COMSATS University Islamabad (CUI)

Software Design Description
(SDS DOCUMENT)

For

<Automatic detection of Cyber Bullying in Social Media Platforms>

Version 1.0

By

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Bachelor of Science in Software Engineering (2018-2022)

Table of Contents

Revision History

Name	Date	Reason for changes	Version

Application Evaluation History

Comments (by committee) ***include the ones given at scope time both in doc and presentation**	**Action Taken**
Update it - so that the platform is for young kids	Have added Date of Birth while use registrations. For users less than 18, the analysis model will be more sensitive for these users and report will be generated and shared with the guardians as soon as possible
Assess the mental state of user as well - similar to assessing the incoming messages	We have added analysis for user's outgoing activity.
After report generation, application should do some useful work.	The report will contain the links of accounts detected that are involved in bullying. This report will be then send to guardians.

Supervised by

Dr. Tahir Mustafa Madni

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Co-Supervised by

Dr. Uzair Iqbal

Signature_____

1. Introduction

Our project aims to help parents keep an eye on their children and to check whether they have been exposed to some sort of bullying on social media or not. Moreover, the users of social media who feel lonely and depressed will be able to get on time assistance in order to help them suppress these negative thoughts. For people interested in marketing their products, they would be able to look out for the sentiment of users regarding their product, their brand or their company hence enabling them to make data driven decisions,

The software solution will provide a platform where users can connect their social media handles with the system. The system will then perform different analyses on social media handles and will generate a single report which will comprise of different metrics like how many of the mentions on their profile were good and how many were bad. The generated report will be sent to their parents or guardians via email.

The work that we have done so far is:

- UI of the application
- User Registration
- Data Gathering from Facebook and Twitter
- Development of Sentiment Analysis Model

2. Design Methodology and Software Process Model

The software methodology used in this project will be **Agile**. The reason to use this model is to ensure that the project finishes on time. Moreover, this method will help to adapt to changes more quickly and efficiently. Another factor that forced us to select Agile is that the work is divided into small iterations with a limited time that can exist as a separate work product. Since the work is divided into small chunks, the quality of work will be improved as it would be easy to test and validate the system. The quality of the product is an important factor for us as we have to make our product as efficient as possible to generate accurate results.

We will be using an object oriented approach for our project. The rationale behind this decision is to reduce code redundancy as the categories described in modules will be used again and again. So this would help in code reusability. For instance, in order to recommend activities to the user, the system needs to use a sentiment analysis model to analyze the sentiment of the user and then recommend activities accordingly. Moreover, for machine learning models the libraries that we are using provide built in classes following the Object Oriented Approach so it is easy for us to incorporate it into our system

3. System Overview

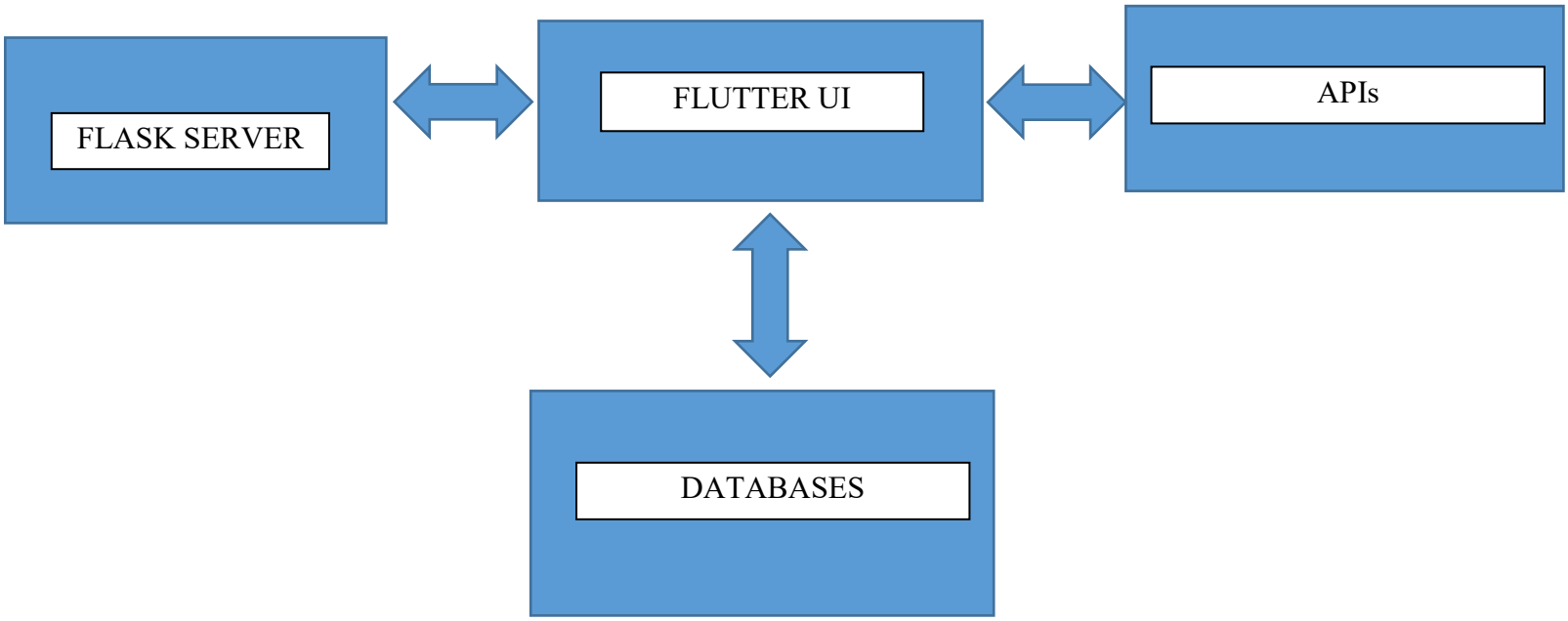
Cyber Watch is a new software system that aims to provide a platform that gives users especially marketers a chance to check the sentiment of the audience regarding a particular brand or keyword on Twitter. Moreover, users can connect their Twitter and Facebook accounts with our platform. As

a result, the system will generate reports using different machine learning algorithms informing the type of content the user interacted with.

In addition to this, the system has an integrated chatbot that will provide assistance to the user when he/she goes through a rough patch. The chatbot will provide an option to have chat with it. It will also recommend different content to the user depending on his/her choices. The system will also inform the guardian contact of the user regarding the mood or emotions they are in.

3.1 Architectural Design

The architecture of our system would be Monolithic. Our system has frontend developed in Flutter, APIs, a flask server on which machine learning models would be deployed and database to store the data. There is a 2 way flow of data between all these components with data coming from APIs to UI from where it is passed to Flask Server. After the analysis are performed, the data from the server is send back to UI from where it is send and stored in databases.



4. Design Models

Since we are using Object Oriented Programming approach in our system, we will be using Class Diagrams, Sequence Diagrams and Activity Diagrams as Design Models.

4.1 Activity Diagrams

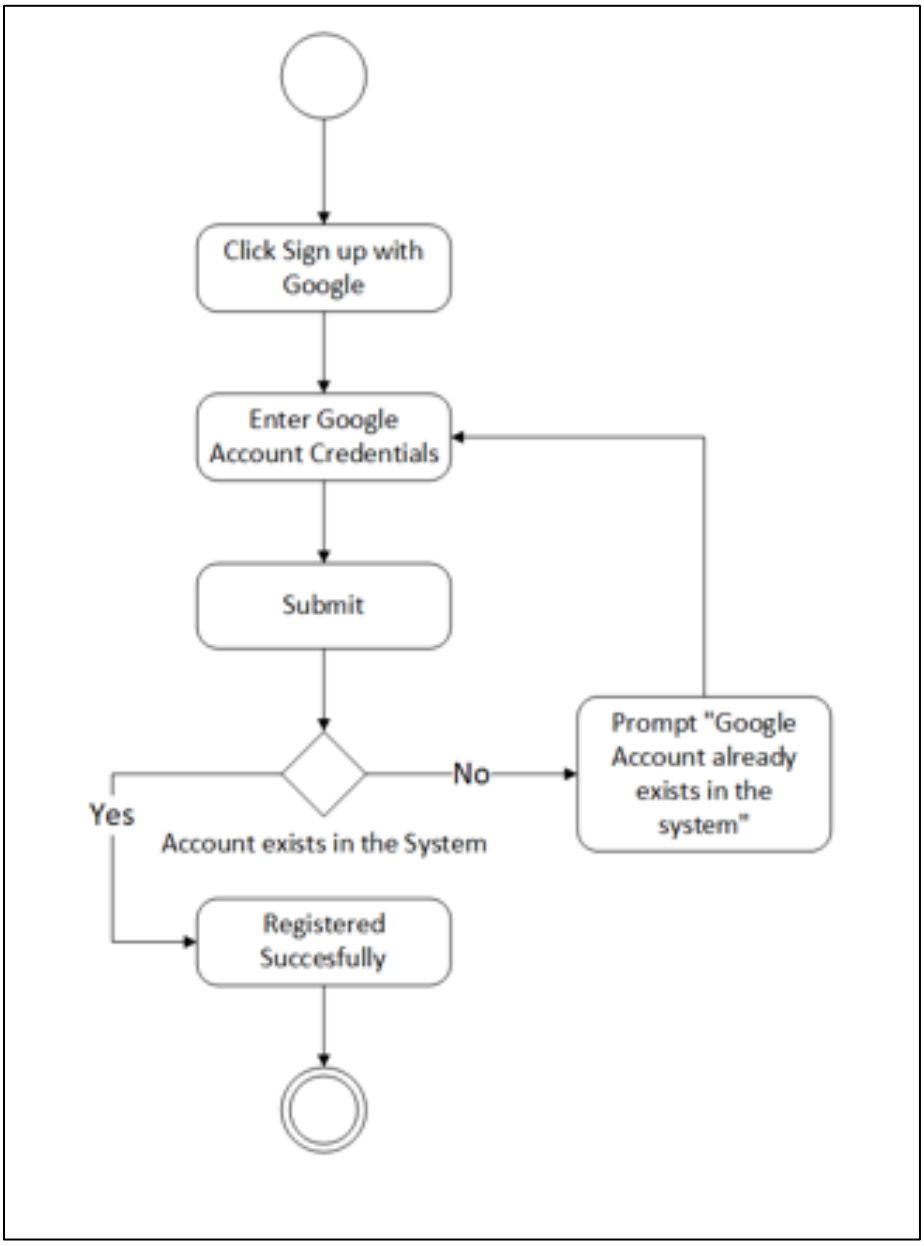


Figure 1: Register with Google

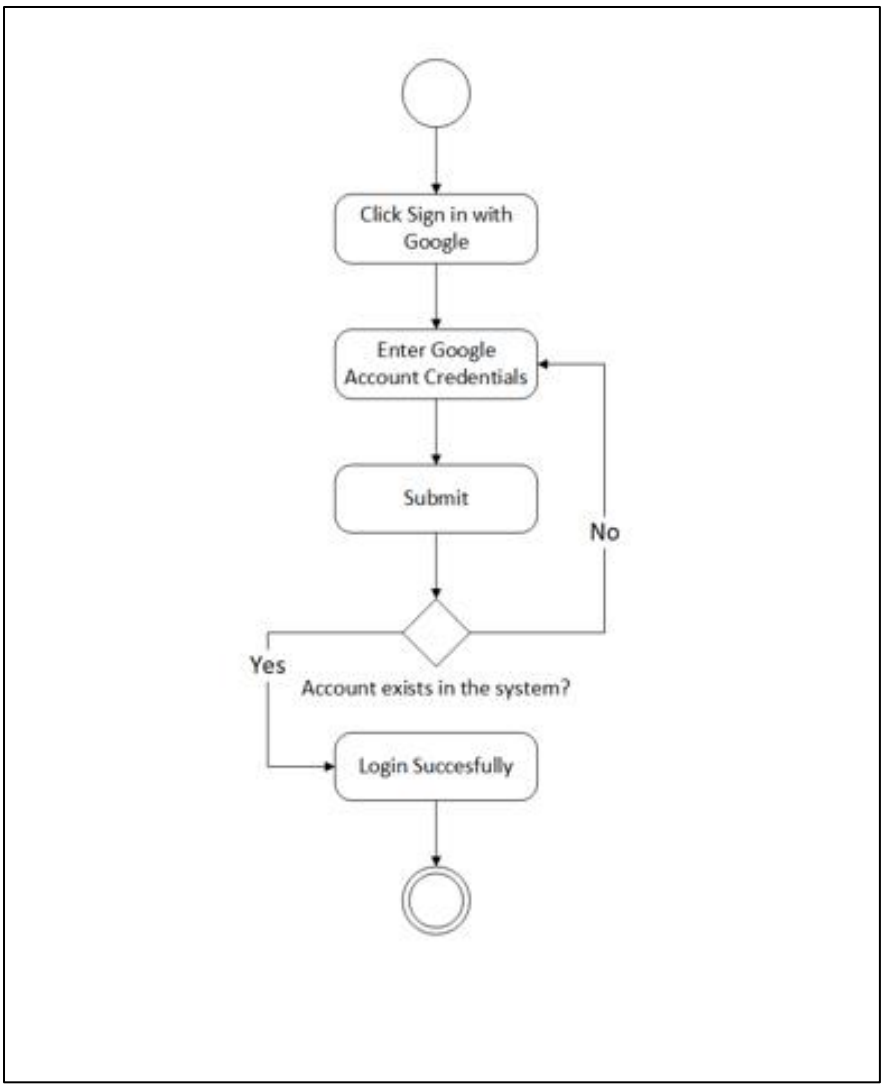


Figure 2: Sign in With Google

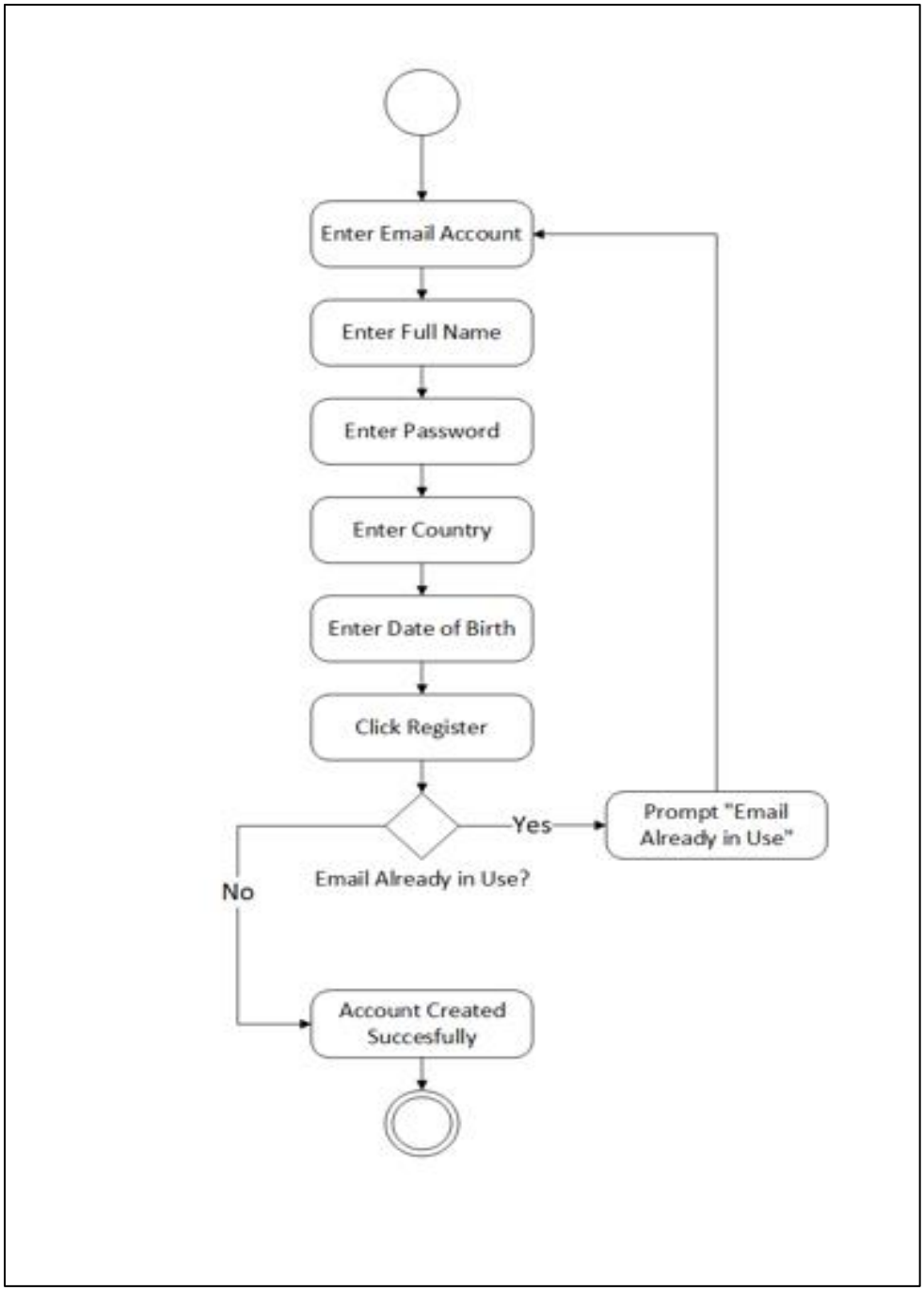


Figure 3: Register Using Email Account

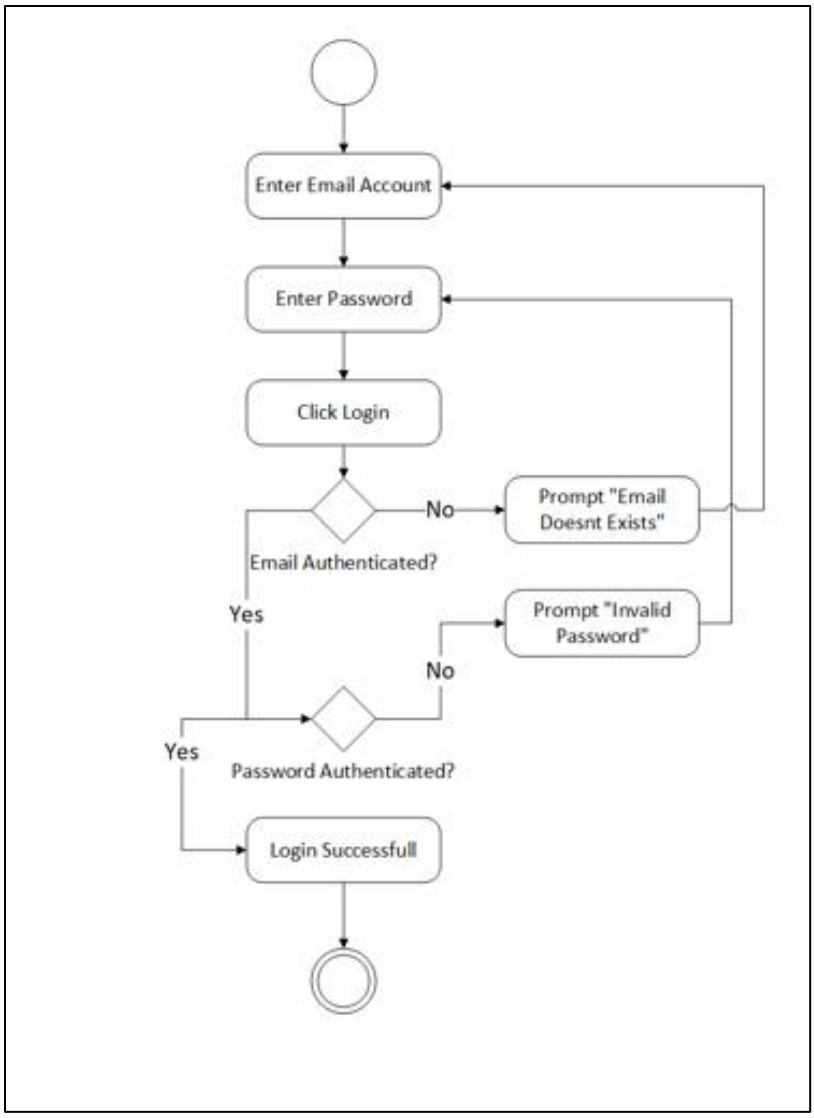


Figure 4: Login with Email Account

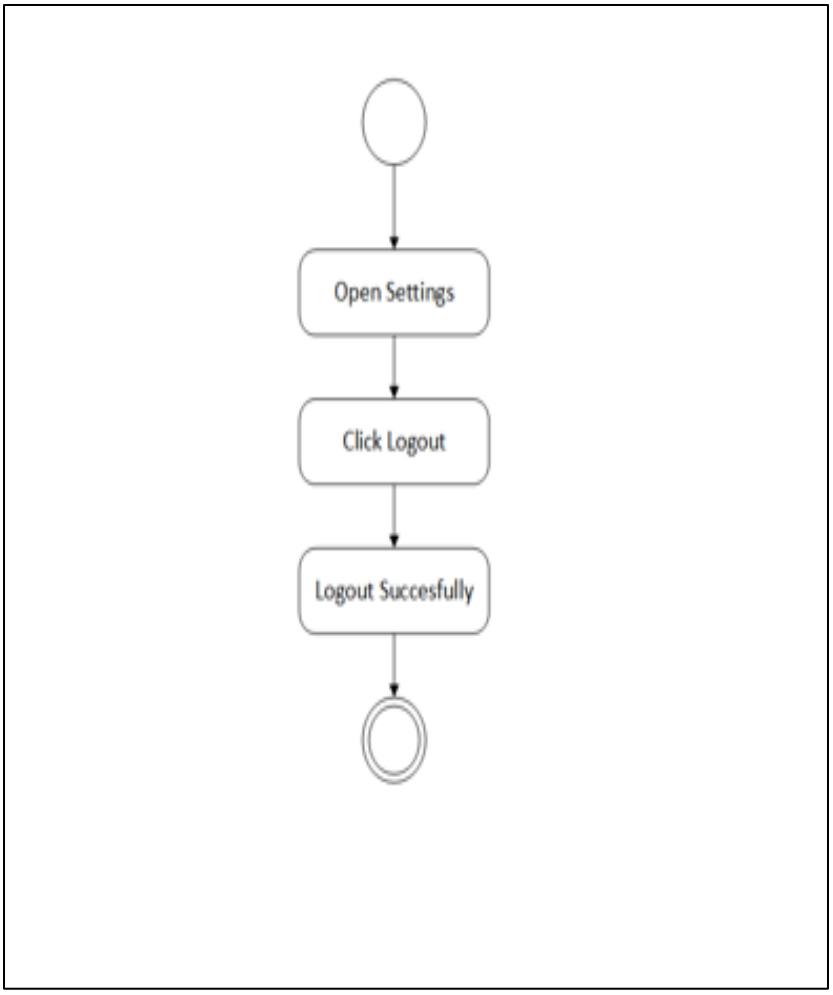


Figure 5: Logout

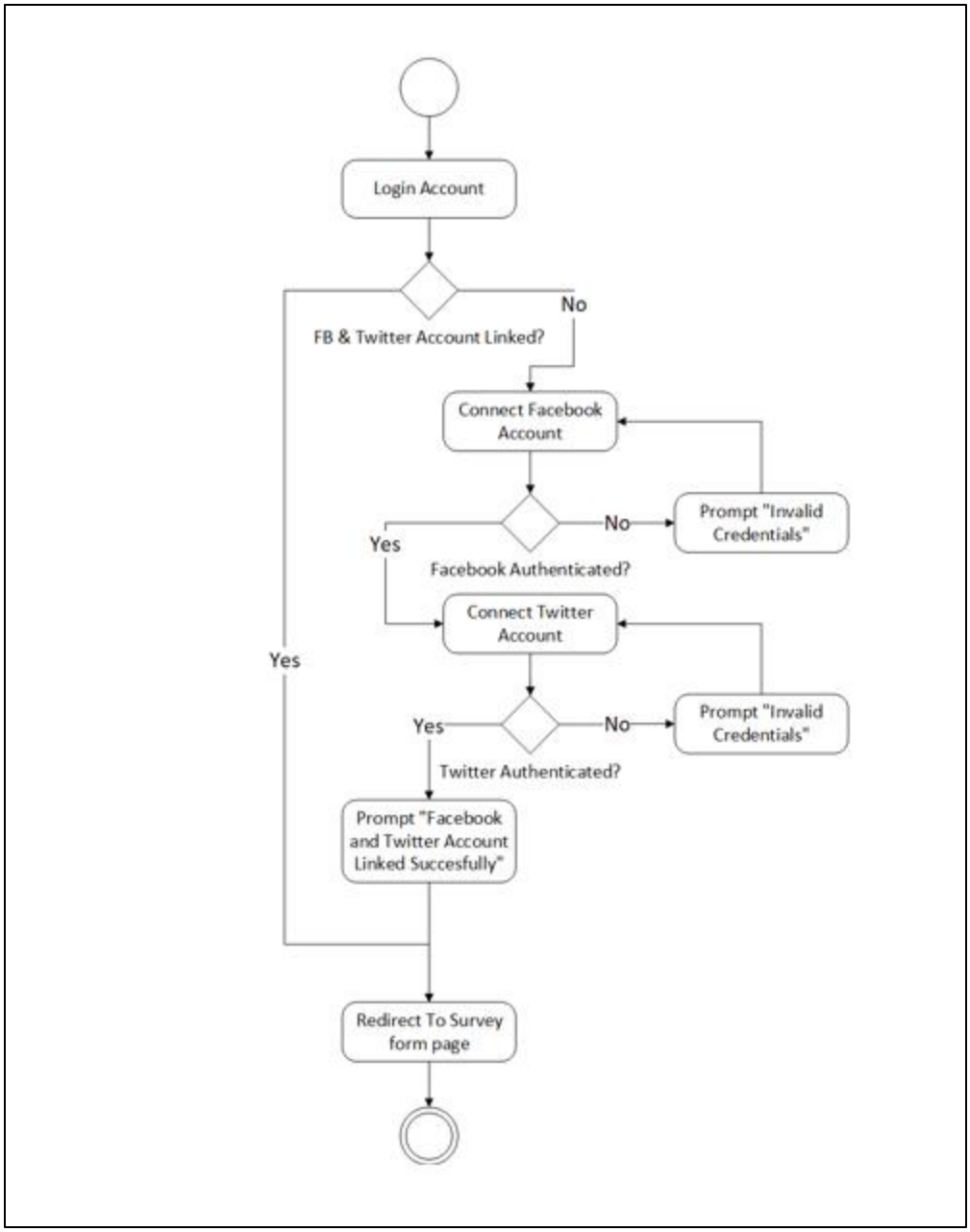


Figure 6: Connect Social Media Account

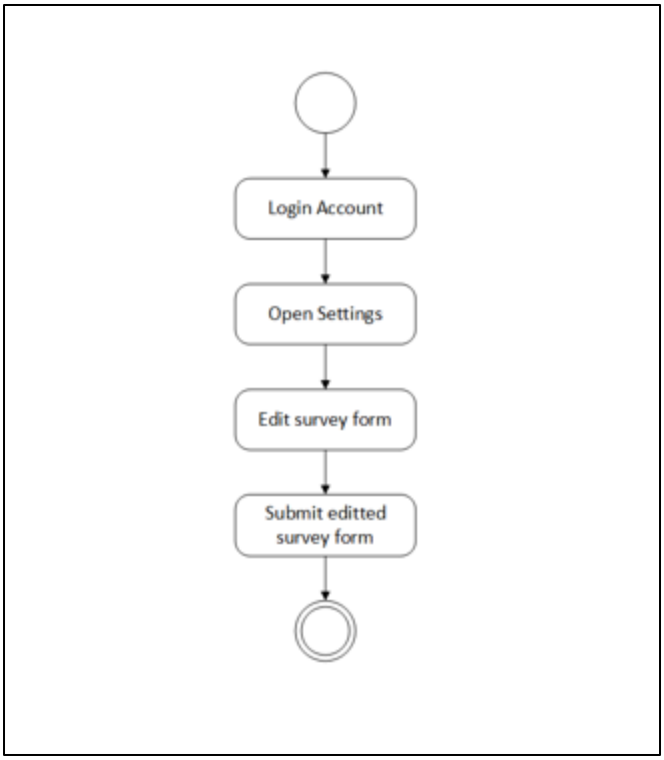


Figure 7: Edit Survey Form

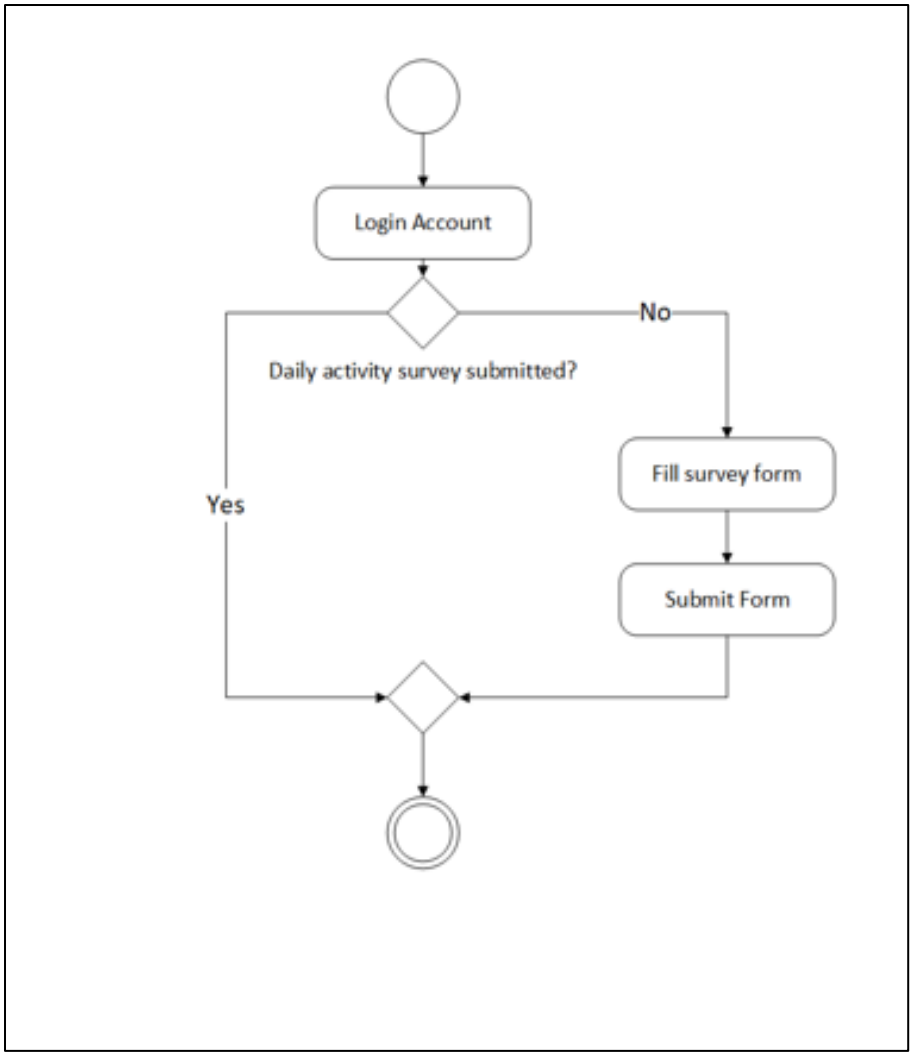


Figure 8: Fill Survey Form

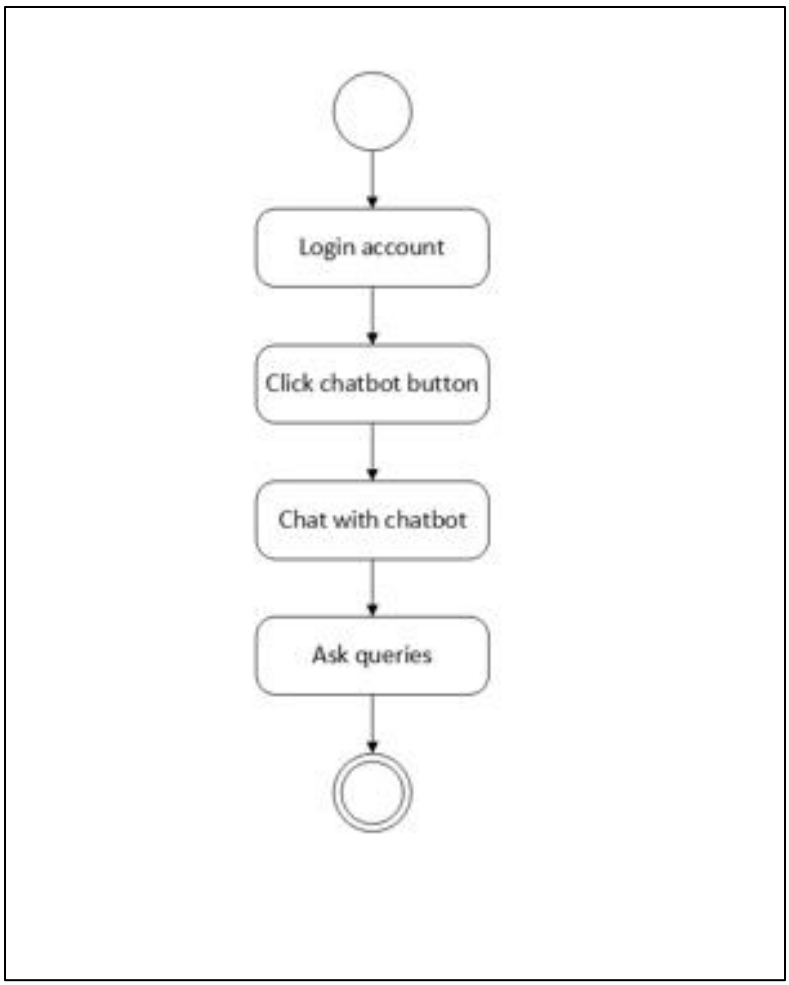


Figure 9: Chat with Chatbot

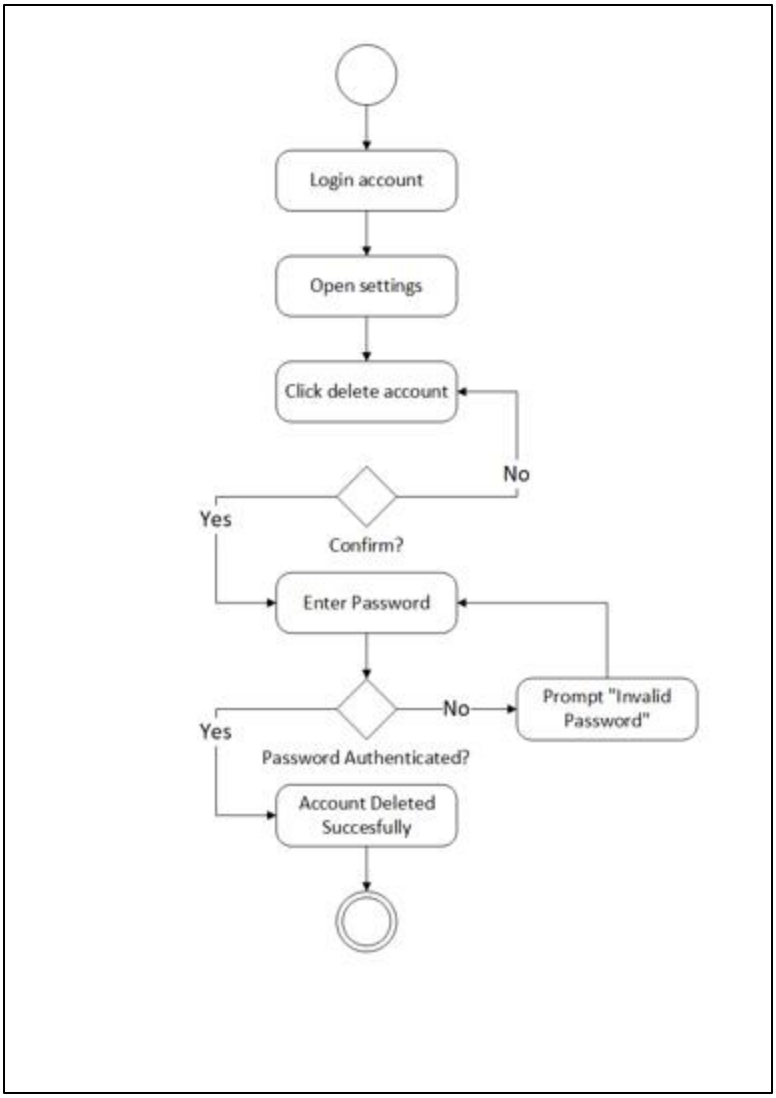


Figure 10: Delete Account

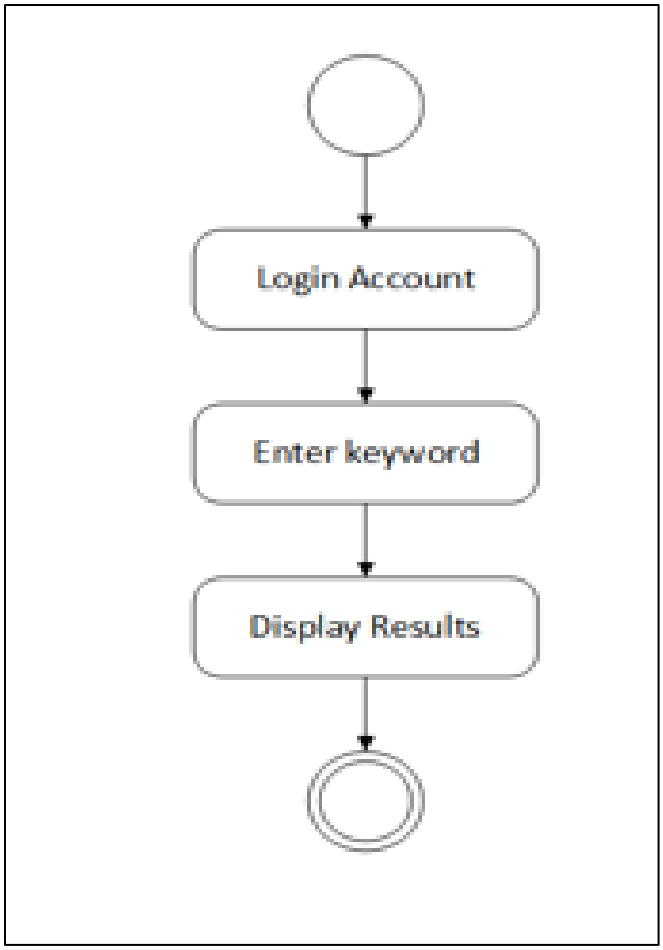


Figure 11: Display Keyword

4.2 Sequence Diagrams

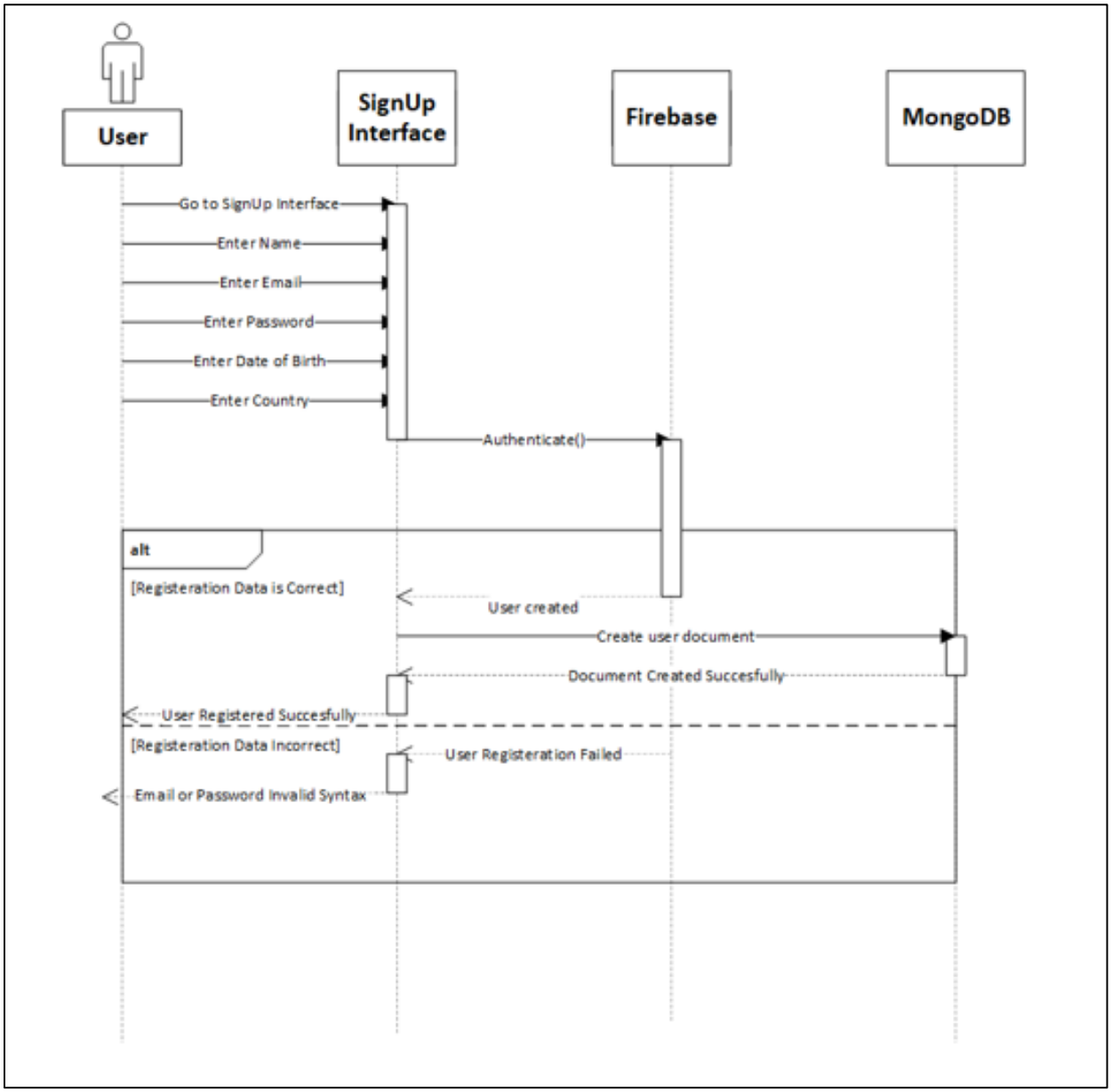


Figure 12: User Registration

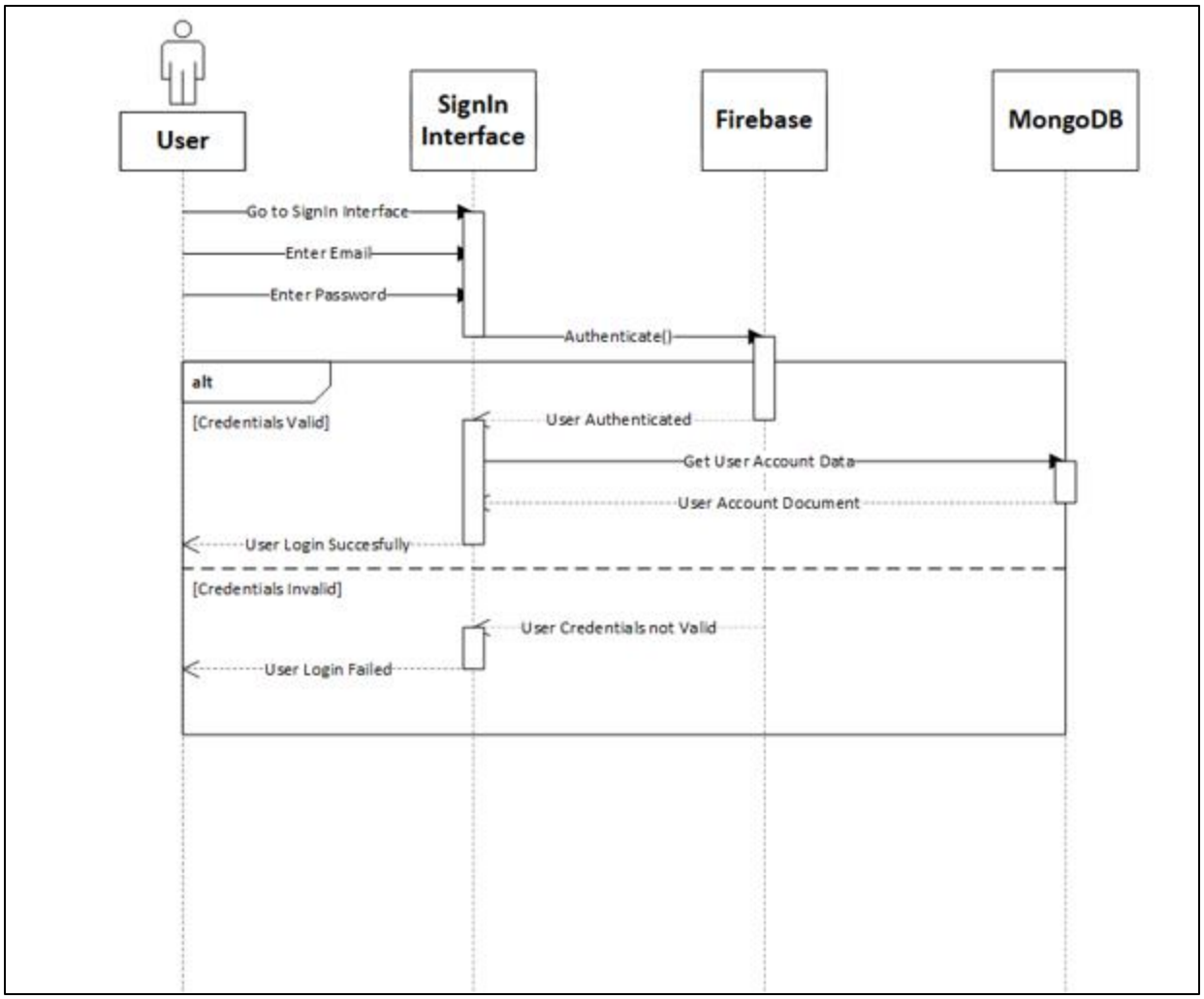


Figure 13: Sign in Diagram

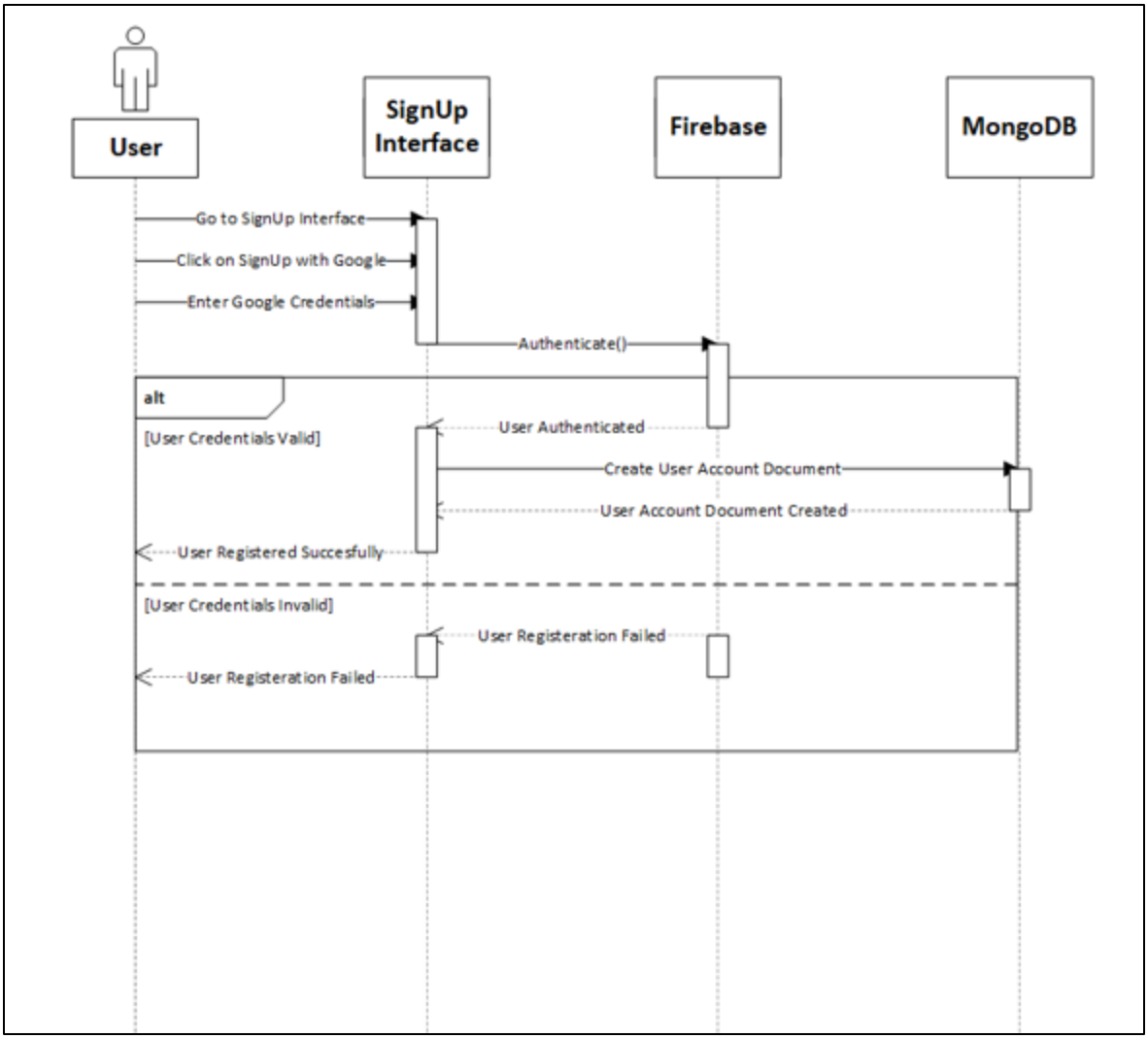


Figure 14: Sign up with Google

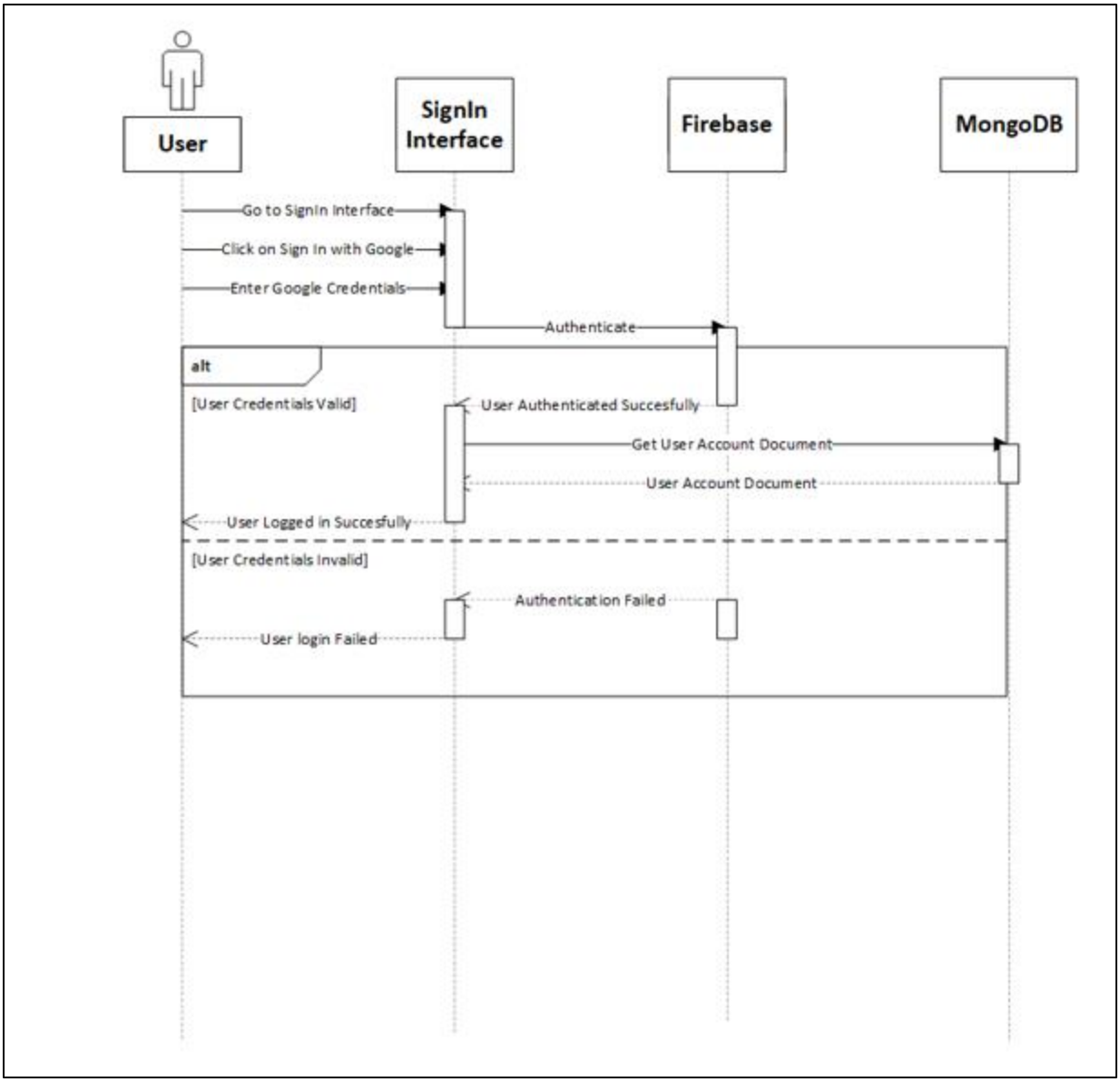


Figure 15: Sign in With Google Account

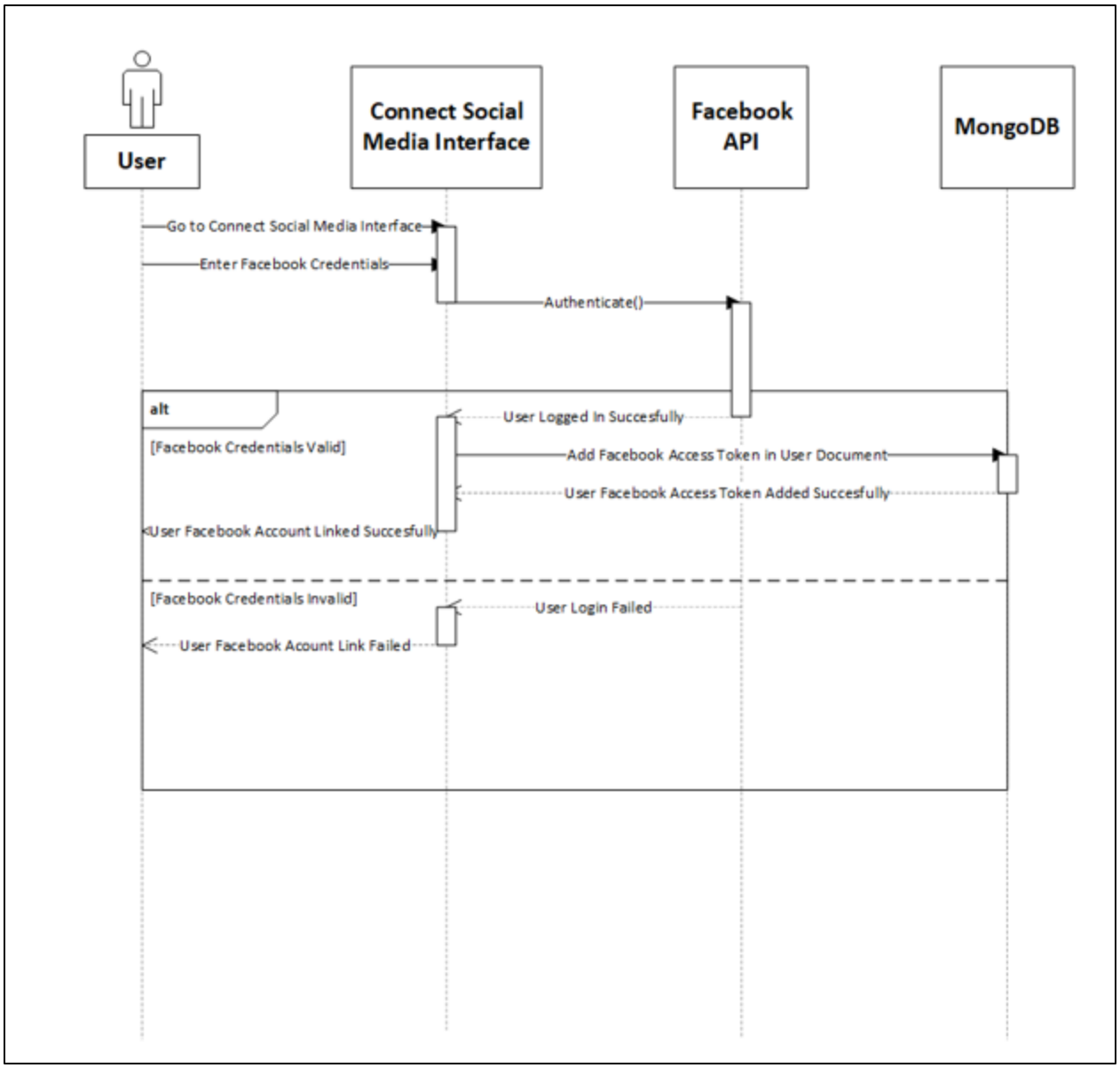


Figure 16: Connect Facebook Account

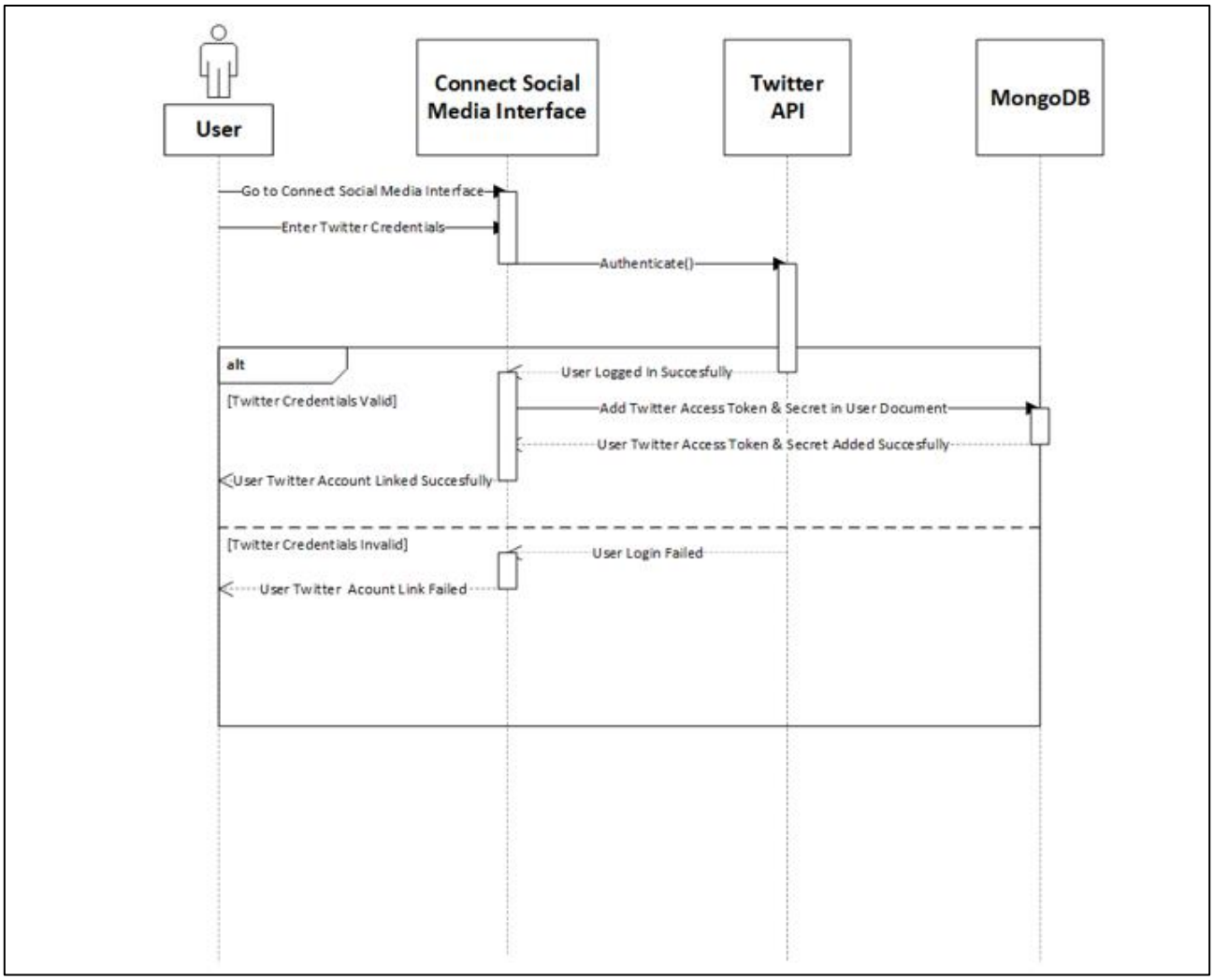


Figure 17: Connect Twitter Account

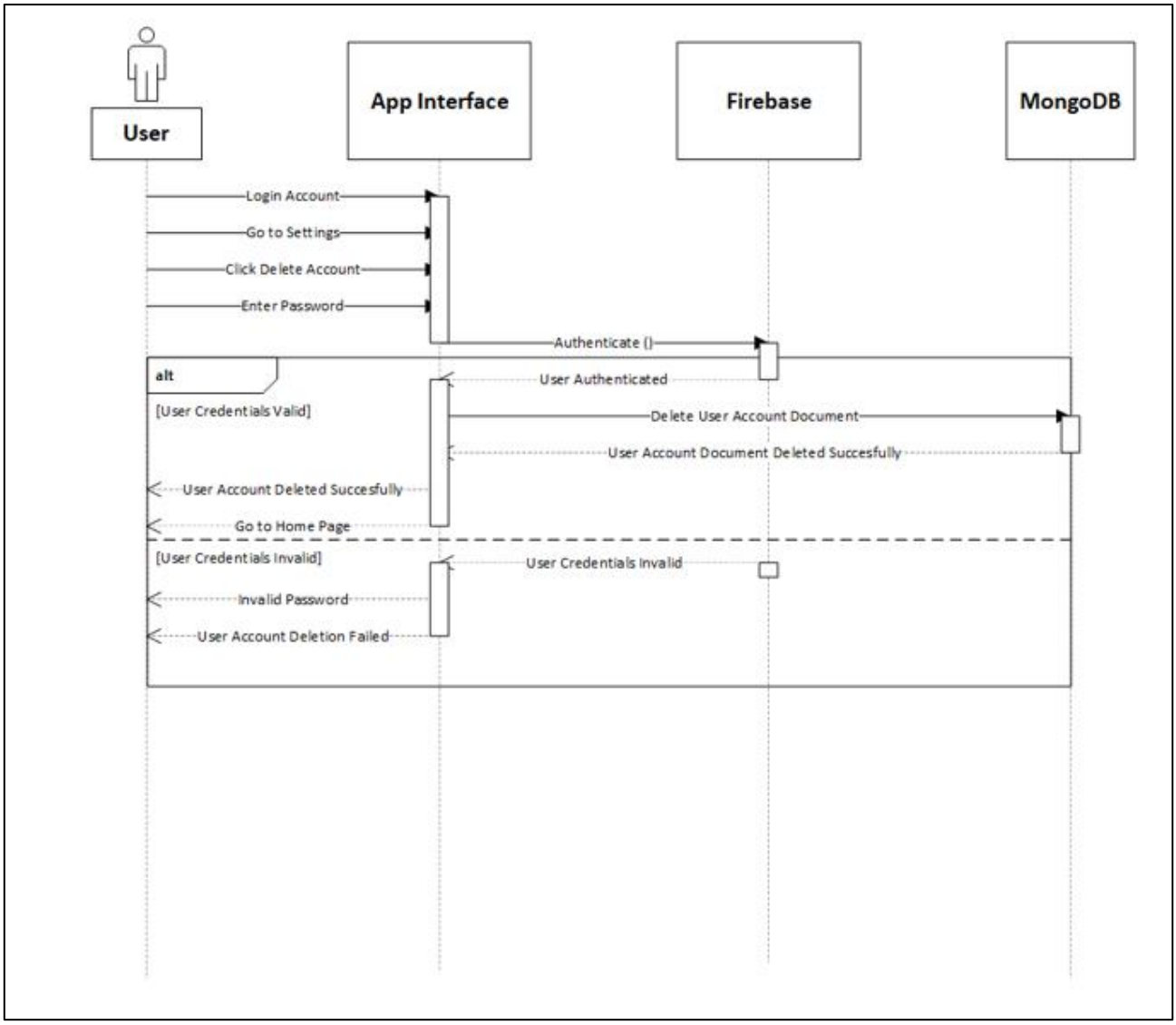


Figure 18: Delete Account

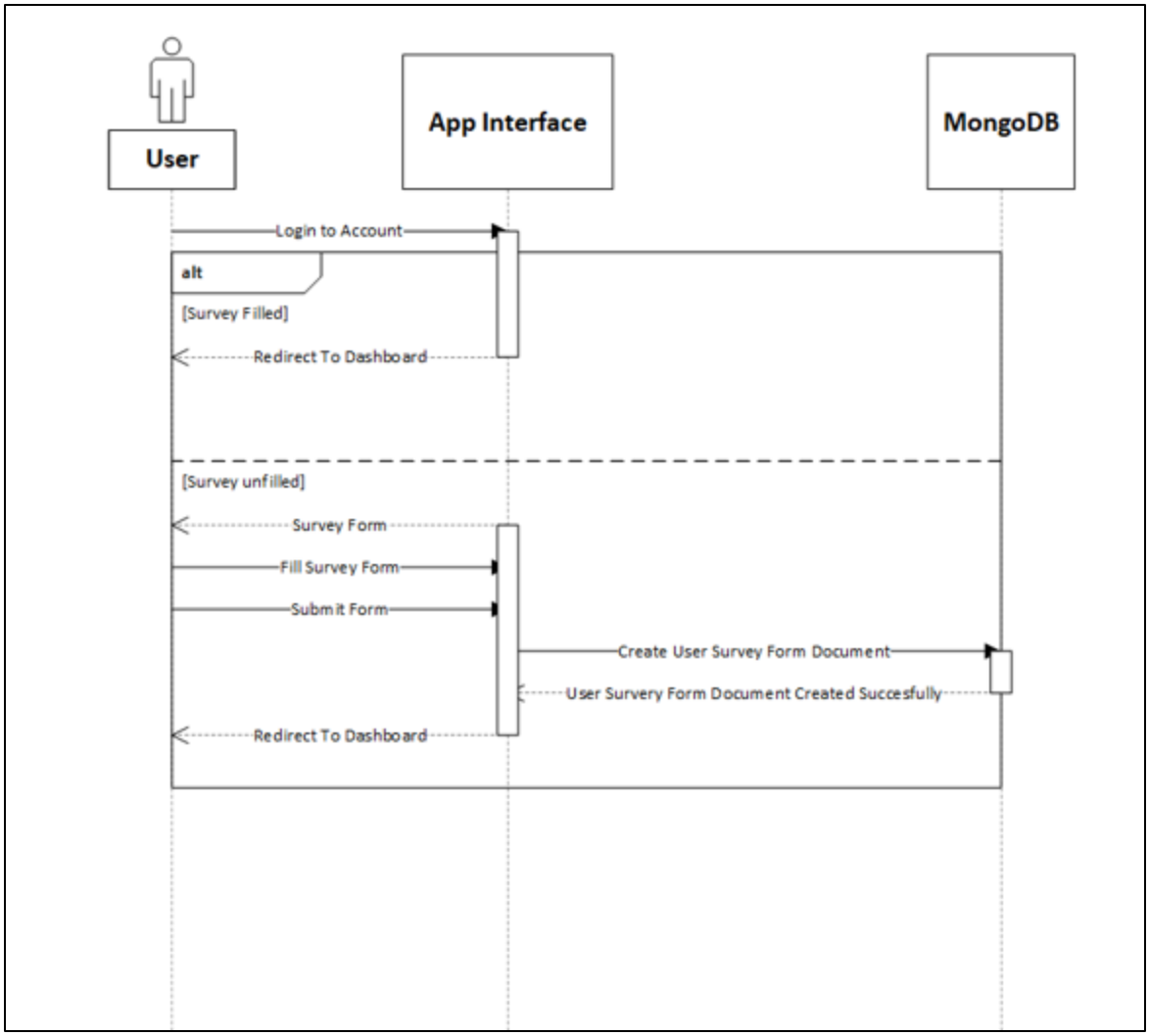


Figure 19: Fill Survey Form

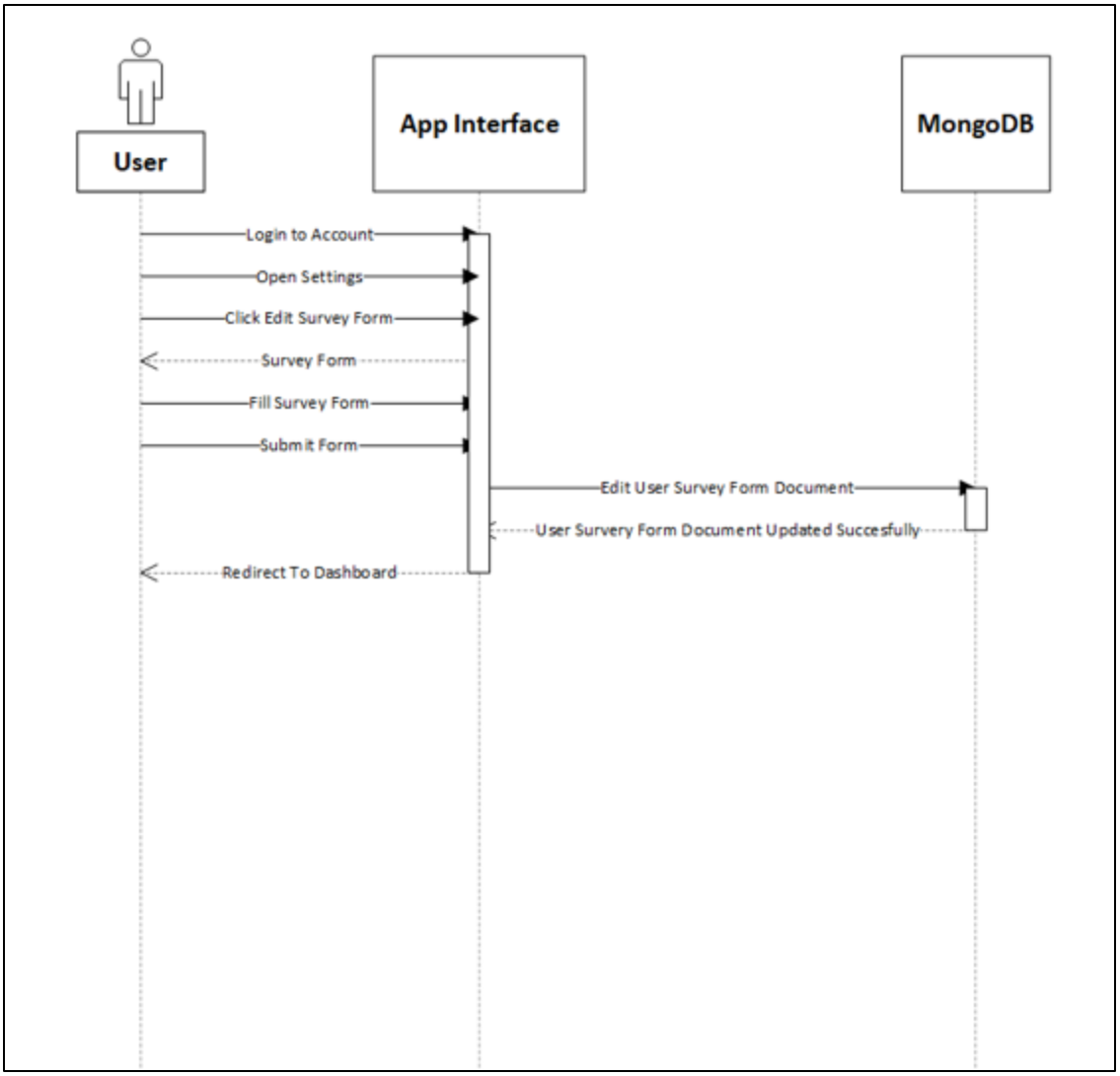


Figure 20: Edit Survey Form

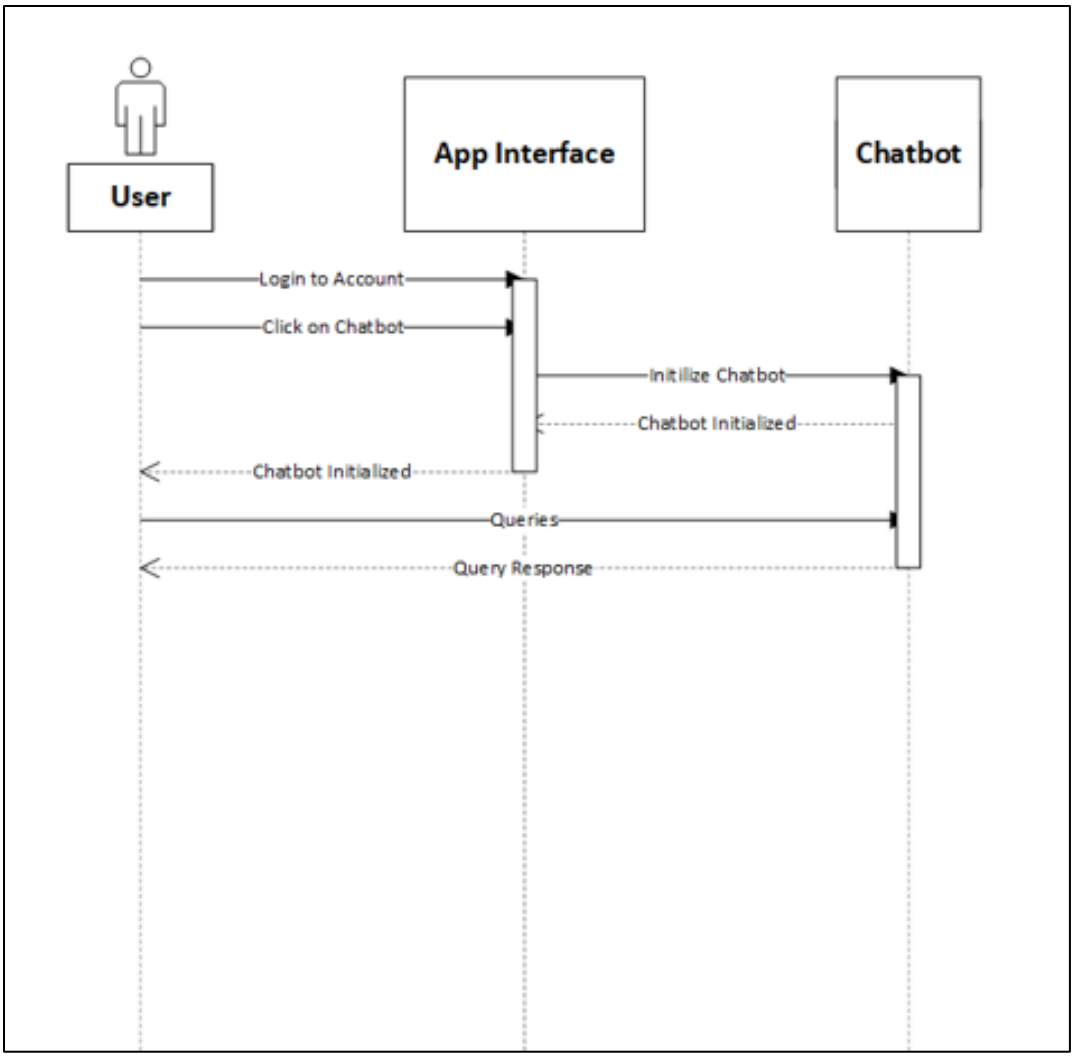


Figure 21: Chat with Chatbot

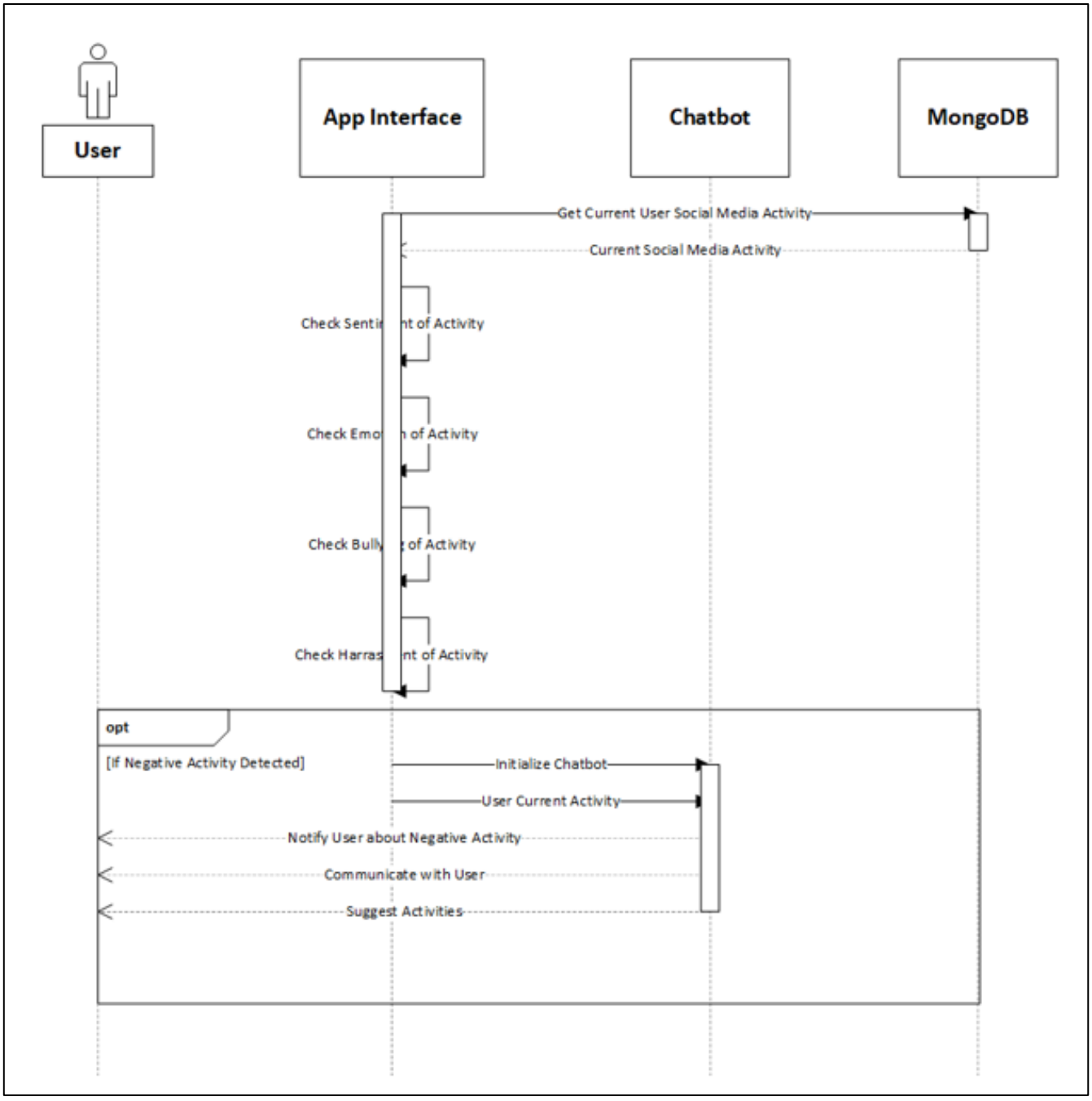


Figure 22: Activity Recommendation by Chatbot

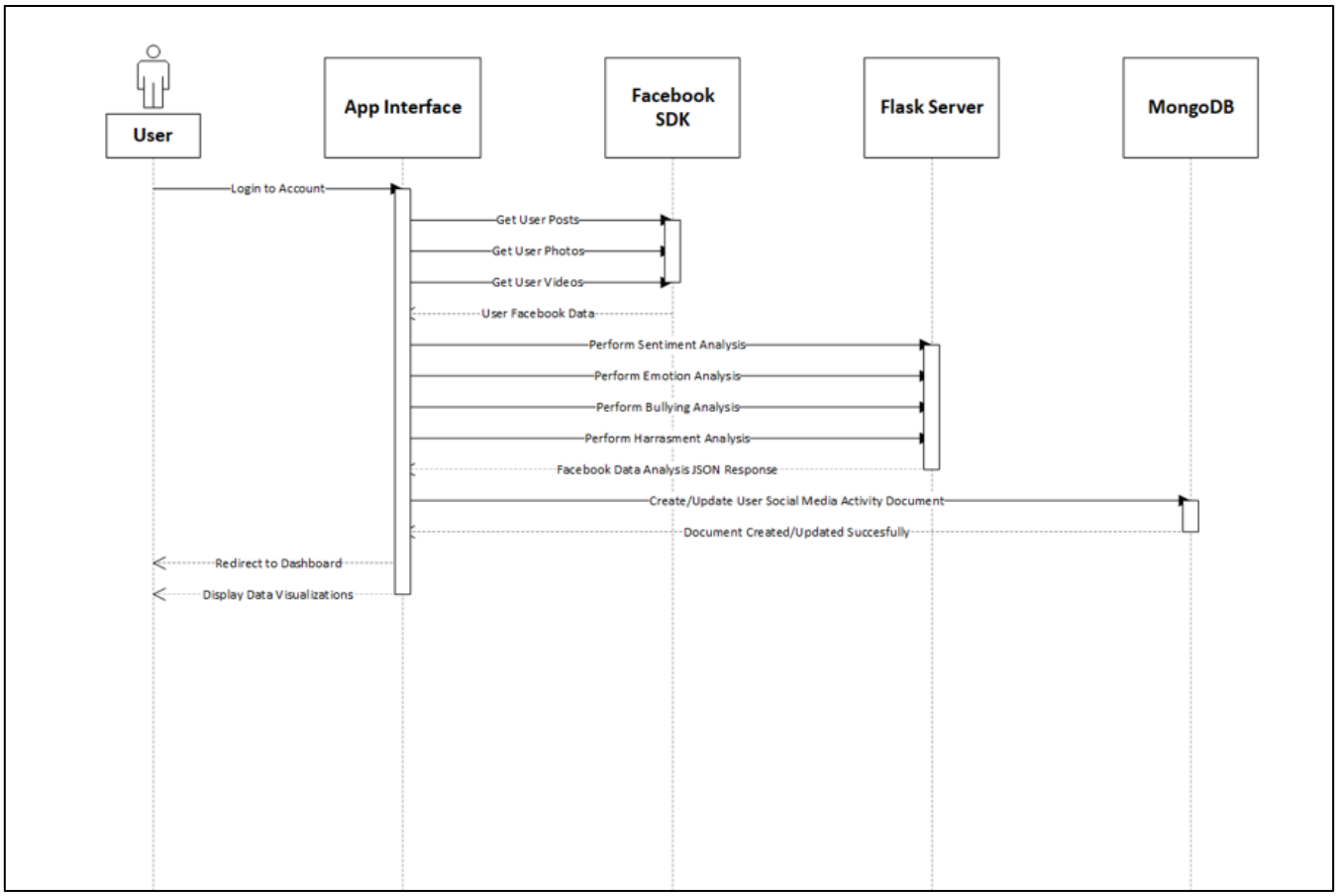


Figure 23: Facebook Data Analysis

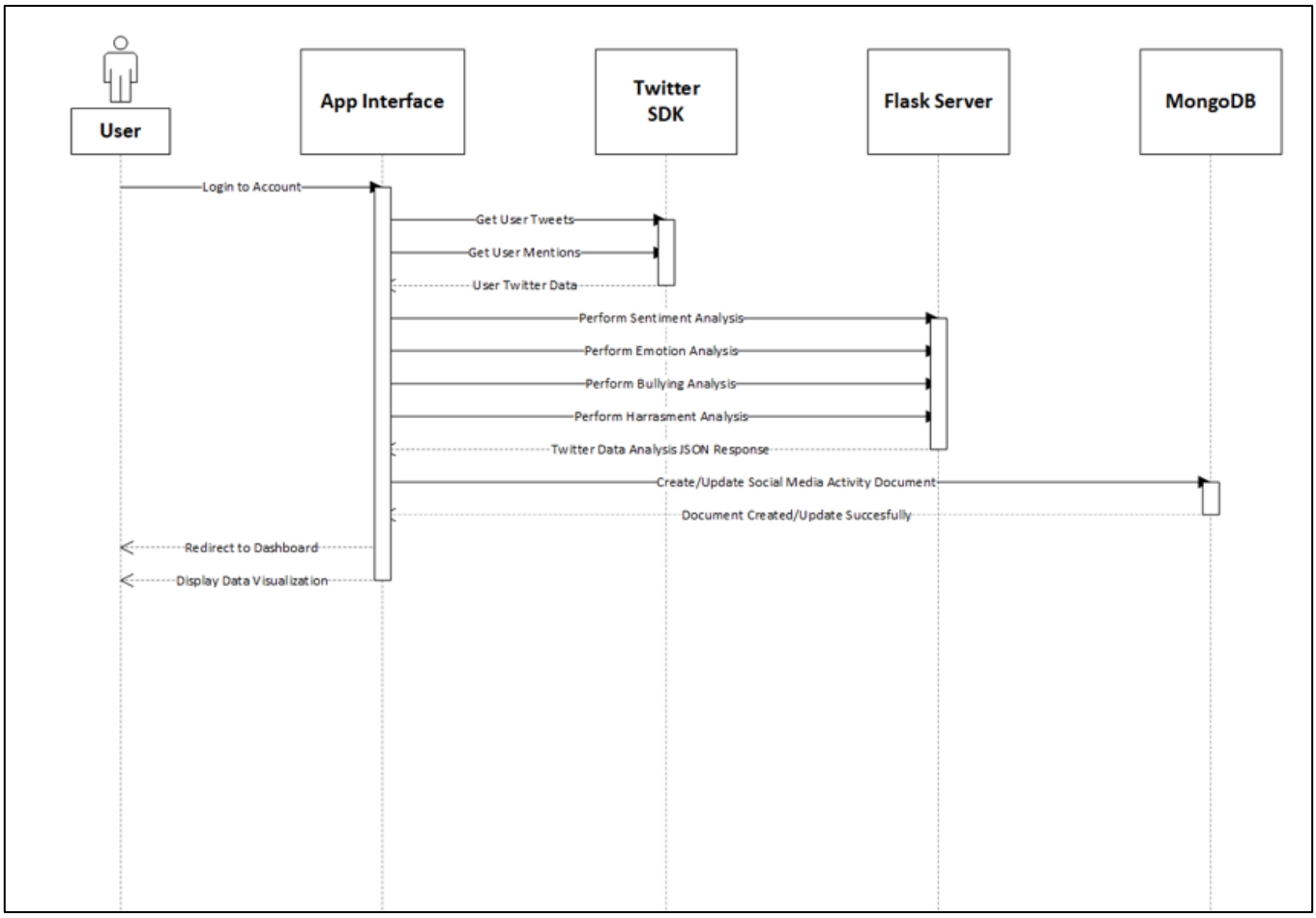


Figure 24: Twitter Data Analysis

4.3 Class Diagram

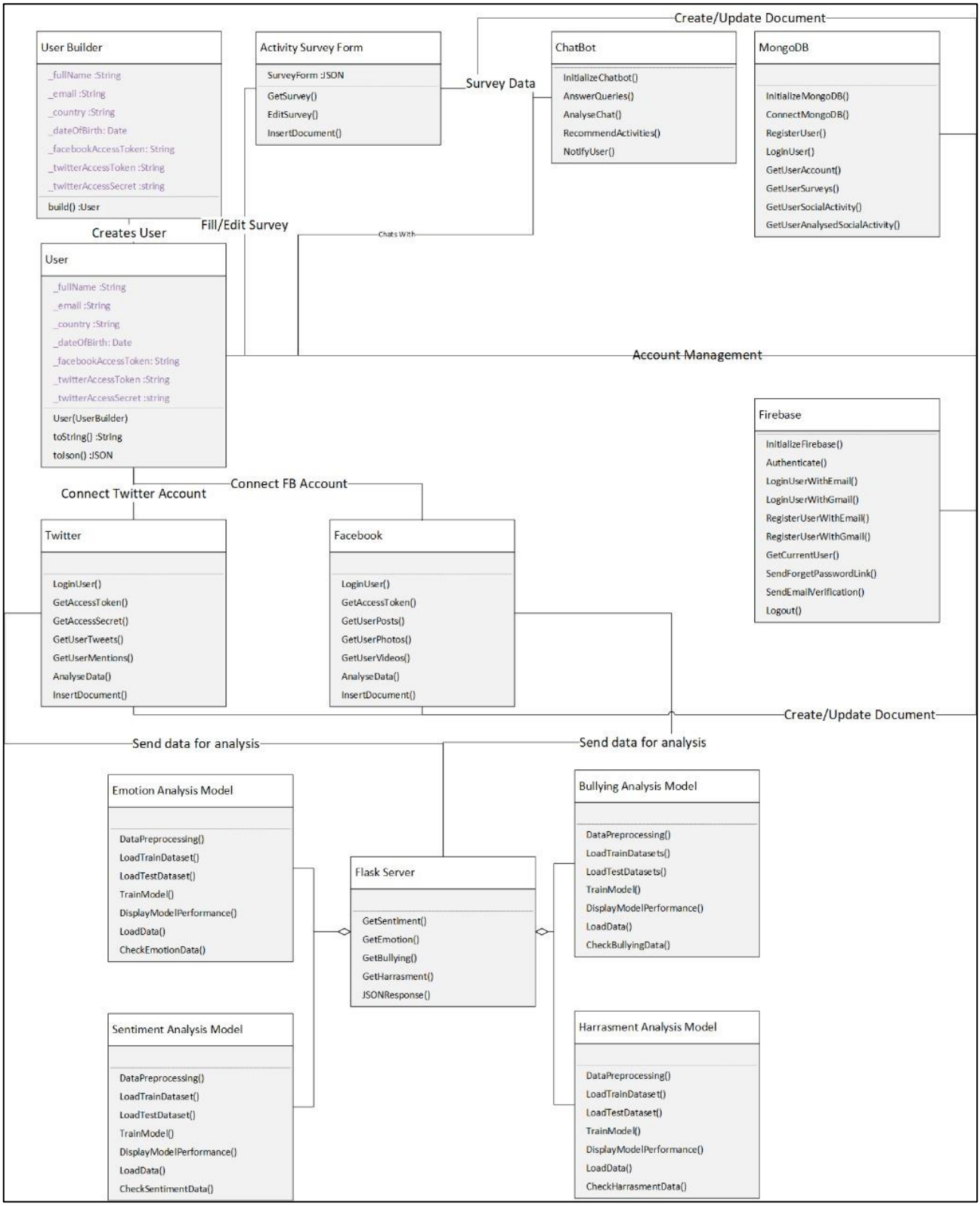


Figure 25: Class Diagrams

5. Data Design

The databases used for our project would be Firebase and MongoDB. Firebase will be used for user registration and notification purposes whereas MongoDB will be used to store rest of the data with it being hosted on is MongoDB Atlas. The data will be stored in form of JSON schema.

5.1 Data Dictionary

Table 1: User Account Collection

Field Name	Data Type	Field Length	Constraints	Description
_id	String	30	Unique, Not Null, Primary Key	Unique User Id generated by Firebase for Authentication
Full Name	String	50	Not Null	User's Full Name
Email	String	50	Unique, Not Null	User's Email
Country	String	50	Not Null	User's Country
Date Of Birth	Date/Time	-	Not Null	User's Date of Birth
Facebook Access Token	String	30	Unique	User's Facebook Access Token for Facebook API Calls
Twitter Access Token	String	30	Unique	User's Twitter Access Token for Twitter API Calls
Twitter Access Secret	String	30	Unique	User's Twitter Access Secret for Twitter API Calls
Facebook Data	Mongo Object Id	24	Unique	Reference of Users Facebook Data Document
Twitter Data	Mongo Object Id	24	Unique	Reference of Users Twitter Data Document
Social Media Activity	List	-	Not Null	List containing object ids of analyzed results of user's social media activity

Created At	Date/Time	-	Not Null	User's Account Creation Date
Updated At	Date/Time	-	Not Null	User's Account Updated Date

Table 2: Survey Form Collection

Fields	Data Type	Field Length	Constraints	Description
_id	Mongo Object Id	24	Unique, Not Null	Activity survey form unique id
User ID	String	30	Unique, Not Null	Reference of User Id
Created Date	Date/Time	-	Not Null	Date/Time of Survey Creation
Modification Date	Date/Time	-	Not Null	Date/Time of Survey Modification
Survey Form	Json	-	Not Null	Survey Form with Questions and Answers of Users

Table 3: User Social Media Activity Collection

Fields	Data Type	Field Length	Constraints	Description
_id	Mongo Object Id	24	Unique, Not Null	Social Media Activity unique id
User ID	String	30	Unique, Not Null	Reference of User Id
Created Date	Date/Time	-	Not Null	Date/Time of Document Creation
Modification Date	Date/Time	-	Not Null	Date/Time of Document Modification
Facebook	JSON	-	Not Null	JSON containing ID of Facebook Posts and Comments,

				Photos and Videos
Twitter	JSON	-	Not Null	JSON containing ID of Twitter Tweets and Mentions

Table 4: Social Media Activity Analysis Collection

Fields	Data Type	Field Length	Constraints	Description
_id	Mongo Object ID	24	Unique, Not Null	Unique id of daily activity document of user
User ID	String	30	Unique, Not Null	Reference of User ID
Created Date	Date/Time	-	Not Null	Date/Time of Document Creation
Modification Date	Date/Time	-	Not Null	Date/Time of Document Modification
Facebook	JSON	-	Not Null	JSON containing ID, Message, Date and Analysis of Facebook Posts and Comments, Photos and Videos
Twitter	JSON	-	Not Null	JSON containing ID, Message, Date and Analysis of Twitter Tweets and Mentions

6. Human Interface Design

We have made our User Interface very simple without any complexity so that it is easy for users to understand and navigate freely to their desired section of the application. During Signup and Login stage, if the user is putting invalid credentials not following the specified criteria, error message will be displayed.

6.1 Screen Images

Figure 25: Splash Screen

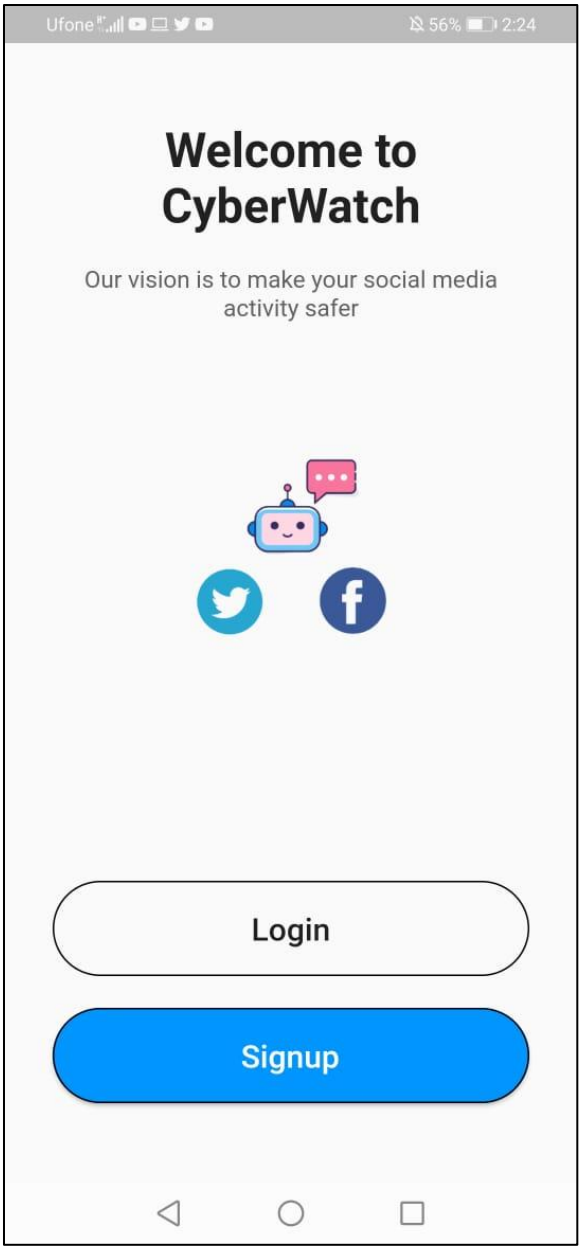


Figure 26: Welcome Screen

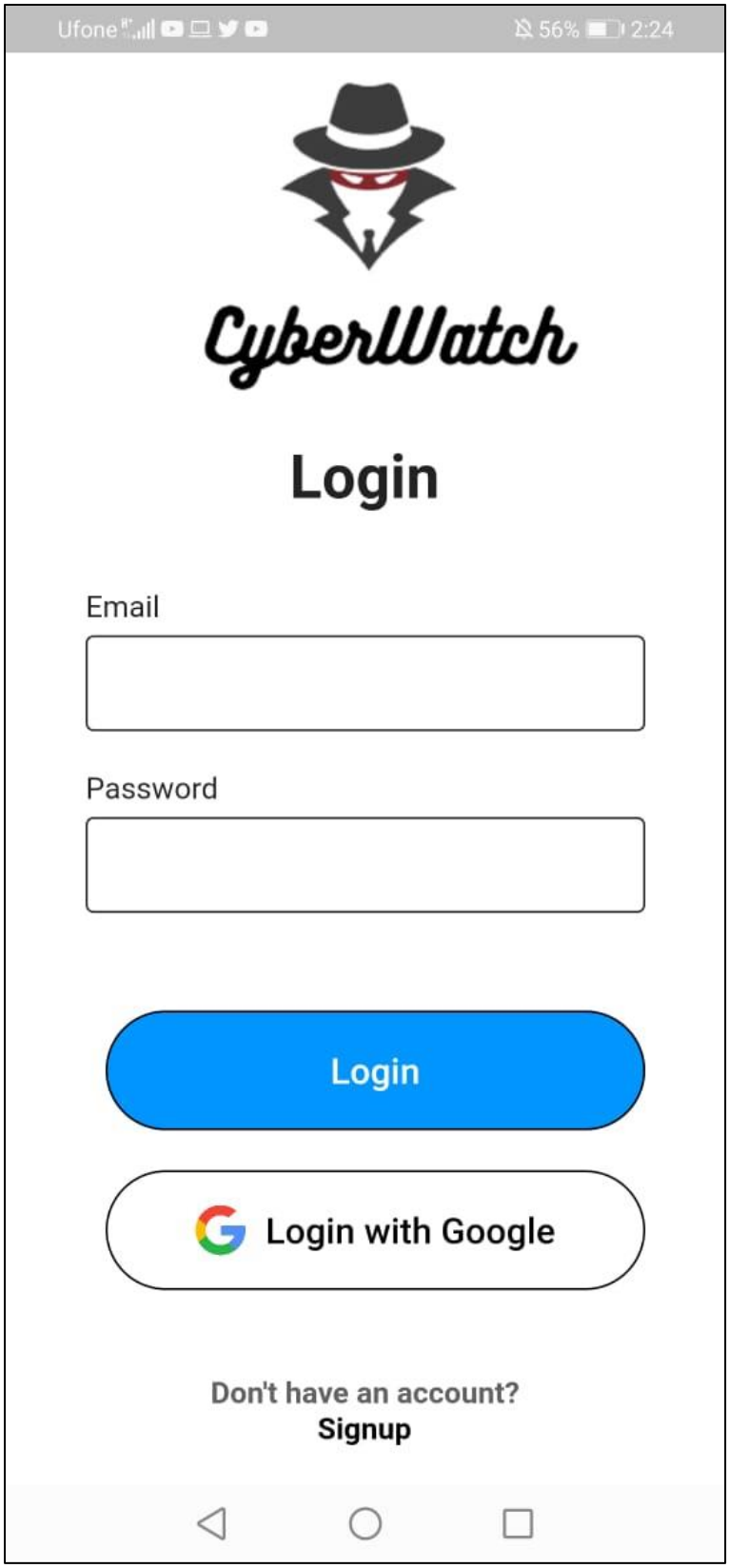


Figure 27: Login Screen

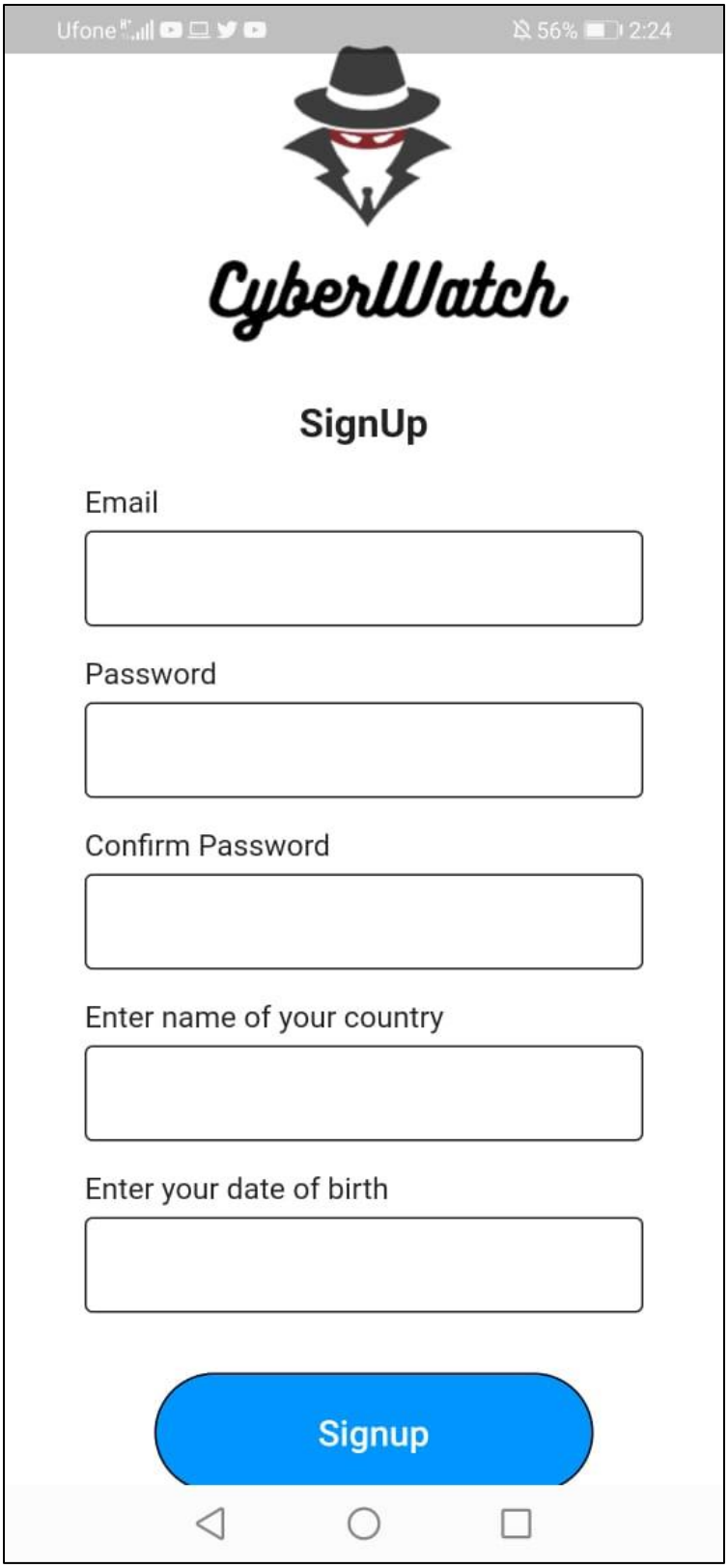


Figure 28: Signup Page

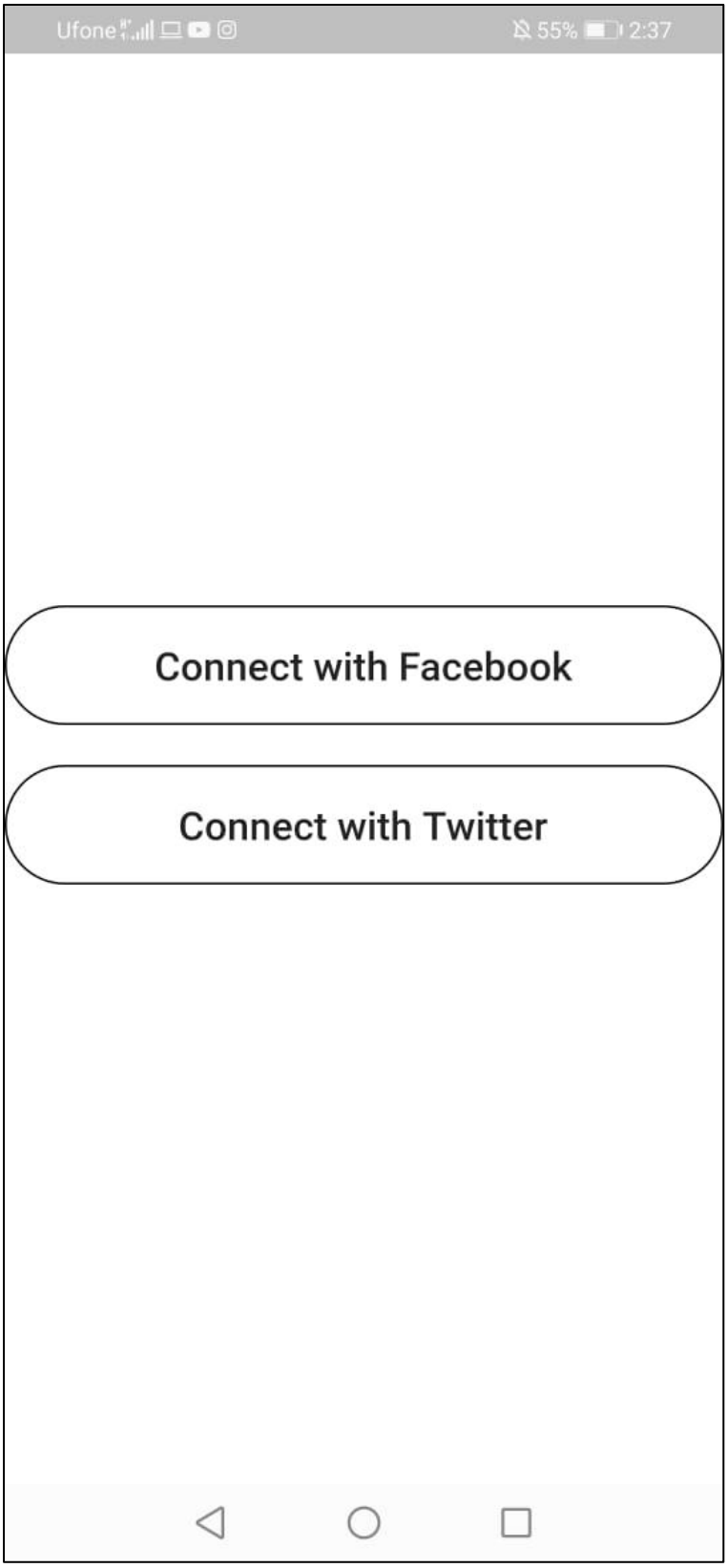


Figure 29: Connect Social Media Handles

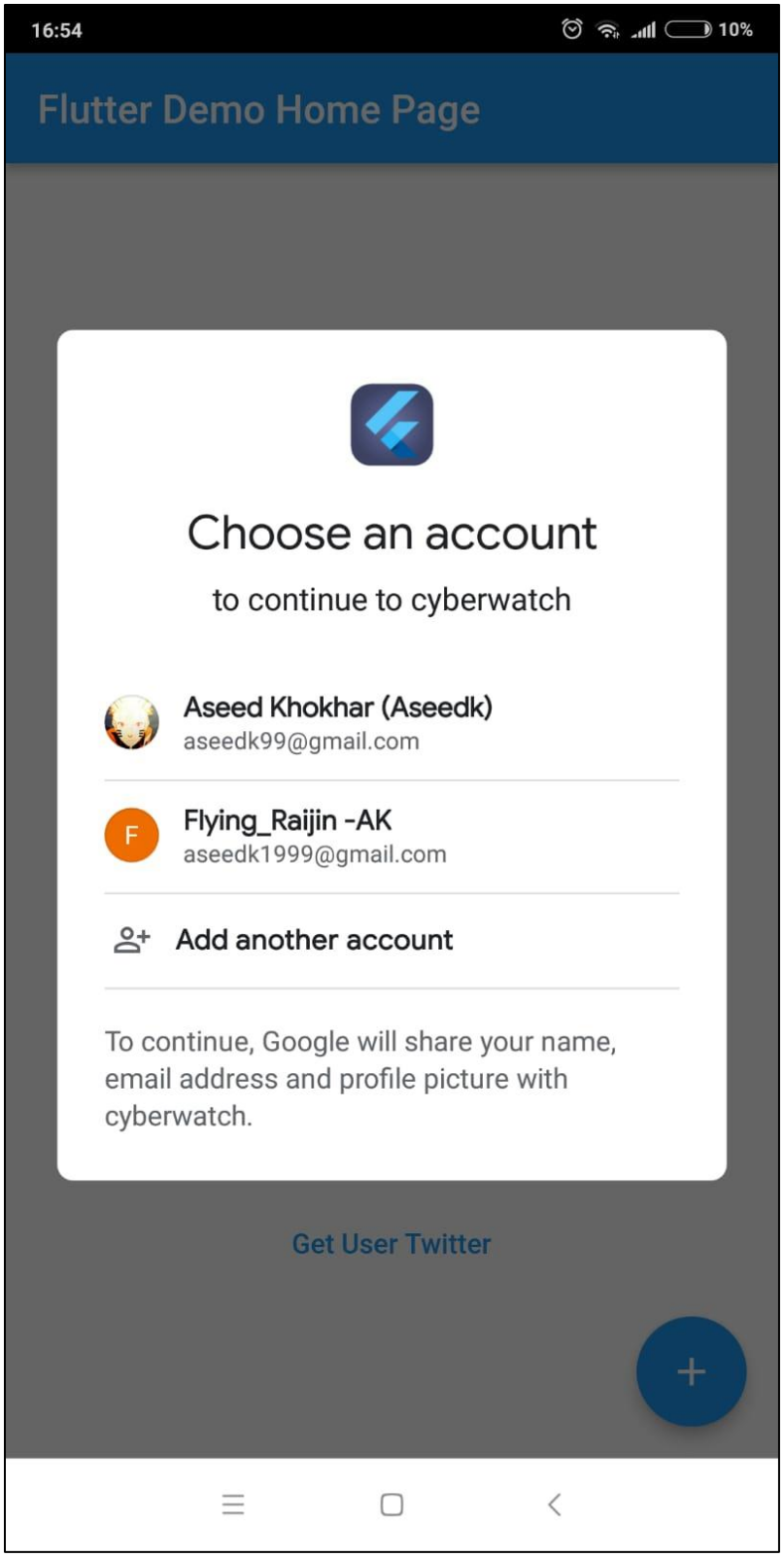


Figure 30: Choose Google Account

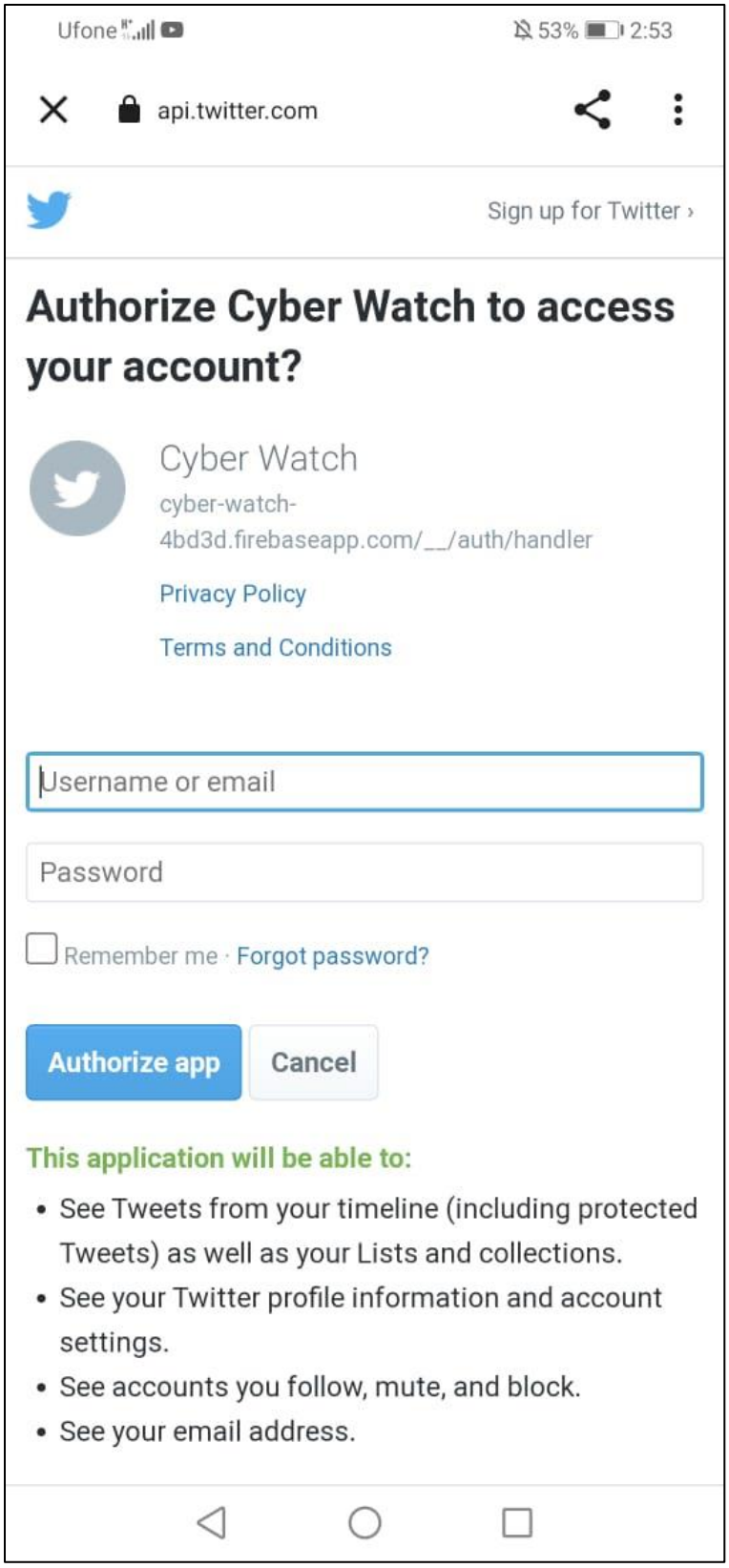


Figure 31: Authorize Twitter

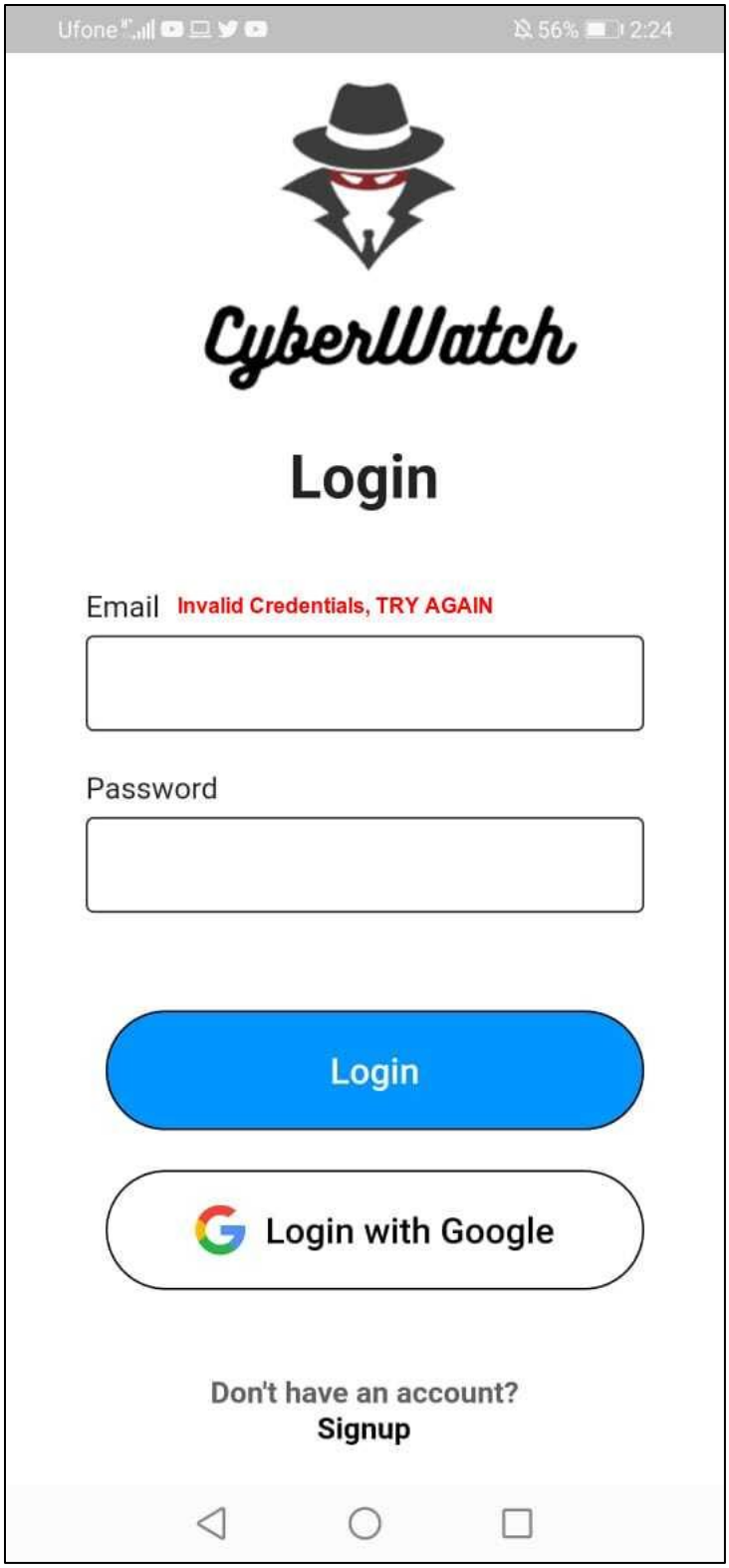


Figure 32: Invalid Credentials

6.2 Screen Objects and Actions

Figure 25: It is the Splash Screen of the application after user is navigated towards Welcome Screen

Figure 26: Welcome Screen containing login and signup button. Login button takes user to login page whereas Sign up page navigates him to Sign up Page

Figure 27: User enters the login credentials and press login button and is navigated to dashboard. In case of wrong information, error will be generated.

Figure 28: User enters the data in the fields specified to create an account.

Figure 29: User connect on the specified buttons to connect Facebook and Twitter accounts

Figure 30: User will have option to select the Google Accounts in order to attach them with the system for easy user registration and login

Figure 31: User to enter his twitter credentials and authorize access in order to connect it with the system.

Figure 32: When user enters invalid credentials, the system prompts “Invalid Credentials” message