbooks) posted by them.*	M	☐
NF-SR-4	*The system should be able to suggest tips to users when the user is creating or modifying a scrapbook.*	S	☐
NF-SR-5	**Usability** ***NF-SR5.1*** *The system must provide an interface for the users to operate with minimum difficulty (user-friendly).* ***NF-SR5.2*** *The system must provide introductory annotations to familiarize the new users with the functionality of the system.*	M	☑

NF-SR-6	**Portability and Compatibility** ***NF-SR6.1*** *The system should be fully responsive across the following web browsers:* 1. Google Chrome 2. Mozilla Firefox 3. Apple Safari 4. Microsoft Edge ***NF-SR6.2*** *The system should be able to run on different devices (mobile, laptop etc.)*	M	☑
NF-SR-7	**Security** ***NF-SR7.1-*** *The system should provide 2 factor authentication* ***NF-SR7.2-*** *The system shall store the user's personal data in a database* ***NF-SR7.3-*** *The system shall encrypt and store the passwords in a database* ***NF-SR7.4-*** *The databases should be accessible only by the database administrators.* ***NF-SR7.5-*** *The system should block login to an account after a certain number of login attempts.* ***NF-SR7.6-*** *The system should use the HTTPS protocol while communicating to the client.* ***NF-SR7.7-*** *The system should be able to detect and prevent attempts at SQL injection by performing input validation, parameterized queries, prepared statements etc.* ***NF-SR7.8-*** *The system should lock an account after 3 failed login attempts.* ***NF-SR7.9-*** *The system should send an email to verify whether the user owns the email they signed up with (Email Verification).*	S	☑

NF-SR-8	**Availability and Reliability** ***NF-SR8.1*** *The system should be available 99.99% of the time, annually* ***NF-SR8.2*** *The system should suffer at most 4 minutes and 22 seconds of downtime per month*	S	☑
NF-SR-9	*The system could recommend platform users about nearby scrapbooks and contacts.*	C	☐
NF-SR-10	*The system must provide additional features for creating and modifying media (such as photo filters etc.).*	M	☐
NF-SR-11	*The system must allow users to recover their passwords by clicking on "forgot password".*	M	☑
NF-SR-12	**Scalability** ***NF-SR 12.1*** *System should be able to adapt to growing demand to manage additional data.* ***NF-SR 12.2*** *System must be able to maintain its optimization even with the growing number of users*	M	☑
NF-SR-13	**Responsiveness** ***NF-SR 13.1*** *System must be able to save state and return to the same state/page if the user is interrupted by a call* ***NF-SR 13.2*** *System must be responsive to user input*	M	☑
NF-SR-14	**Performance** ***NF-SR14.1*** *System mustn't take more than 3 seconds to load the initial screen* ***NF-SR 14.2*** *System must be optimized to use less data when users are on cellular data*	M	☑

NF-SR-15	**Network Coverage** ***NF-SR 15.1*** *Basic system functions should be able to work with low/poor internet connectivity* ***NF-SR15.2*** *System should be able to automatically switch to mobile network in case of poor Wi-Fi if the user allows it*	S	☑
NF-SR-16	**Accessibility** ***NF-SR16.1*** *System could have a voiceover feature for the visually impaired (Color blind)* ***NF-SR16.2*** *System could have a "Speech" option to choose different voiceover accents to help the user understand better* ***NF-SR16.5*** *System could have an option "Color Filters" to help users who are color blind differentiate colors and help those having difficulty reading text* ***NF-SR16.3*** *System could have an option to change language* ***NF-SR16.4*** *System could have an option to change text formatting from right to left*	C	☐

NF-SR-17	**ACCOUNT TYPES** ***NF-SR-17.1 - General Users*** ***NF-SR-17.1.1*** *- The system should enable users to create their own filters with interactive fictional characters/objects and share them so that other users can use them at that geographic location.* ***NF-SR17.2 - Geocacher Account*** ***NF-SR17.2.1 -*** *The system should award achievements/badges to user to display them in their personal profiles based on* - The number of quests completed - Creates a record time for completing a quests ***NF-SR17.3*** **- Historian Account** ***NF-SR*- 17.3.1 -** The system should allow users to create Self-Guided Tour Scrapbooks at a particular location. ***NF-SR*- 17.3.2 -** The system should allow users to create Trivia or similar quizzes related to a historic site.	S	☐
NF-SR-18	*The system should automatically filter profanity in places such as:* 1. Group Names 2. Posts 3. Comments 4. Annotations 5. Usernames	M	☐

NF-SR-19	*The system must support facilities and provide separate interfaces for the different potential users:* 1. Such as generating analytics for data scientists 2. Allow programmers to use API'S that interact with the system	S	☑
NF-SR-20	*The system must allow users to download photos and videos only related to their account/ only from their account.*	M	☐

MILESTONES ACHIEVED

The following features were implemented for the app so far –

I. Dynamic User Profiles

This component of the application displays user details like the profile picture, number of followers, number of people they follow, and a list of the pictures they have shared on the platform (shared as "posts").

II. User Settings

This component allows users to set, view and update their account settings. It also contains tabs to report a problem, set account visibility, reset account password, view and modify user profile and personal information etc.

III. AR Camera

This is one of the main features of the application. Users can use the AR Camera to view AR objects in real time and leave objects at a particular location.

IV. Capturing a Memory

Users can capture memories using their device camera. The front-view and rear-view cameras have been implemented to capture a memory.

V. Posting a Memory

This component allows users to post the captured memory which will be stored in Firebase once the user clicks on the Post button.

VI. The Feed page

This page allows users to view “posts” from other users and interact with them by using the “Like” and “Commenting” features.

VII. Search feature

This feature allows a user to search for other registered users.

VIII. The Map page

This page allows users to view the posts in the user's current and neighboring regions.

IX. Likes and Comments

This allows our users to interact with other users’ posts in 2 ways - first, by liking the post to acknowledge the post, and second, by commenting on the post, to engage with the post further by sharing their opinions about it.

X. User Registration

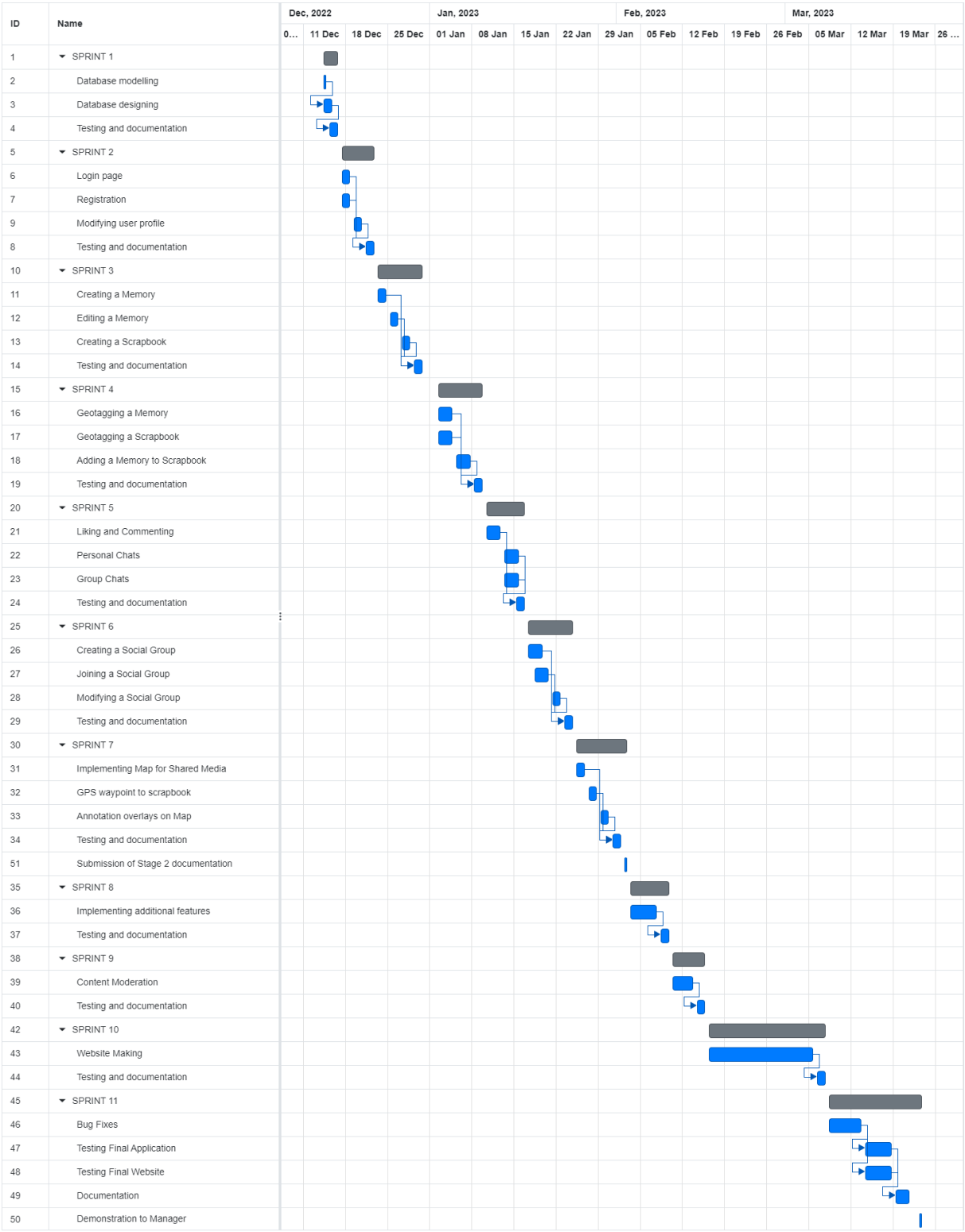
If a user is new to the application, they must create a new account in order to register themselves and use the various features the app has to offer.

XI. User Login

Registered users can log in to the application using their email and password. In case they forget their password, they can reset their password by requesting - on which, an email is sent to their registered email IDs with a link to reset their password.

GANTT CHART

Below is the originally planned Gantt chart for Stage 2 –



Name	Start Date	End Date	Duration
SPRINT 1	Dec 14, 2022	Dec 16, 2022	3 days
Database modelling	Dec 14, 2022	Dec 14, 2022	1 day
Database designing	Dec 14, 2022	Dec 15, 2022	2 days
Testing and documentation	Dec 15, 2022	Dec 16, 2022	2 days
SPRINT 2	Dec 17, 2022	Dec 22, 2022	6 days
Login page	Dec 17, 2022	Dec 18, 2022	2 days
Registration	Dec 17, 2022	Dec 18, 2022	2 days
Modifying user profile	Dec 19, 2022	Dec 20, 2022	2 days
Testing and documentation	Dec 21, 2022	Dec 22, 2022	2 days
SPRINT 3	Dec 23, 2022	Dec 30, 2022	8 days
Creating a Memory	Dec 23, 2022	Dec 24, 2022	2 days
Editing a Memory	Dec 25, 2022	Dec 26, 2022	2 days
Creating a Scrapbook	Dec 27, 2022	Dec 28, 2022	2 days
Testing and documentation	Dec 29, 2022	Dec 30, 2022	2 days
SPRINT 4	Jan 02, 2023	Jan 09, 2023	8 days
Geotagging a Memory	Jan 02, 2023	Jan 04, 2023	3 days
Geotagging a Scrapbook	Jan 02, 2023	Jan 04, 2023	3 days
Adding a Memory to Scrapbook	Jan 05, 2023	Jan 07, 2023	3 days
Testing and documentation	Jan 08, 2023	Jan 09, 2023	2 days

▾ SPRINT 5	Jan 10, 2023	Jan 16, 2023	7 days
Liking and Commenting	Jan 10, 2023	Jan 12, 2023	3 days
Personal Chats	Jan 13, 2023	Jan 15, 2023	3 days
Group Chats	Jan 13, 2023	Jan 15, 2023	3 days
Testing and documentation	Jan 15, 2023	Jan 16, 2023	2 days
▾ SPRINT 6	Jan 17, 2023	Jan 24, 2023	8 days
Creating a Social Group	Jan 17, 2023	Jan 19, 2023	3 days
Joining a Social Group	Jan 18, 2023	Jan 20, 2023	3 days
Modifying a Social Group	Jan 21, 2023	Jan 22, 2023	2 days
Testing and documentation	Jan 23, 2023	Jan 24, 2023	2 days
▾ SPRINT 7	Jan 25, 2023	Feb 02, 2023	9 days
Implementing Map for Shared Media	Jan 25, 2023	Jan 26, 2023	2 days
GPS waypoint to scrapbook	Jan 27, 2023	Jan 28, 2023	2 days
Annotation overlays on Map	Jan 29, 2023	Jan 30, 2023	2 days
Testing and documentation	Jan 31, 2023	Feb 01, 2023	2 days
Submission of Stage 2 documentation	Feb 02, 2023	Feb 02, 2023	1 day
▾ SPRINT 8	Feb 03, 2023	Feb 09, 2023	7 days
Implementing additional features	Feb 03, 2023	Feb 07, 2023	5 days
Testing and documentation	Feb 08, 2023	Feb 09, 2023	2 days

▾ SPRINT 9	Feb 10, 2023	Feb 15, 2023	6 days
Content Moderation	Feb 10, 2023	Feb 13, 2023	4 days
Testing and documentation	Feb 14, 2023	Feb 15, 2023	2 days
▾ SPRINT 10	Feb 16, 2023	Mar 07, 2023	20 days
Website Making	Feb 16, 2023	Mar 05, 2023	18 days
Testing and documentation	Mar 06, 2023	Mar 07, 2023	2 days
▾ SPRINT 11	Mar 08, 2023	Mar 23, 2023	16 days
Bug Fixes	Mar 08, 2023	Mar 13, 2023	6 days
Testing Final Application	Mar 14, 2023	Mar 18, 2023	5 days
Testing Final Website	Mar 14, 2023	Mar 18, 2023	5 days
Documentation	Mar 19, 2023	Mar 21, 2023	3 days
Demonstration to Manager	Mar 23, 2023	Mar 23, 2023	1 day

Below is the updated Gantt chart showing the remaining functionalities which are to be implemented –

Pending tasks with deadlines and durations –

Name	Start Date	End Date	Duration
Sprint 1	Feb 05, 2023	Feb 13, 2023	9 days
Editing a memory	Feb 05, 2023	Feb 07, 2023	3 days
Creating a scrapbook	Feb 05, 2023	Feb 07, 2023	3 days
Adding a memory to a scrapbook	Feb 08, 2023	Feb 10, 2023	3 days
Testing and Documentation	Feb 11, 2023	Feb 13, 2023	3 days
Sprint 2	Feb 12, 2023	Feb 21, 2023	10 days
Geotagging a memory	Feb 12, 2023	Feb 15, 2023	4 days
Geotagging a Scrapbook	Feb 12, 2023	Feb 15, 2023	4 days
GPS waypoint to scrapbook	Feb 16, 2023	Feb 18, 2023	3 days
Testing and documentation	Feb 19, 2023	Feb 21, 2023	3 days

▾ Sprint 3	Feb 17, 2023	Feb 27, 2023	11 days
Personal Chats	Feb 17, 2023	Feb 22, 2023	6 days
Group chats	Feb 19, 2023	Feb 24, 2023	6 days
Testing and Documentation	Feb 25, 2023	Feb 27, 2023	3 days
▾ Sprint 4	Feb 28, 2023	Mar 13, 2023	14 days
Creating a Social Group	Feb 28, 2023	Mar 02, 2023	3 days
Modifying a Social Group	Mar 03, 2023	Mar 06, 2023	4 days
Joining a Social Group	Mar 07, 2023	Mar 10, 2023	4 days
Testing and Documentation	Mar 11, 2023	Mar 13, 2023	3 days
▾ Sprint 5	Mar 14, 2023	Mar 23, 2023	10 days
Content Moderation	Mar 14, 2023	Mar 17, 2023	4 days
Additional features	Mar 16, 2023	Mar 20, 2023	5 days
Testing and documentation	Mar 21, 2023	Mar 23, 2023	3 days

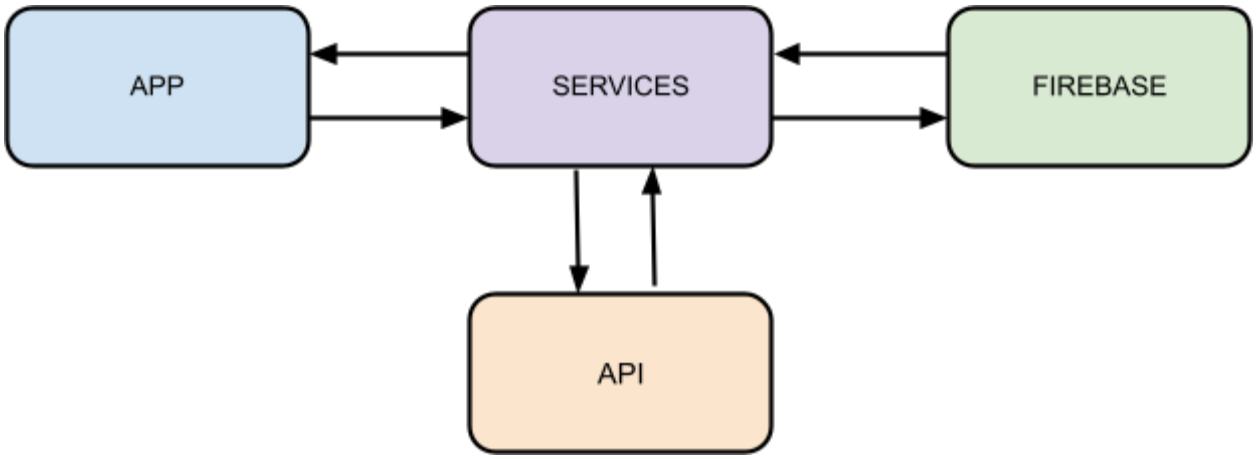
FUTURE PLANS

Based on the updated Gantt chart provided about, the pending functionalities include -

- Editing a memory
- Creating a scrapbook
- Adding a memory to the scrapbook
- Geotagging a memory and a scrapbook
- GPS waypoint scrapbook
- Personal and group chats
- Creating, modifying, and joining a social group
- Content moderation and additional features

HIGH LEVEL OVERVIEW

APPLICATION ARCHITECTURE



The application architecture consists of 3 layers - App, Services, Firebase. The data retrieved from the database (Firebase) is relayed to and displayed in the App.

The user interacts with the App component/ layer of the architecture. The Services layer consists of JSON queries and makes use of API calls which relay requests and responses between the App and Firebase. Some calls also go to APIs such as Google Maps and spatial anchors. Firebase is a cloud-hosted NoSQL database that enables storing and syncing data between the users in real time.

MVC Architecture

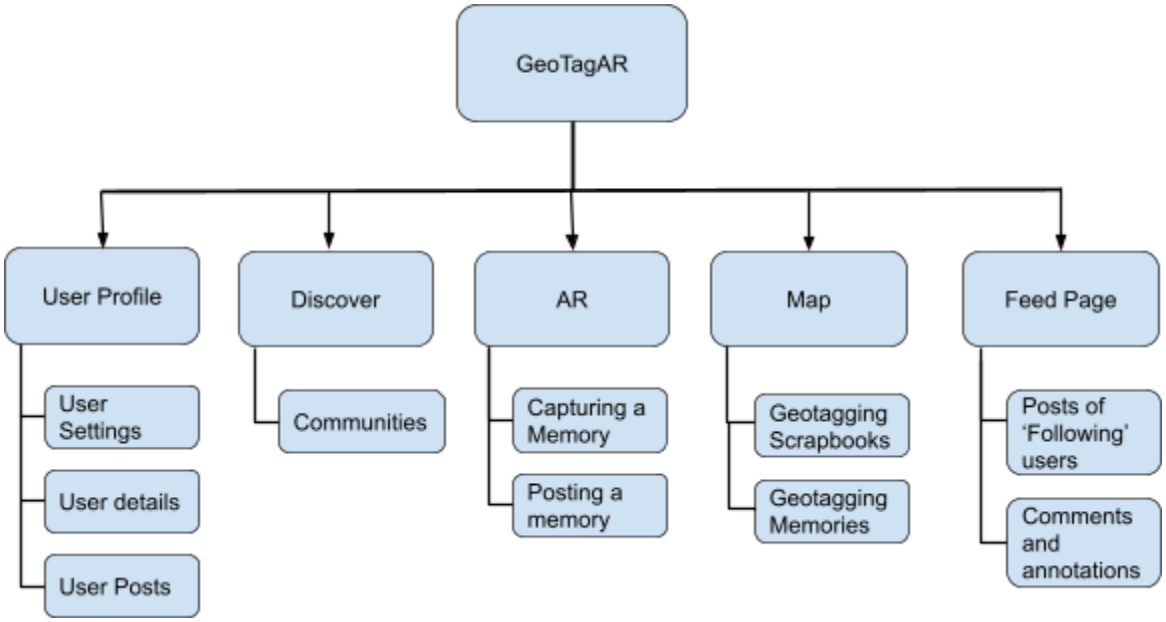
The **Model-View-Controller (MVC)** Framework is a design pattern that separates an application into three main logical components - Model, View and Controller. This design pattern is used to mitigate the problem of controlling large and complex data by splitting a large application into sections, each having its own specific purpose. It not only makes the code easier to maintain and modify but also allows testing of each component separately. All the components are independent of each other.

The user interacts with the **View** component. It represents the UI of the application. It only interacts with the controller.

The **Model** component deals with the data stored in the database. It can add or fetch (retrieve) data from the database. It interacts with the database and supplies the data as requested to the controller, hence, it acts as a middleman between the controller and the database.

The **Controller** component responsible for the communication between View and Model. Any data modification is sent to the Model by the Controller. It is responsible for transporting data fetched by the Model to be displayed by the View component.

INFORMATION ARCHITECTURE / COMPONENTS



The above Information Architecture diagram gives us a blueprint of the design structure of the application. The Application consists of 5 main blocks - User Profile, Discover, AR, Map and Feed Page. The User Profile displays the user details and allows the user to update these details by visiting the User Settings. The User posts are the Memories and Scrapbooks posted by the User. The Discover page contains the communities the user is a part of. A user can send messages/interact within the communities they are a part of. The AR section allows the user to capture and post a memory. The Map page displays the geotagged scrapbooks and memories captured and posted by the users. AR and the Map are the primary focuses of our application.The Feed page contains the posts by the people

that the user follows. The user can also comment and annotate on the posts by other users.

DEPLOYMENT

The end user will be able to access the mobile application on devices such as mobile, tablet and laptop. The application will also be responsive across the following web browsers:

1. Google Chrome
2. Mozilla Firefox
3. Apple Safari
4. Microsoft Edge

All Android devices with android 8.0 and above and iOS devices with version 8.0 and above are compatible to run the application.

The minimum requirements and dependencies necessary to successfully run and deploy the application are as follows:

1. For the AR component of the application
    - Unity (2020.3)
    - Azure spatial anchors 2.13.0
    - ARCore
    - ARFoundations 5.1.0
2. Firebase
3. HTML 5
4. Flutter (3.3.10)
5. Android toolchain - develop for Android devices (Android SDK version 33.0.1)
6. VS Code (version 1.74.3)
7. JAVA 1.8
8. Java 11.14

IN DEPTH OVERVIEW

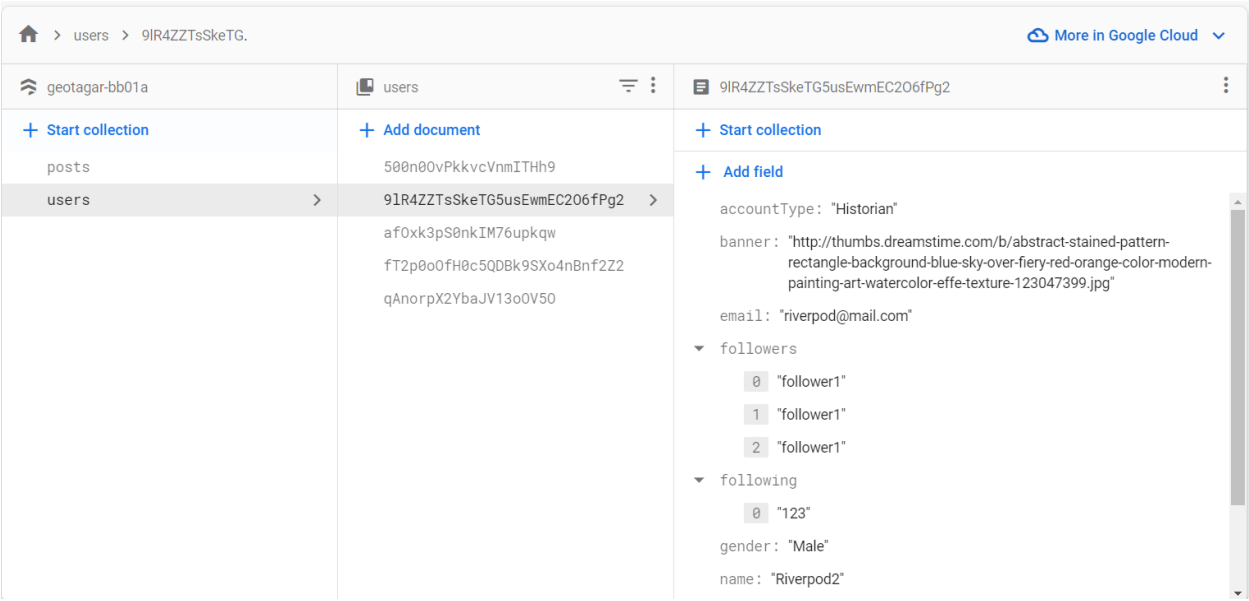
DATABASE DESIGN

For the database we used firebase which is a cloud-hosted NoSQL database that enables storing and syncing data between the users in real time.

Below are a few screenshots of how the data is stored in Firebase.

The following is the data being stored about the user:

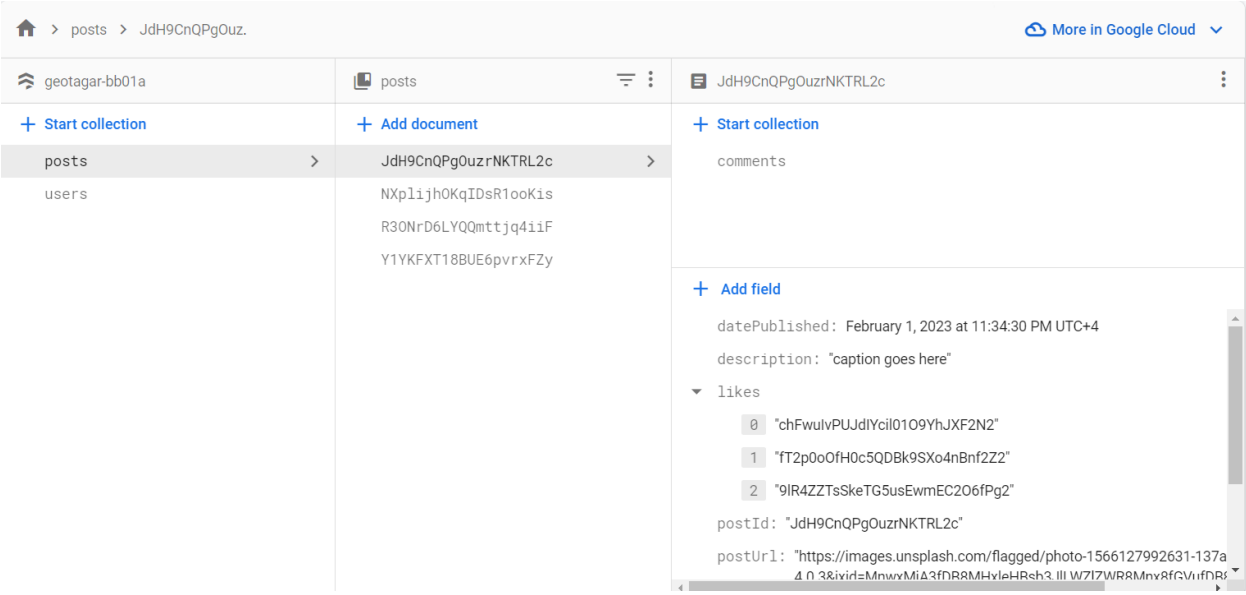
- Account type
- Banner (Background picture)
- Profile Picture
- Email ID
- Followers
- Following
- Gender
- Name
- User ID
- Username



[Storing User Details]

The following is the data being stored about the posts the user shares:

- Date posted
- Description
- Likes
- Post ID
- Post URL
- Profile Image
- User ID
- Username

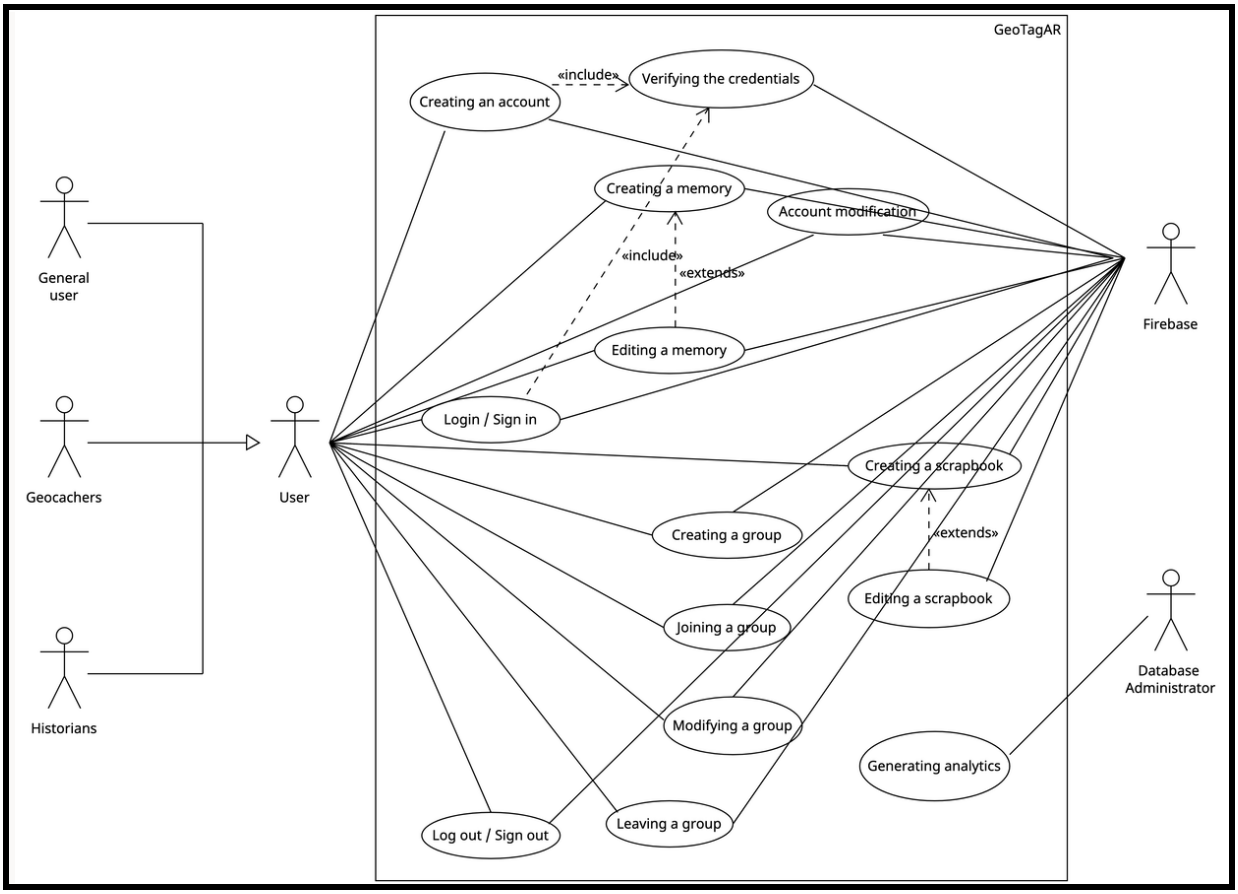


[Storing details of Posts]

DIAGRAMS

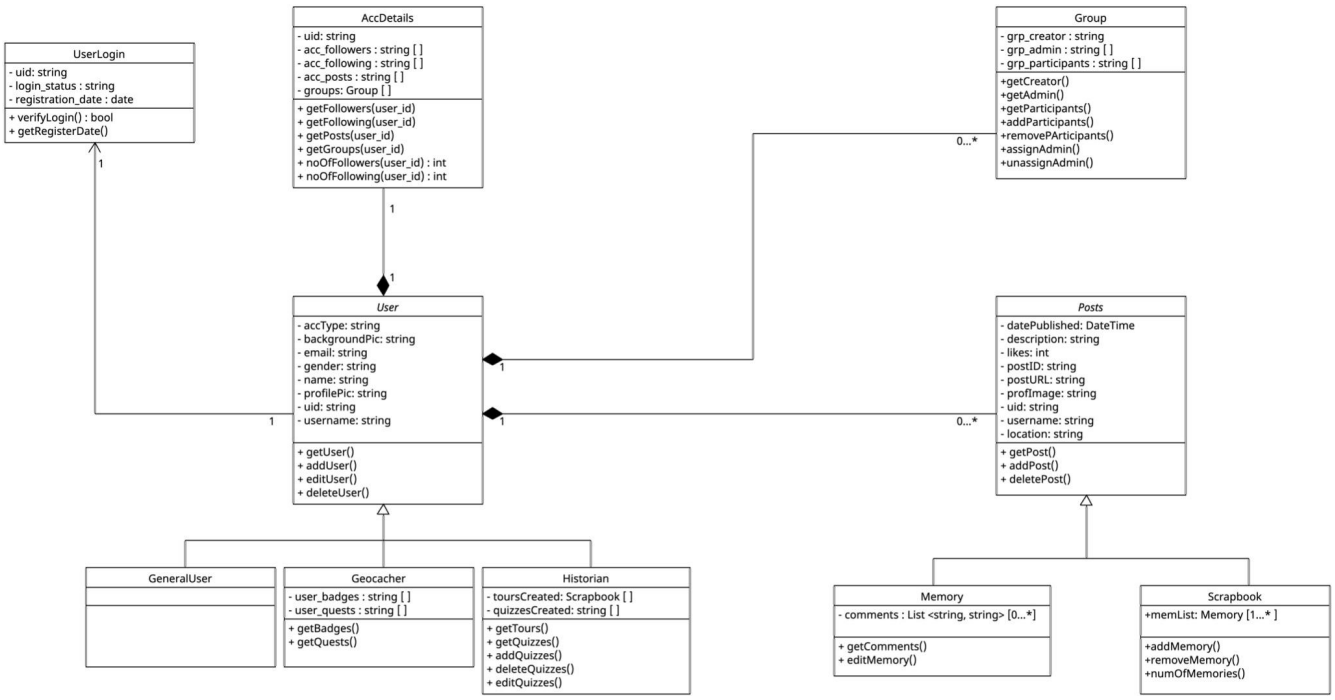
USE CASE DIAGRAM

The following Use Case diagram covers the functionalities that we aim to achieve by the end of the project:



CLASS DIAGRAM

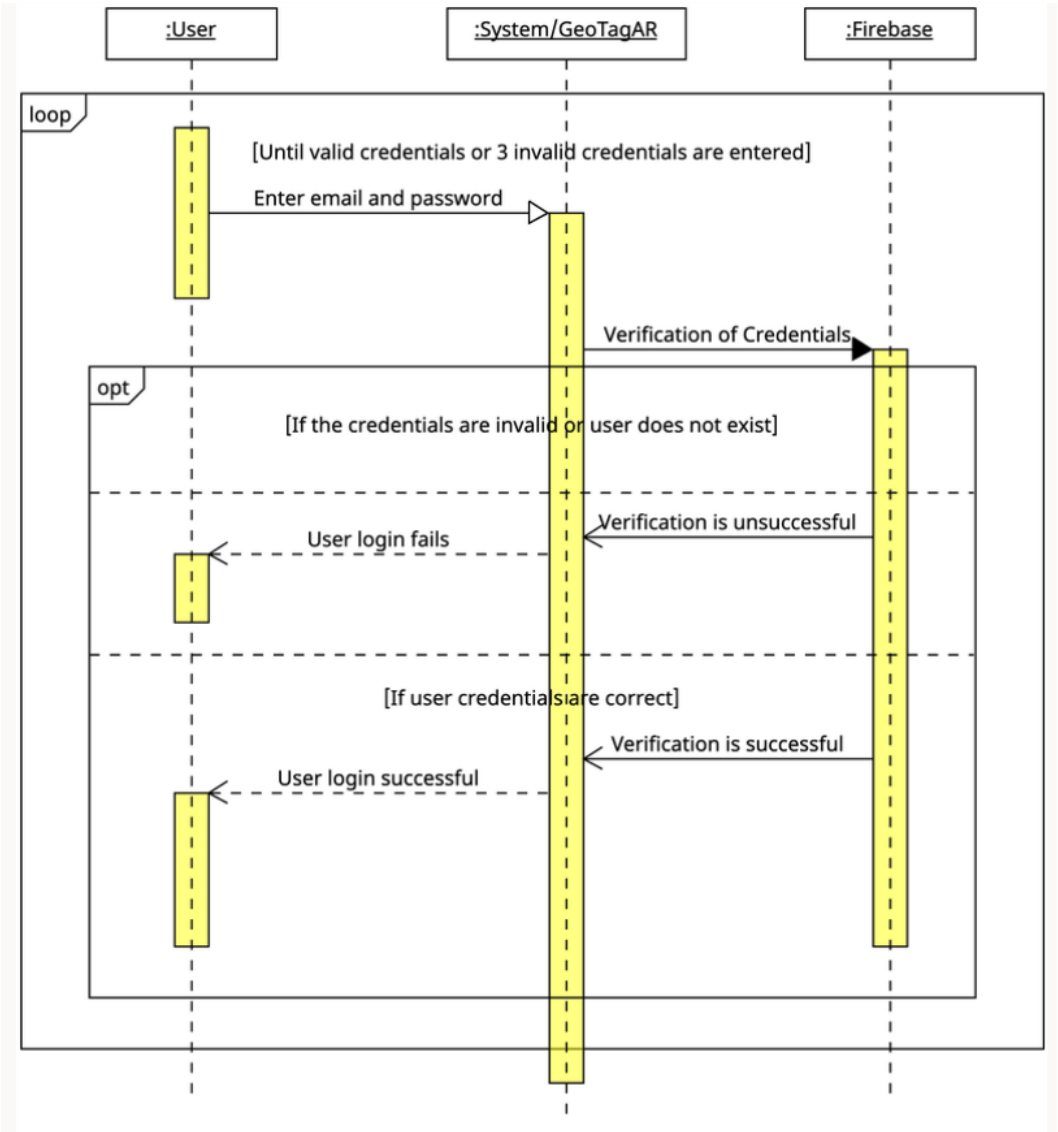
The following class diagram represents the main classes that our application consists of and the relations between them.



SEQUENCE DIAGRAMS

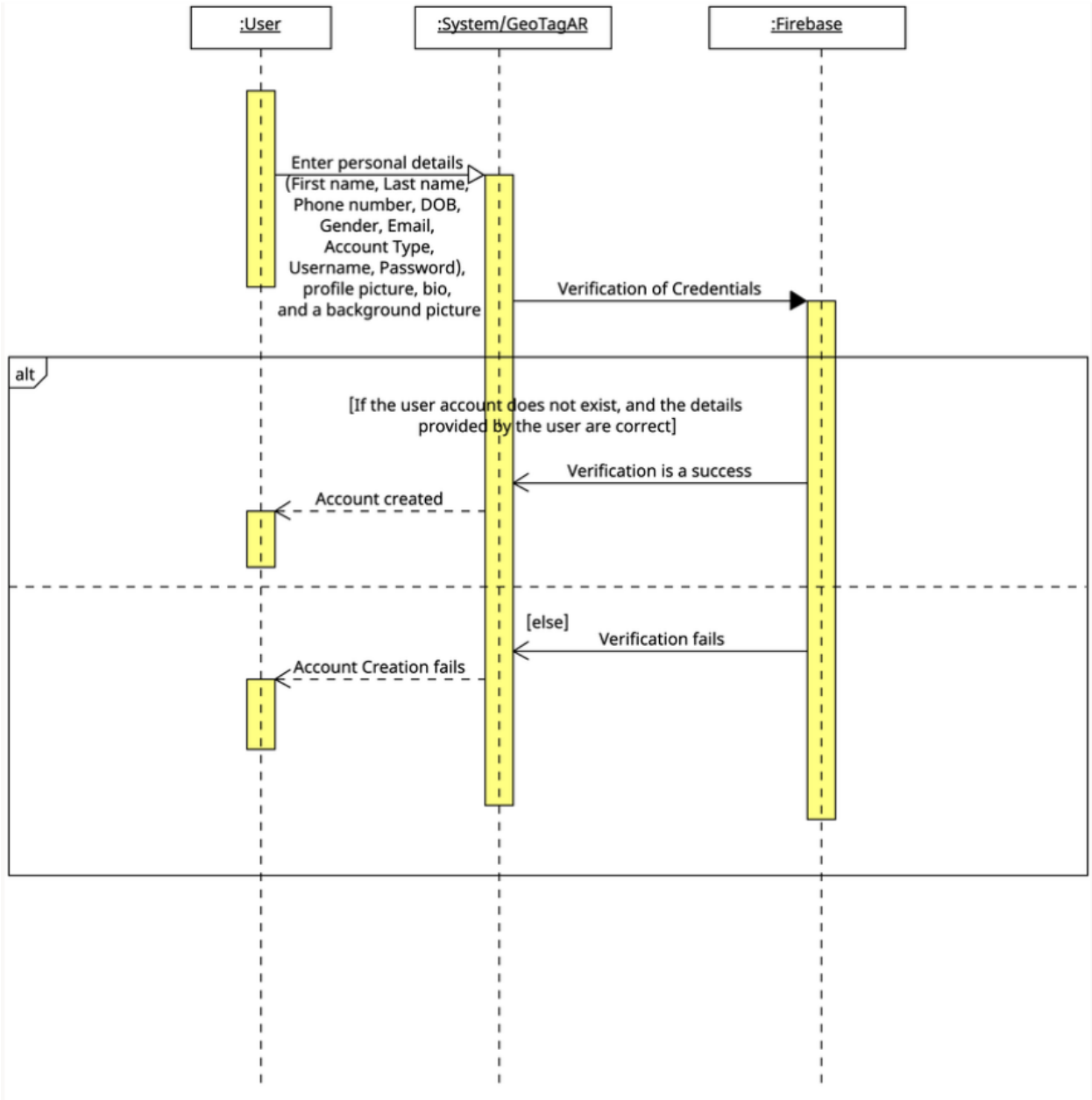
User Login

The user has to log in into their account in order to avail the functionalities offered by the app. The diagram below represents the login process of the application. The user is asked to enter their registered email and password to log in into their account. The user is given 3 attempts to enter the correct credentials. The user account will be blocked after 3 invalid login attempts.



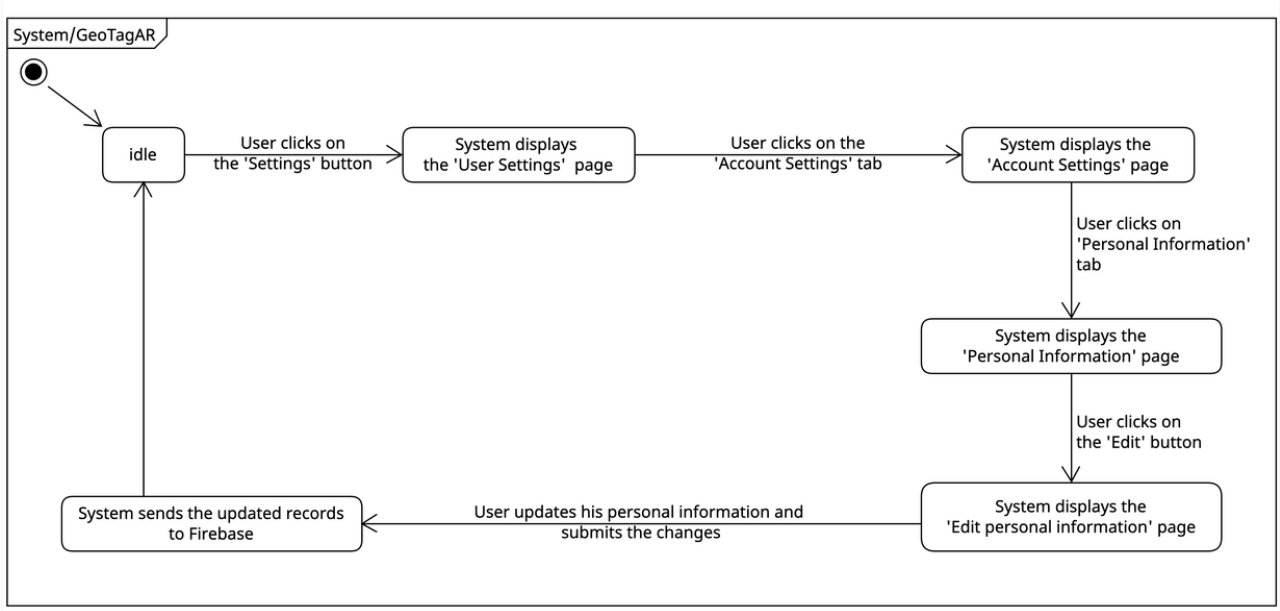
User Registration

The diagram below represents the User registering process. The user is required to provide their name, phone number, date of birth, gender, and email and set a valid username and password. In the second half of the process, the user is asked to set their profile picture and background picture which they can choose to skip.



STATE MACHINE DIAGRAM

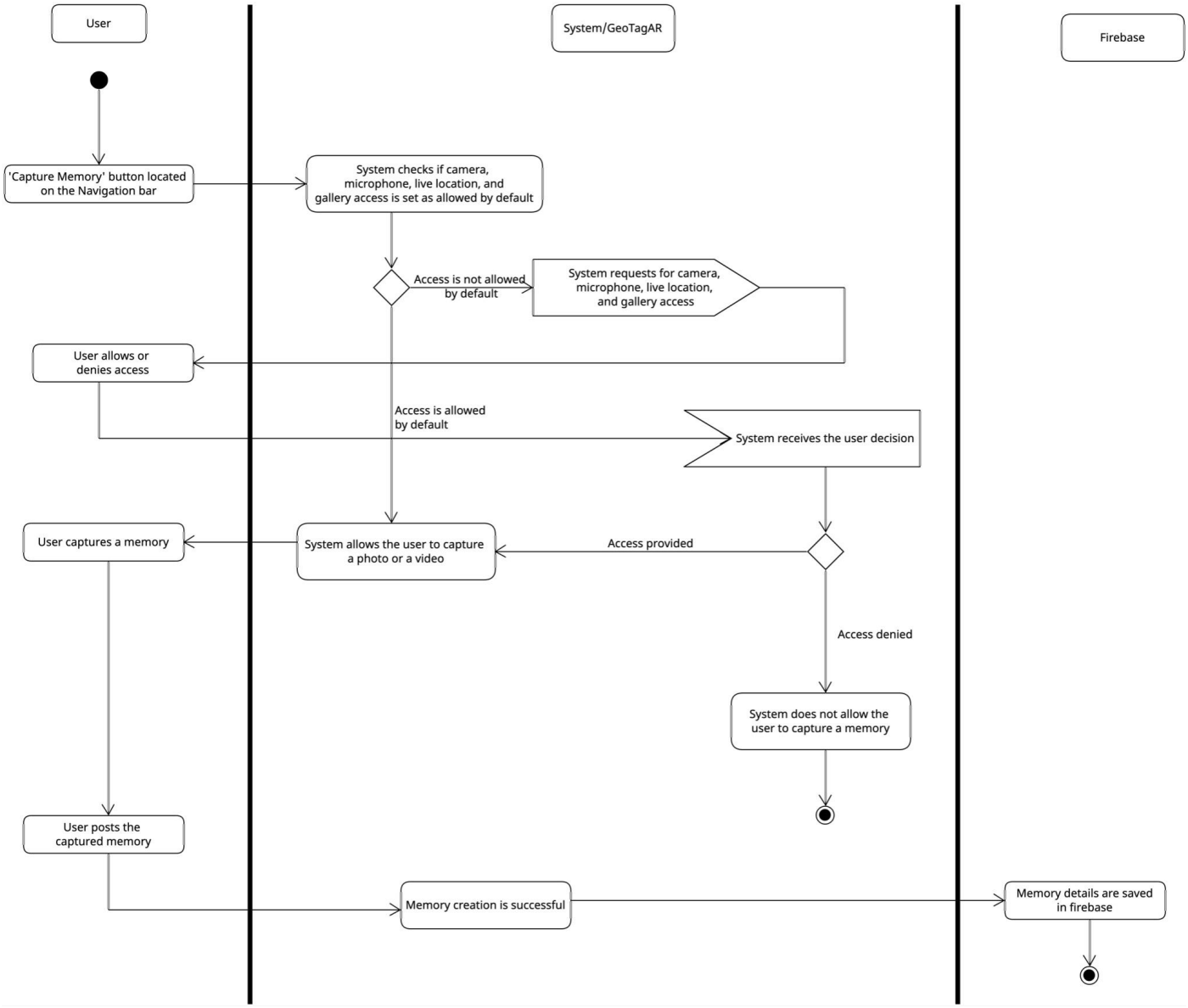
The diagram below represents the change in state of the application during the process of updating the User Profile. The idle state represents the user at the User Profile page which can be found using the Navigation bar at the bottom of the screen in the application.



ACTIVITY DIAGRAMS

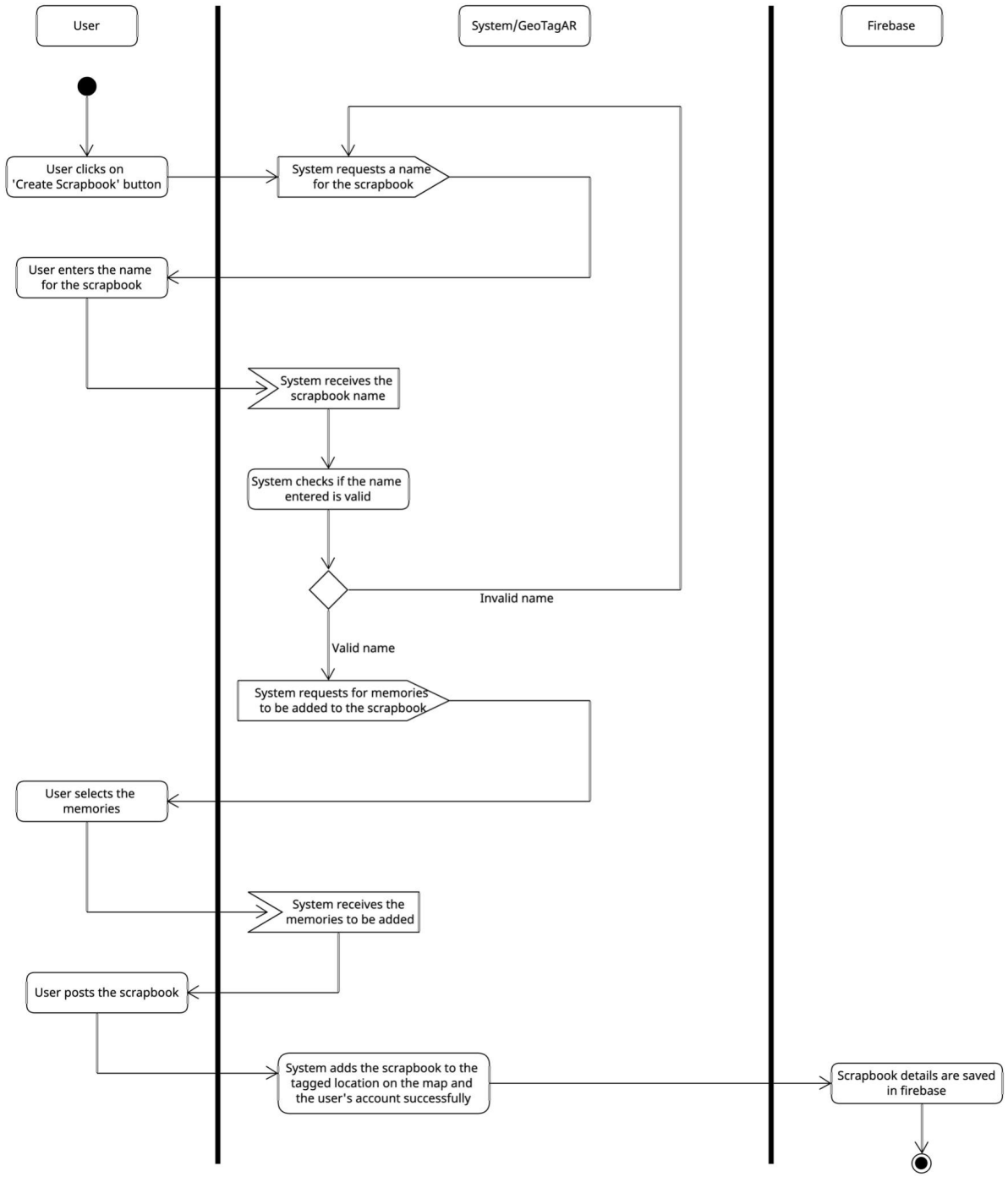
Creating a Memory

The diagram below represents the process of creating a memory. The features of capturing a memory, posting the memory and geotagging the memory to the user's current location are involved in the process.



Creating a Scrapbook

The diagram below represents the process of creating a scrapbook. The features of adding memories to a scrapbook and geotagging the scrapbook on the map are involved in the process.



COMPANY WEBSITE

https://rcs474.editorx.io/mintsolutions

The link provided above redirects to our promotional company website - Mint Solutions, which gives an overview of the company, its product - GeoTagAR, and our team. It also allows any users visiting the website to sign up for our newsletter by joining the mailing list and contact us by providing their details. It also has a well-defined set of Privacy policy, Terms and Conditions, and Cookie policy.

GITHUB REPOSITORY

https://github.com/JacDM/GeoTagAR

Above mentioned is the link to our GitHub repository where we have posted our Flutter code that we wrote to build our application.

TESTING

The test cases were assessed within the requirements to indicate the status of the application, this test details the testing process and provides the results based on the technical correctness. The main objective was to verify the functional and non-functional aspects of the application to work as intended and to meet the requirements that have been listed. The testing will be done by implementing a unit and widget test in a few of the functions while utilizing a simulator in Flutter and will also be done manually with real mobile devices. Since the testing has been done beforehand, the changes in the interface will be seen throughout the document.

Test Environment

At this stage of the project, the front-end and back-end have only been configured to work within the Android operating system, so the devices that have been used in the test cases are mobile devices that utilizes the android operating system.

Device Model	OS Version	Resolution
Samsung S10e	Android 12	1080 x 2280
Samsung A73 5G	Android 12	1080 x 2400

Samsung S21	Android 13	1080 x 2400
Sony Xperia XA1 Plus	Android 8.0	1080 x 1920

Test results for the requirements

F-SR-1	*The system must be connected to the internet*	Passed

The devices would need access to the internet in order to view some of the contents in the application.

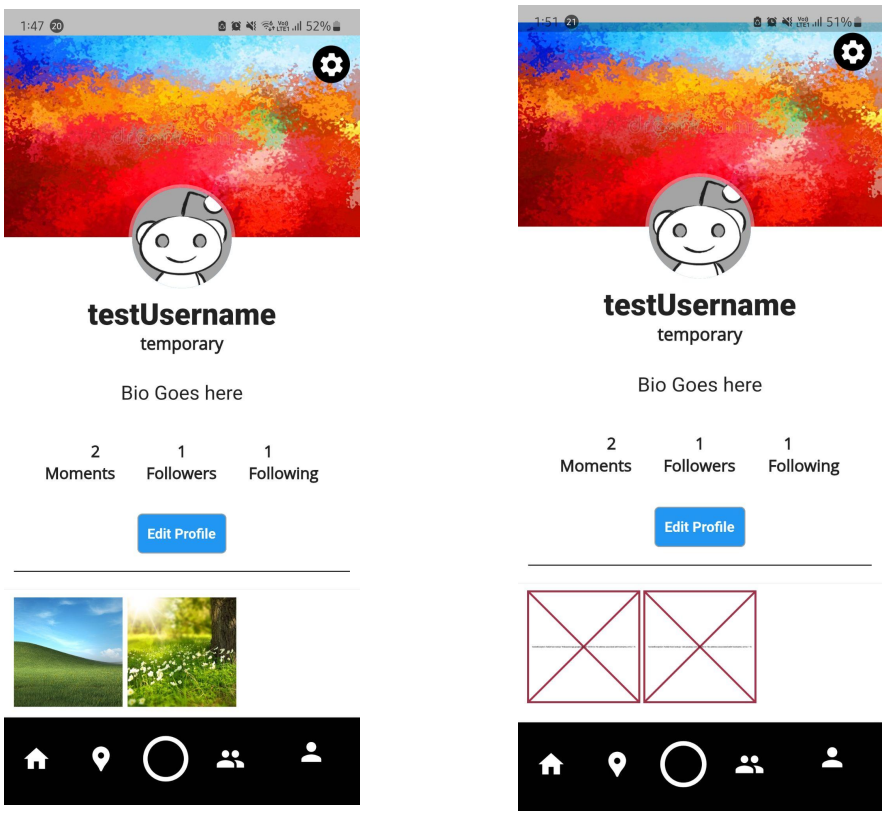


Fig 1. Shows two different interface in the user profile page with the first interface shown with an Internet connecting and the second interface without an Internet connection

F-UR-1	ACCOUNT CREATION *F-UR-1.1 - The user must be able to create an account after providing the following details:* 1. First name (optional) 2. Last name (optional) 3. Username (mandatory) -linked to NF-SR-1 4. Password (mandatory) - linked to NF-SR-1 5. Password confirmation (mandatory) 6. Phone number (optional) 7. Email address (mandatory) 8. Date of birth (mandatory) 8.1 The user must be ages 13 or above 9. Gender (optional) 10. Account category selection (mandatory) - linked to NF-SR-18 10.1. Geocacher 10.2. Historian 10.3. General user ***F-UR-1.2 –*** *The user must agree to the Terms and Conditions of the system before signing up* - linked to NF-SR-1 ***F-UR-1.3****- The user is sent an email verification link which is sent to their email – Linked to* ***NF-SR7.9***	*F-UR-1.1* - Passed with missing functions. *F-UR-1.2* - Missing *F-UR-1.3* - Passed

When creating an account, the fields that are required or deemed mandatory in order to sign up will prompt the user to fill it if the user does not input any text in the field.

The account category section in which users can select their type of account along with the terms and condition policy has not been implemented yet.

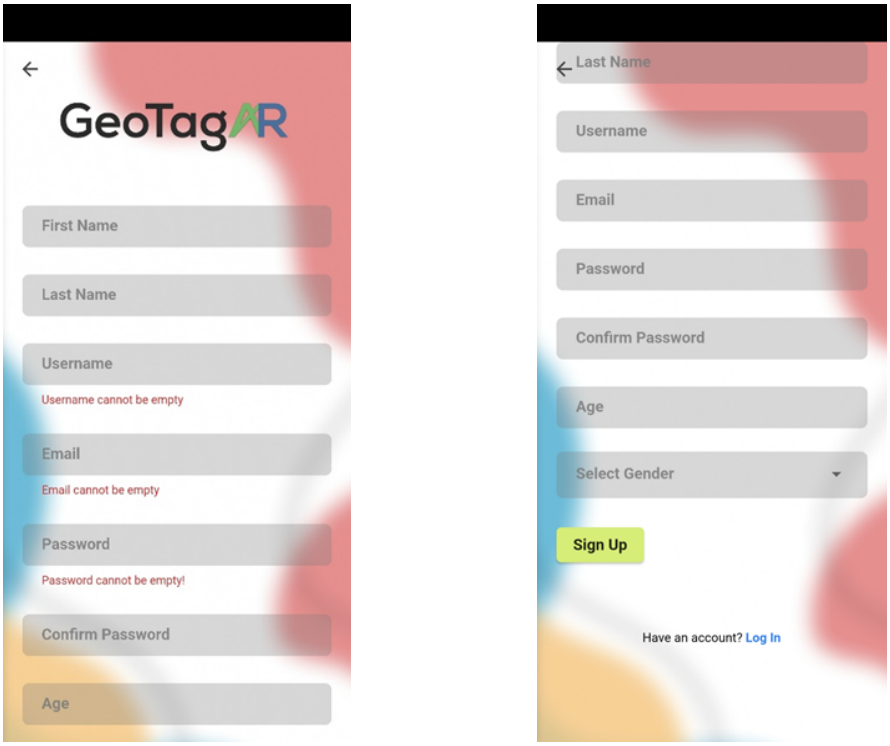


Fig 2. Shows the interface of the account creation or sign up page where the application prompts the user to fill in the mandatory fields

F-SR-2	*The system must have access to the GPS location of the user*	Passed with a missing functionality

The interface is provided with a map of the location but it does not show the user's current location as it just shows an overview of the location.

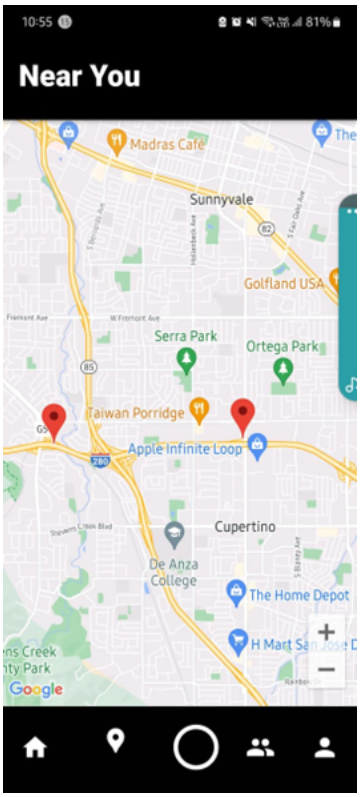


Fig 3. Shows the overview of the Google Map

F-UR-2	*The user must be able to login using the following credentials:* 1. Email or username (mandatory) 2. Password (mandatory)	Passed

The user will be prompted to enter their email and password again if not entered correctly or if the input field is left empty, it also provides the functionality to notify the user to enter a valid email address. The minor issue being that the username is not being prompted as an option for the login credentials which is mentioned in the requirement.

Fig 4. Shows the login page where the user is prompt to enter an email address and a valid email address

F-SR-3	*The user should be able to log out from the system*	Passed

F-UR-4	MEMORIES F-UR-4*.1 - The user must be able to create a memory.* *F-UR.4.2 - The user must be able to edit the following in a memory* - Title - Filters - captions - Delete the memory F-UR-4.3 -*The user must be able to share content (photos or videos) as a Memory*	*F-UR-4.1* - Passed with Issues *F-UR-4.2* - Missing *F-UR-4.3* - Passed

The user is able to create and share a memory as a video or photo. Editing a memory is yet to be implemented as the priority was to provide a presentable user interface to use this functionality with ease.

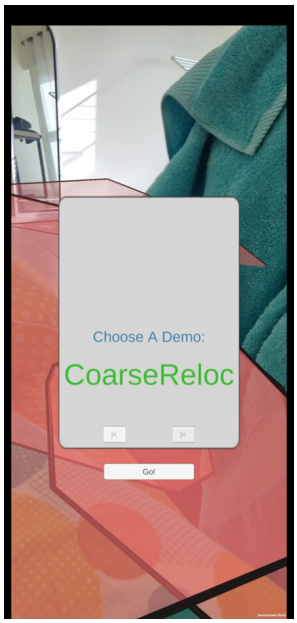


Fig 5. Shows the camera being used to create a memory while using the AR features

NF-SR-1	The system must allow users to create an account only if: 1. The username is unique 2. The username is 6 – 30 characters long 3. The username only consists of letters, numbers, and special characters like '('and ')'. 4. The password is 6 - 20 characters long 5. The password contains an uppercase character, a number, and a special character. 6. The password doesn't contain the first name, last name, or the username of the user 7. The password matches with the entered confirm password 8. The user agrees to the terms and conditions of the system	Passed but missing functionalities

With the database present, each field needs to be inputted with a unique name, this includes the username for the user. The password currently does not have a limit which is needed for implementation according to the requirement. It prompts the user if the confirmed password doesn't match. The only missing information is the implementation of the terms and conditions in the system.

NF-UR-1	FEEDBACK ***NF-UR-1.1*** *The user must be able to provide feedback/comments to posted memories.* ***NF-UR-1.2*** *The user must be able to view and add derivative annotations*	NF-UR-1.1 - Passed NF-UR-1.2 - Missing

The user can comment on a post when a memory is posted but the functionality to add annotations has yet to be implemented.

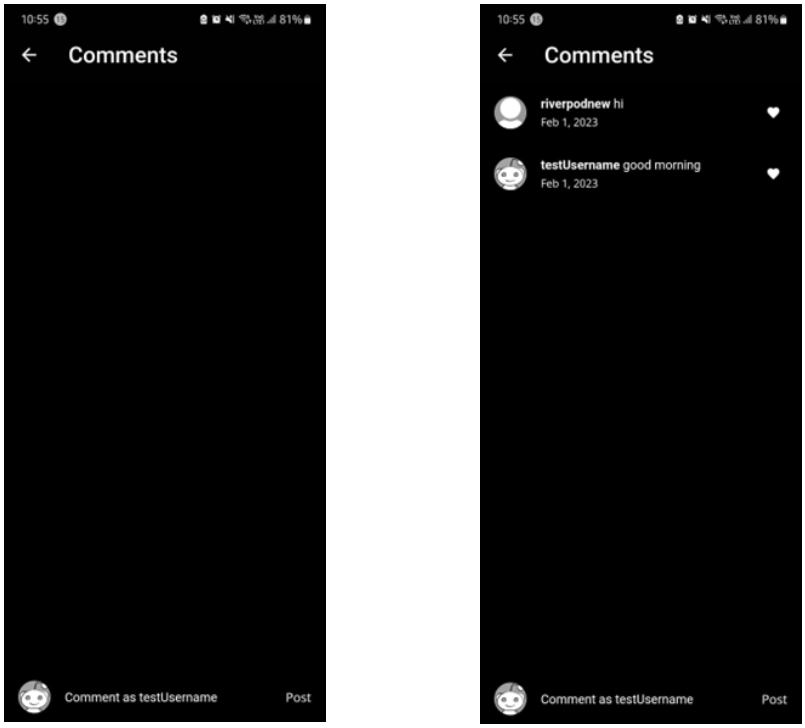


Fig 6. Shows the screens of the comment section when commenting on a posted memory

NF-SR-2	*The system must allow users to report misinformation and issues*	Passed
NF-UR-2	*The user should be able to report messages if they deem it to be fake news or offensive.*	Passed

The system provides an interface allowing users accessibility to report any issues or any offensive/fake information

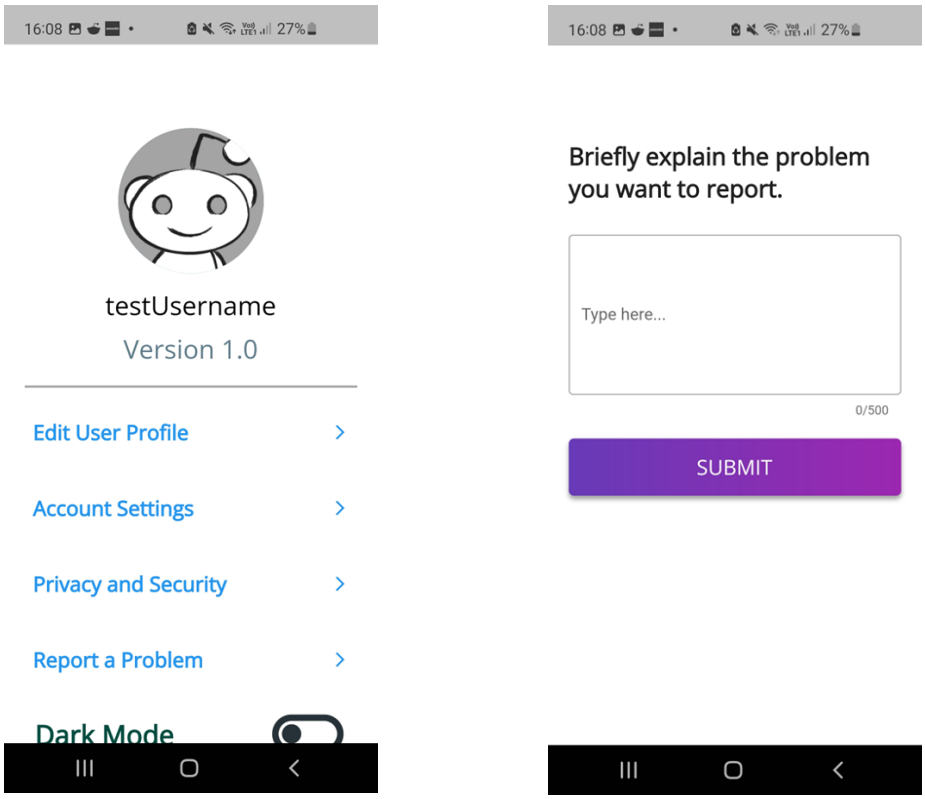


Fig 7. Shows the interfaces of user being able to report any issue when the user clicks on the “Report a Problem” section

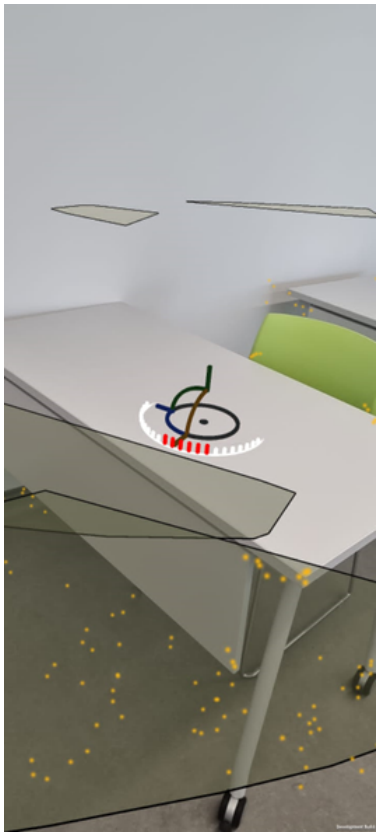
NF-UR-3	***Profile Modification*** NF-UR-3.1 - *The user must be able to change the following account details* 1. Profile picture. 2. Account Username 3. Account password 4. First name 5. Last name 6. Phone number 7. E-mail 8. Date of Birth 9. Gender **NF-UR-3.2** *The user must be able to add a bio/sub-description.* **NF-UR-3.3** *The user must be able to set their preferred visibility on their profile.* 1. Visible to all 2. Visible to friends only	Passed with missing functionalities

While the user is able to edit their profile and add a bio/sub description, the main issue is that it doesn't allow any changes in the interface. For the NF-UR-3.2, The keypad when used to edit the profile ends up glitching a lot as the keypad keeps closing when trying to edit that specific field.

The interface for the visibility feature of the user profile can be seen but it does not update the user profile in the system.

Test features with the Augmented Reality (AR)

The resolution within the android devices is different depending on the model and its latest features present. When testing on all the devices, there was an issue with the older models of the devices, the amount of time it had taken to find the required space to input the object using AR. It was also less engaging when utilizing the AR function with the older models and the lower pixel density can cause blurring. Higher pixel density can create more realistic images and videos for the human eye. However this cannot be fixed as it ends up being an issue from the user's hardware



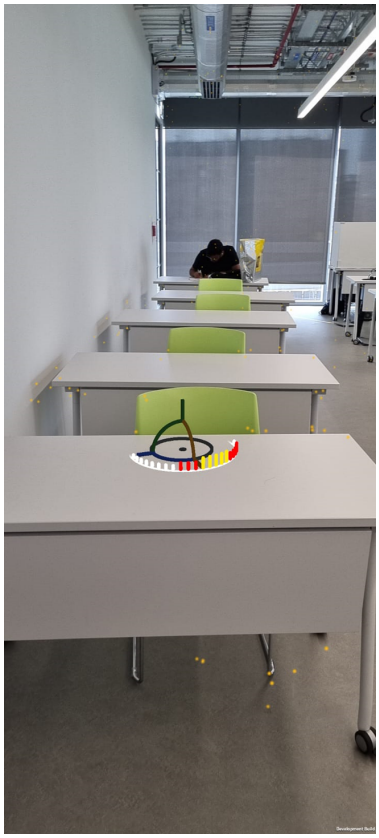


Fig 8. Shows the AR feature being used with a default object

It can be concluded that resolution is an important factor for augmented reality as it provides a more immersive and realistic experience for the user to enjoy, with less resolution it can lead to the user with a less convincing experience. Most AR features would require fine details in order to make the application unique from others.