Bilkent University

Department of Computer Engineering

Senior Design Project

Team ID: T2331

RecoModa

Analysis and Requirement Report

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13.11.2022

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Senior Design Project course CS491/2.

1 Introduction

In today’s world, there are many online shopping applications. Through these apps, people can reach clothes, groceries, food, etc. Even though online shopping makes life easier, it still has many parts to improve to save time. One of the problems that need to be improved is users can experience difficulties while choosing the best-fitting cloth for themselves even though they know their body sizes. It is because every brand may have an exclusive size for their products while they are labeled with standard body sizes. Therefore, people can never be sure about whether clothes fit their bodies or not.

Moreover, on the internet, many resembling products from different brands, and users spend too much time searching for the correct product. The only way to be sure is by ordering the clothes, which is a waste of both money and time because there is a high possibility of returning the product due to dissatisfaction.

In that sense, RecoModa intends to find a solution to the loss of time and waste of money of users while they try to find the best-fitting product for themselves. The goal is to decrease the time of online shopping with the data that is received from the users. With the help of data, the user's taste will be detected, and our application will recommend the combinations according to the user's preferences. Furthermore, our product will act like social media. It will be an alternative platform for influencers and users to share their combinations. People will have the opportunity to reach out to the combination of the influencer, which will save time for the user while buying the combination because instead of searching for every piece of the combination separately, the user can find the whole combination through links.

In this report, details of our application are listed below regarding different aspects, which are functional, non-functional, and pseudo requirements, system models, group member duties, mockups, and scenarios.

2 Current System

In the current system, it is easy to find many webs, Android and IOS applications for shopping. In those applications customers can access clothes,

glassware, and other stuff in those applications. However, those applications do not have strong recommendation systems like RecoModa for body sizes and products.

Trendyol is one of the most popular shopping applications in Turkey, and it has a better recommendation system than other applications in Turkey. It considers the user’s previous choices, visited brands, etc. However, it does recommend the correct product according to the user’s body measurements.

Amazon, which is popular all over the world, has a very similar system to Trendyol. It considers all activities to decide on the user's choices by considering likes, previous purchases, etc. Like Trendyol, Amazon does not have a system for suggesting products with correct body sizes.

3 Proposed System

3.1 Overview

RecoModa is a mobile shopping application with a strong recommendation system that combines the features of both shopping and social media. Like social media, users can share products or combinations with others and be followed by others. These shared combinations can be registered by the users in parts or completely, and they will be able to buy the whole combination or the parts they want with a single click with a fingerprint scan. Using information such as body information, weight, height, and shoulder width, appropriate sizes will be determined, and then suggested. This information will be requested to be updated at regular intervals, and new suggestions will be made according to the changes. Suggestions that may be different in different brands will reduce the size problem. The most important feature of RecoModa is its strong personalized recommendation system. For this, every data that can be obtained from the user will be used. To enhance and elaborate the recommendation system, this data includes likes of users, shares of users followed, products previously bought, etc. There will be suggestions generated all over the system. RecoModa will constantly update its database as bots scrape data from other clothing companies.

3.2 Functional Requirements

3.2.1 Unauthenticated Functionalities

- The application displays popular posts of the week rather than personalized recommendations.
- The application lists the trending posts below the categories.
- The application allows searching without requiring any authentication.

3.2.2 Registration Functionalities

- The application displays unique recommended posts to each user according to the recommendation model, which is determined by the likings of the user.
- The application lists the recommended posts according to the recommendation model below the given categories.
- The application mandatorily requires a username, password, and e-mail and optionally requires a full postal address, credit card information, body measurements, and fingerprint id.
- The application activates the register button if and only if the mandatory information is correctly given.
- The application requires a unique username, a valid e-mail address, and a minimum 8-character password which includes an uppercase, lowercase, and special character. Otherwise, the application gives an error message and does not activate the register button.
- The application requires email confirmation for successful registration.

3.2.3 Search Functionalities

- The user can search by typing a string in the text field.
- The user can search by choosing given categories of garments, RGB color values, and sizes.

3.2.4 Post & Profile Functionalities

- The user is able to post outfits into the system, where users can attach the Amazon link to each garment.
- The user gets a share from the acquisition for every sale from a post.
- The user can see the previous post of another user or self by the profile.
- The user is able to “like” or “comment” on a post that is visible to other users.
- The user can “save” the post or linked garments on the post, which is available to the user in the “saves” section.
- The user can “follow” or be “followed” by another user, which alters the recommendation model.

3.2.5 Information & Purchase Functionalities

- The user is able to upload and update the full postal address, credit card information, body measurements, and fingerprint id.
- The information given to the system is used while purchasing the post's outfit or selected garments with fingerprint confirmation.
- The user needs to measure their own body in a specified given way. The information includes gender, weight, height, shoulder width, chest circumference, waist circumference, hip circumference, leg length, and foot size.
- The body measurement information is used to recommend the fitting size for any piece of garment.
- The recommendation depends on whether the user likes wearing loose, slim, or standard sizes.
- The full postal address is used to create a shipment to that address.
- The credit information is used to purchase the selected items.
- The body measurements are inserted by the usage

3.2.6 Server Functionalities

- The server recommends posts according to user interactions and returns a post list. If there is no authentication, the server returns a trendy post list.
- The server saves and updates posts and user information in the database.
- The server encrypts the user information and then saves them in the database.

3.3 Non-functional Requirements

3.3.1 Performance

- The processes that need high computing power should be handled on the server side so that the program does not drain the battery.
- The application should be able to fetch data in a few seconds.

3.3.2 Security

- The sensitive information of the user, such as passwords and credit card information, should be saved in the encrypted format.
- By using a stateless session (JSON Web Token), all data does not need to be saved in a database on the server-side like cookies, it only exists on the client side. It eliminates the CSRF attacks [3].

3.3.3 Scalability

- The prototype of the application should be able to handle 50.000 users and 2000 concurrent users.

3.3.4 Usability

- The interface of the application should be straightforward to adapt and use in a few minutes for a new user.

3.3.5 Modifiability

- Further implementations should be added without difficulty to the current system. Therefore, the system must be built and prepared for future modifications.

3.3.6 Availability

- The system should be available 24 hours on any day of the year, including holidays.

3.3.7 Accessibility

- The application should be accessible on at least 60% of Android devices.

3.3.8 Legal and Regulatory Requirements

- The terms of service and privacy should be accepted by the user before the usage of the application. The user must allow their body measurement data to be used to get size recommendations.

3.3.9 Reliability

- Since the database receives crucial information from the users, such as credit card information, full postal address, and body measurements, any program crashes, or data loss should not happen in any case.

3.3.10 Robustness

- The system must handle all possible errors since any error in the purchase phase could be dangerous.

3.3.11 Efficiency

- The application should load and show posts 3 seconds after it is started.

3.3.12 Compatibility

- The user should be accessing any data from another device that the user signed in to.

3.4 Pseudo Requirements

3.4.1 Implementation Requirements

- Our application will be implemented for Android smartphones
- Engineering branches such as Machine Learning, Data Science, and Data analysis will be used.
- Github platform will be used for code sharing, branching, and reaching to the history
- Jira application will be used in the follow-up of the project.
- Open-source libraries and data models will be used in application development and machine learning.
- The development will be done by adhering to the MERN Stack recommended by MongoDB [https://www.mongodb.com/mern-stack]. MongoDB, Express.js, React Native, and Node.js will be used while implementing the application. Python language will be used in the Machine learning and Data Science sections.
- A regular data flow will be provided by using web scraping and API for creating clothing data on the web.

3.4.2 Economic Requirements

- The application will be offered to users free of charge.
- Before the application is presented to the users, the expenses that will occur in the subjects such as server and database will be calculated. [1]
- A fee will be paid for the application to be published on the Google Play Store [1].

3.4.3 Time Requirements

- According to the Bilkent academic calendar, the demo of the project should be trained before the end of the fall semester. The entire project, together with all its features, should be grown at the end of the spring term.

3.4.4 Sustainability Requirements

- It will be updated regularly so that the application can run with better performance with a better user experience.
- Since the data will be variable within the application, the clothing database structure in the application will remain up to date.

3.5 System Models

3.5.1 Scenarios

Use case name: Sign in

Participating Actor: Customer

Entry Condition: The customer navigates to the sign-in screen

Exit Condition: The user signs in and gets an authentication mail

Flow of Events:

1. The customer enters the credentials
2. Sign in button is clicked
3. The user gets an authentication email
4. The email directs the user to the login page, and the account is successfully created

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Use case name: Login

Participating Actor: Customer

Entry Condition: The customer navigates to the login page and enters credentials

Exit Condition: The customer successfully log in to the system.

Flow of Events:

1. The customer enters credentials
2. The customer clicks on the login button

3. By verified credentials, system directs the customer to the main page.

Use case name: Follow Users

Participating Actor: Customer

Entry Condition: The customer navigates to another user's profile page

Exit Condition: Customer clicks on the ‘Follow’ button

Flow of Events:

1. The user clicks on ‘Follow’ button in another user’s profile page
2. The customer started to follow another user. New posts of the user will be seen by the customer on the home page

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Use case name: Add Product & Combination to the Closet

Participating Actor: Customer

Entry Condition: Navigate to my account my closet page

Exit Condition: Add product or combination to the my closet

Flow of Events:

1. User clicks on add button
2. The customer chooses a product or combination by taking photo or selecting from the photo gallery

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Use case name: Share Product & Combination

Participating Actor: Customer

Entry Condition: Navigate to my account my closet page

Exit Condition: Share one of the products or combinations in the closet

Flow of Events:

1. The user clicks on one of the combinations or products
2. A pop-up reveals
3. The user clicks on the ‘Share’ button

Use case name: Recommendation

Participating Actor: System

Entry Condition: The user signs up

Exit Condition: The user deletes the account

Flow of Events:

1. Every activity such as likes, comments, and previous products bought and followed users’ posts is tracked to obtain data about the user.
2. This data is used to enlarge and elaborate the recommendation system.

Use case name: Search User

Participating Actor: Customer

Entry Condition: The customer navigates to the discovery page

Exit Condition: The user clicks on the search button

Flow of Events:

1. The customer types the username to the search bar
2. After clicking on the search button, if such a user exists, the user will be visible to the customer
3. The user can navigate to the user's profile page by clicking on the profile seen in the search bar.

Use case name: Like/Comment Post

Participating Actor: Customer

Entry Condition: Either visiting another user's profile and selecting a post or navigating to the primary page

Exit Condition: Clicking on like button or sharing the comment

Flow of Events:

1. To like the post the customer double clicks
2. To share a comment, the user clicks on 'Share' after typing a comment

3. The comment and like will be visible by users who are following the likes/commented user

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Use case name: Search/ Filter Products

Participating Actor: Customer

Entry Condition: The customer navigates to ‘Shop’ page

Exit Condition: The user clicks on ‘Search’ button

Flow of Events:

1. The customer types the name of the product to the search bar
2. The customer can filter the product by its brand name, color, and price, etc. By clicking on filter button,
3. After clicking on the search button, the products according to the user’s selection are shown to the customer

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Use case name: Buy Product

Participating Actor: Customer

Entry Condition: The user navigates to ‘My Basket’ page

Exit Condition: The user is guided to one of the sellers’ web page

Flow of Events:

1. The customer approves paying the products in the basket
2. The system suggests the all sellers who sell these products with their prices on the ‘Easy Shop’ page
3. The customer selects one of the sellers
4. It navigates the customer to the sellers’ web page to buy the cloth
5. The customer approves purchasing the clothes on the web page

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Use case name: Share Post

Participating Actor: Customer

Entry Condition: The customer navigates to the ‘My Account My Posts’ page

Exit Condition: The user shares a post

Flow of Events:

1. The customer clicks on share button
2. The customer selects a product or combination either from the gallery or by taking a photo
3. After sharing the post, other users can like the post and comment
4. The post will be seen in the followers’ feed

Use case name: Add Product/ Combination to the Favorites

Participating Actor: Customer

Entry Condition: Navigate to the main page or discover page

Exit Condition: Click on the ‘Add to Wishlist Button’

Flow of Events:

1. After selecting a post either from the main page or discover page, the customer can add it to wishlist
2. Later user can buy combination in the post by navigating to ‘Wishlist’ page

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Use case name: Tag User in a Post

Participating Actor: Customer

Entry Condition: The user navigates to the ‘My Shared Posts’ page

Exit Condition: The customer clicks on ‘Share’ button

Flow of Events:

1. The customer clicks on ‘Share Post’ button
2. After selecting the photo to share, the customer can tag other users to the post by clicking on photo
3. After clicking on the photo, the customer can tag another user by ‘@’

Use case name: Enter Measurement

Participating Actor: Customer

Entry Condition: The customer navigates to the ‘Measurement’ page through ‘Settings’ page

Exit Condition: The user clicks on ‘Approve’ button

Flow of Events:

1. The user fills in the blanks about body measurements such as height, weight, etc.

Use case name: Recommend the Product With Correct Body Size

Participating Actor: System

Entry Condition: The customer enters body measurements to the system

Exit Condition:-

Flow of Events:

1. According to the customer’s body measurements, the system recommends the product with correct body size for each brand

3.5.2 Use-Case Model

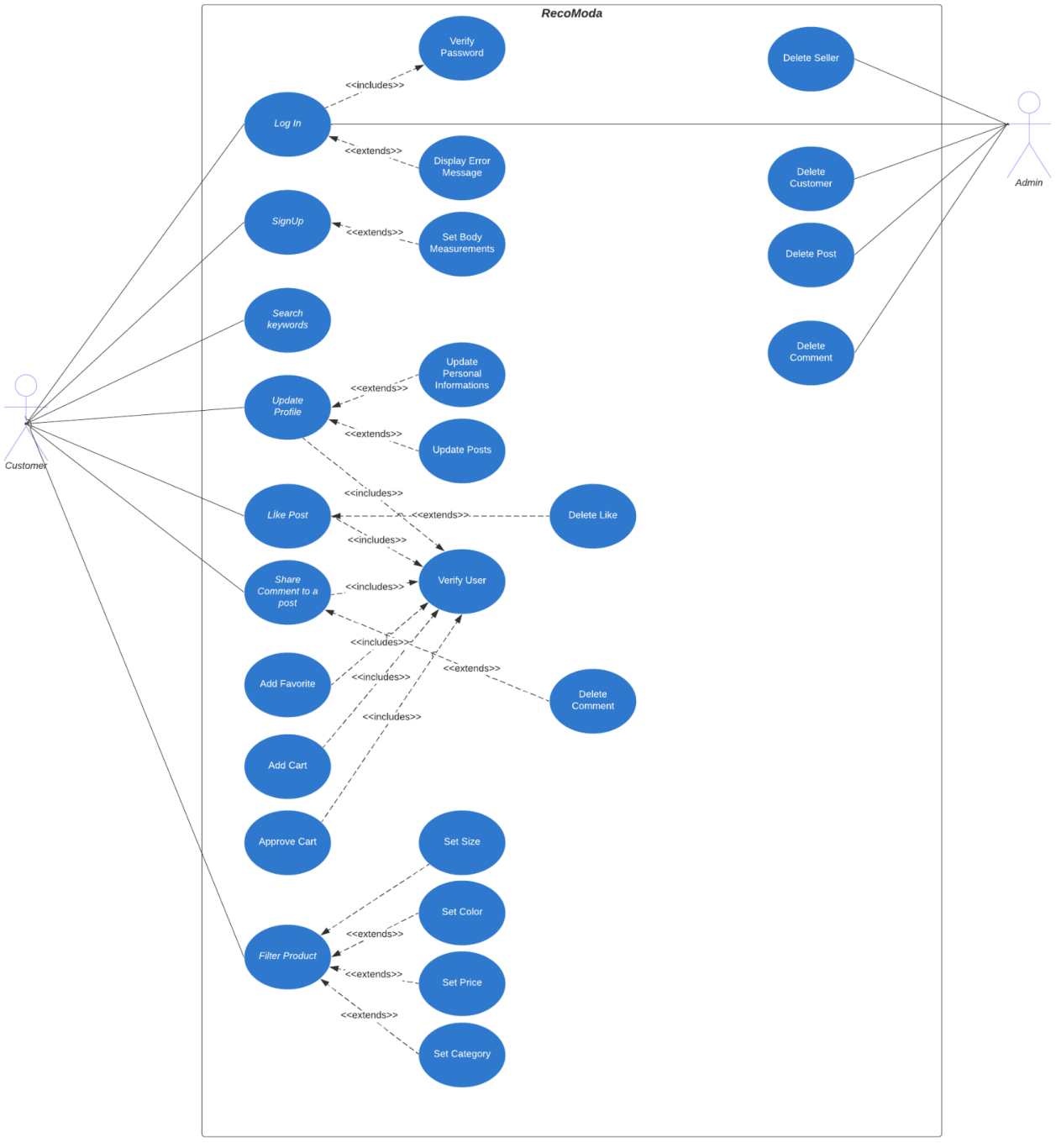

Figure [1]: Use Case Diagram

3.5.3 Object and Class Model

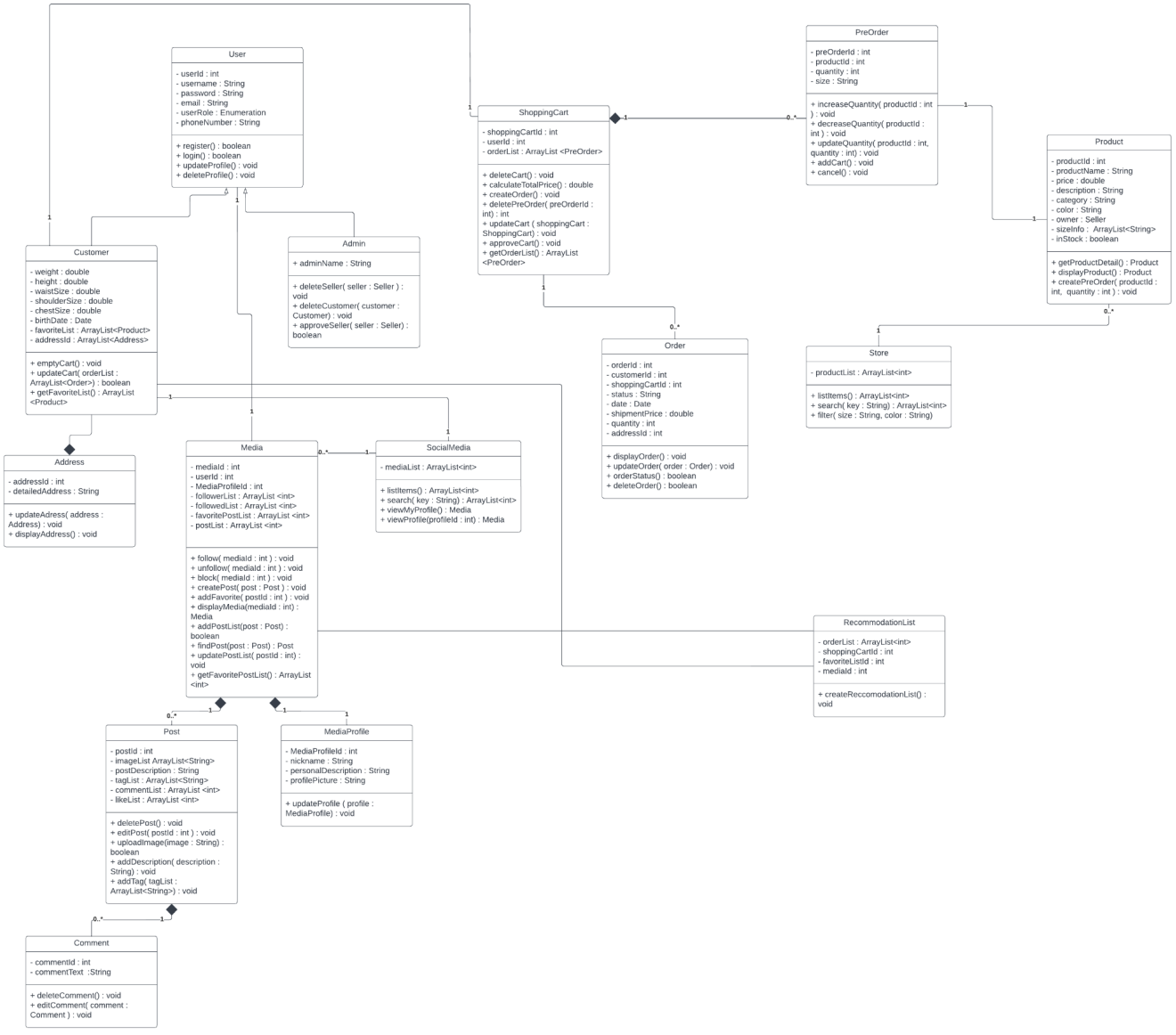

Figure [2]: Object and Class Diagram

User: The user contains information of the user, either Admin or Customer.

Customer: The customer takes all information from the customer. Every user has Address information on a different object.

Address: The address contains information about the user and is used by the customer object.

Media: Main Media includes the posts, social media main page, user profiles, and follow information.

SocialMedia: Social Media includes a media list that contains posts and users. They can be searched or viewed.

ShoppingCard: Shopping Card contains added products into the card. Products can be updated, deleted, or approved.

PreOrder: PreOrder contains the quantity and size of the product. After they select it, it is added to the shopping card.

Order: The order contains order information from both the customer and the seller.

Store: The store contains all products of the store and product information taken from the Product object.

RecommodationList: Created by orders, favorites, media, and shopping card of the User.

MediaProfile: Profile page of User which contains information of a user. Media profiles can be visited from media.

Comment: Comment object can only be in Posts and contains comment text.

Product: Contains any information about the product and can be accessed from the store.

Post: Posts are created by the user and contains images, tags, like, and description. Posts can have comments. Those can be seen on media or user profiles.

Admin: Admin of the system which can delete or approve sellers, or delete customers.

3.5.4 Dynamic Models

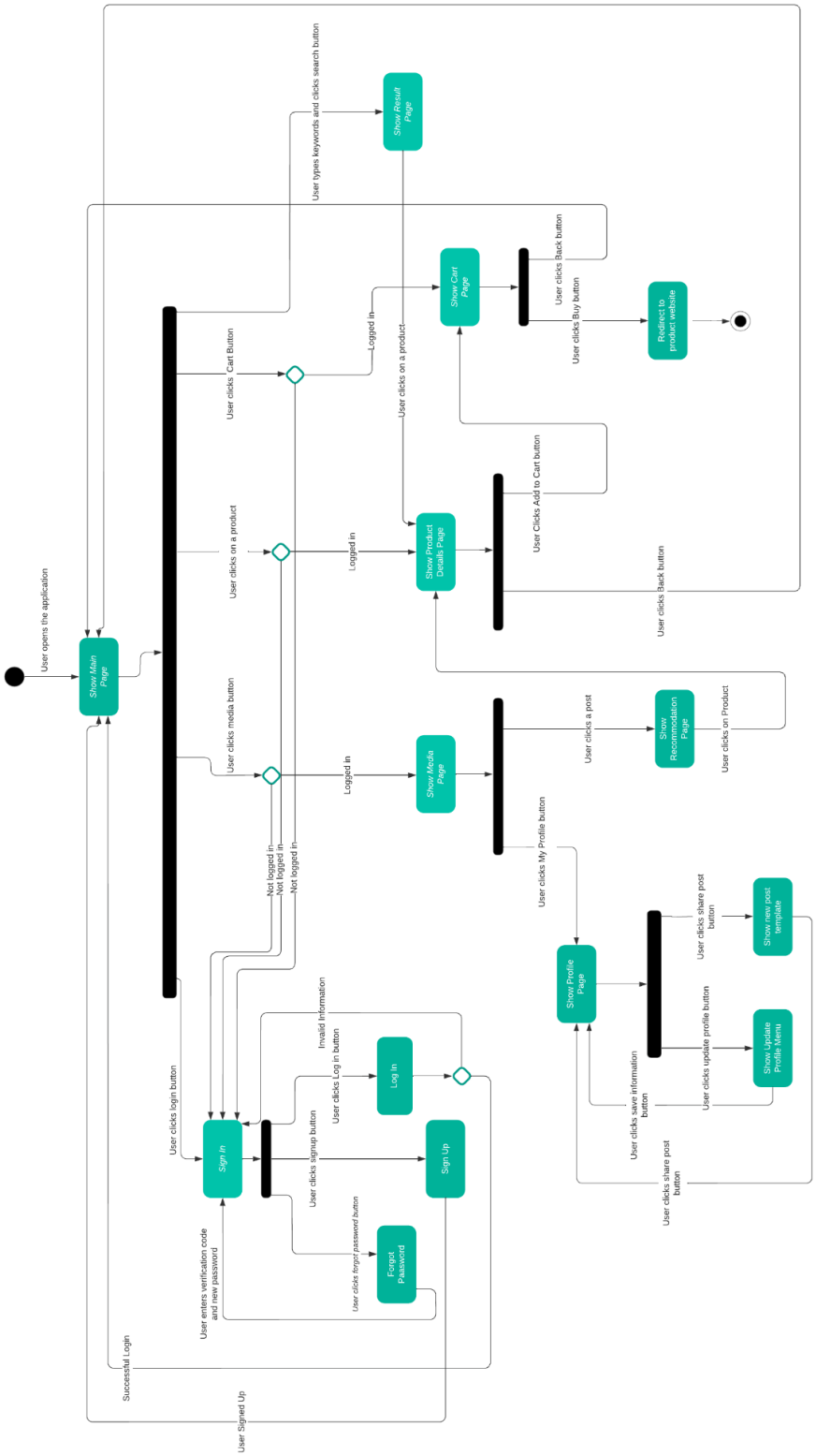

Figure [3]: Activity Diagram

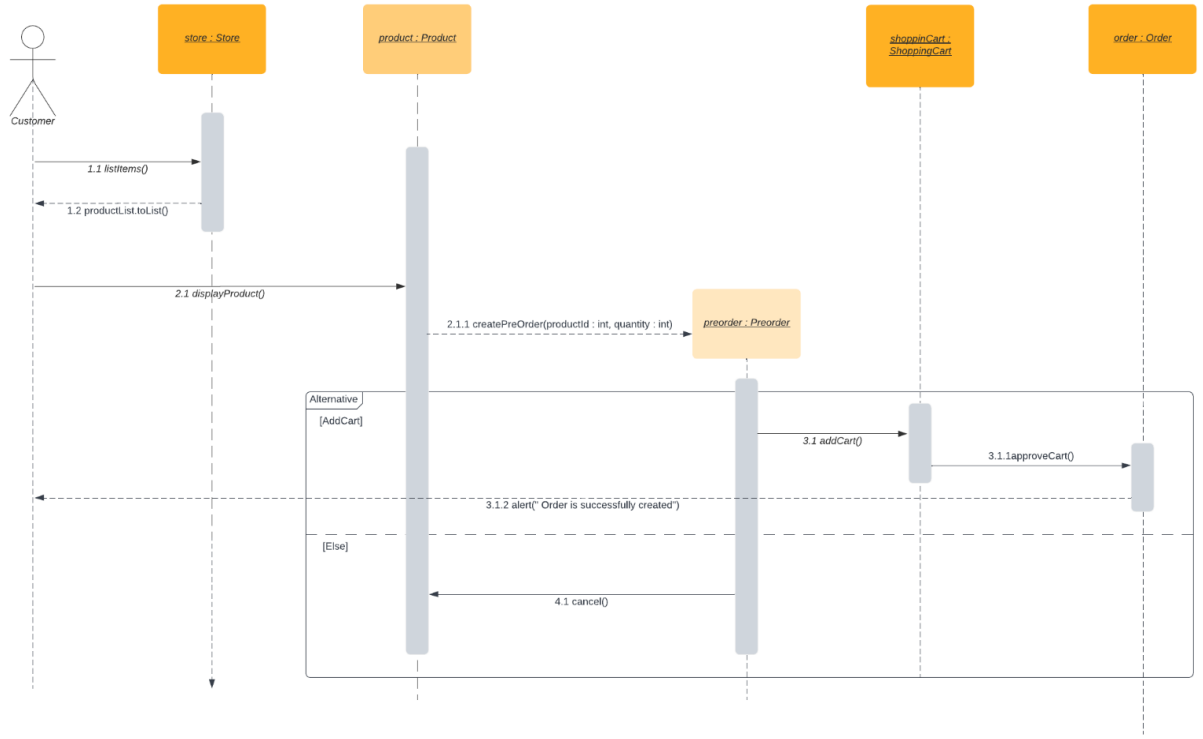

Figure [4]:Create Order Sequence Diagram

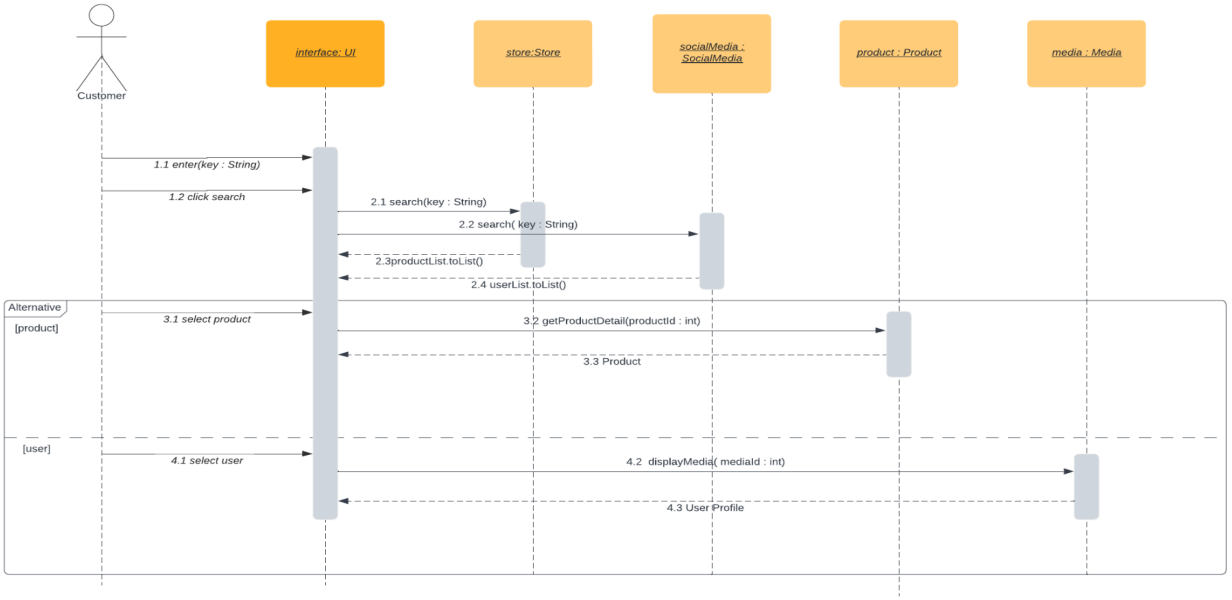

Figure [5]: Search Sequence Diagram

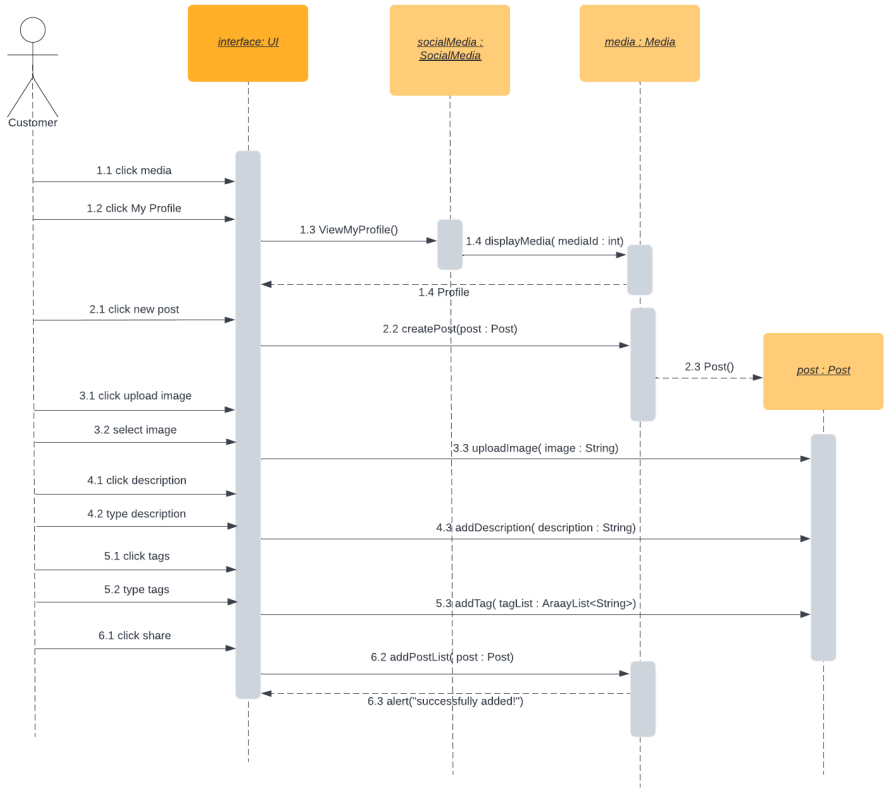

Figure [6]: Share Post Sequence Diagram

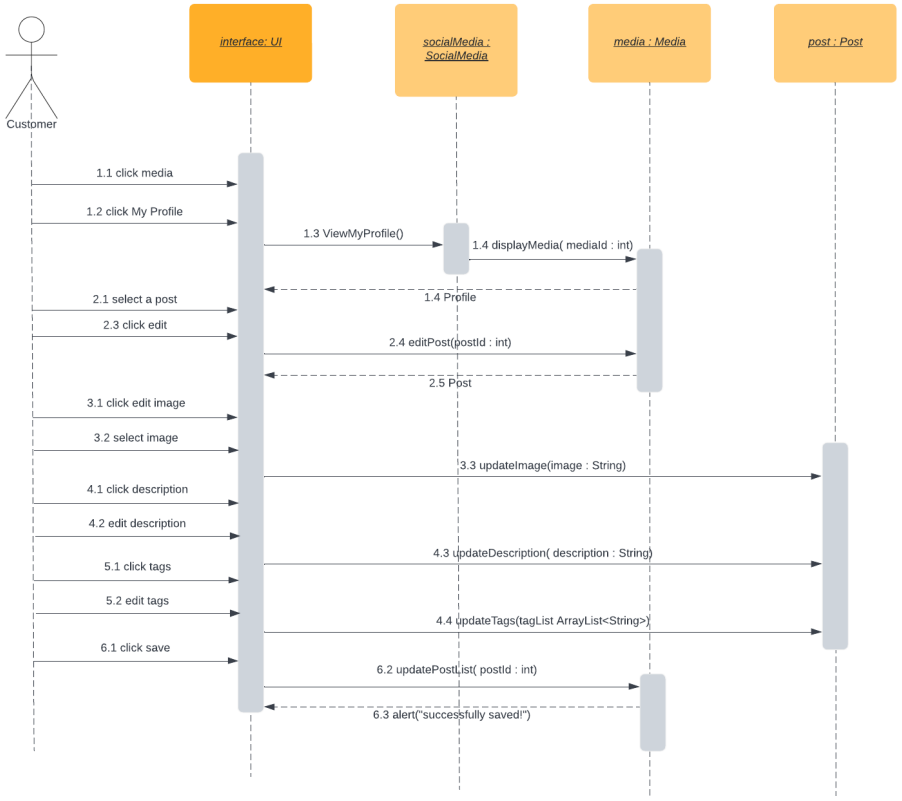

Figure [7]: Update Post Sequence Diagram

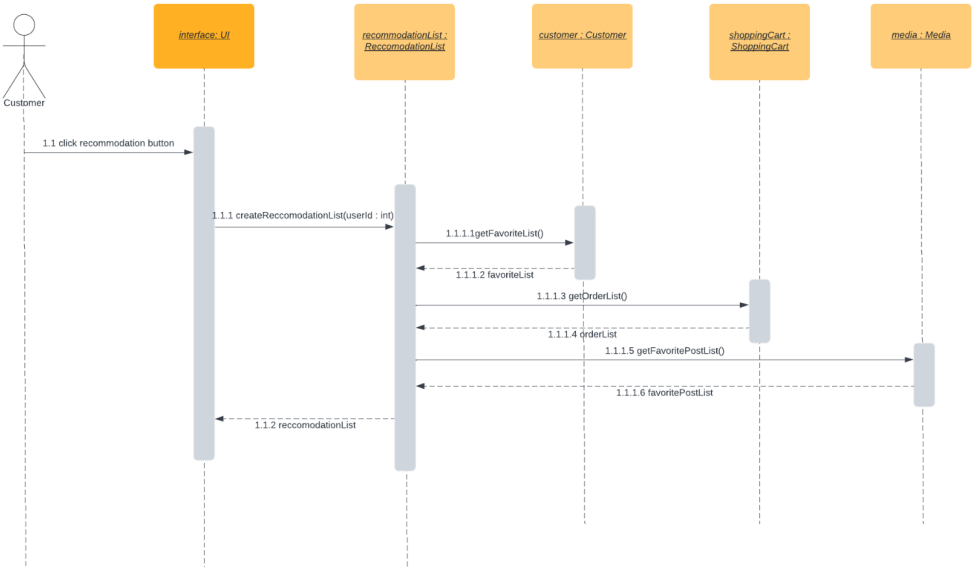

Figure [8]: Get Recommendation Sequence Diagram

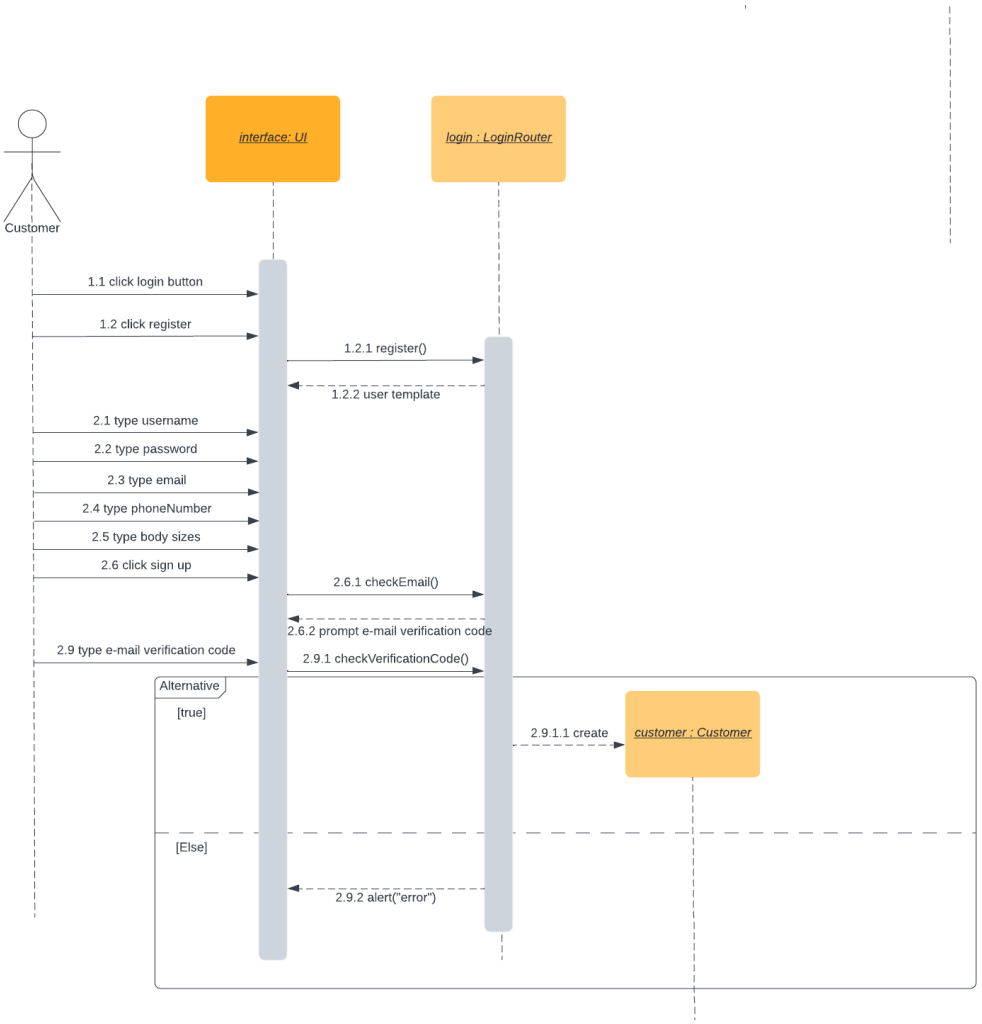

Figure [9]: Sign Up Sequence Diagram

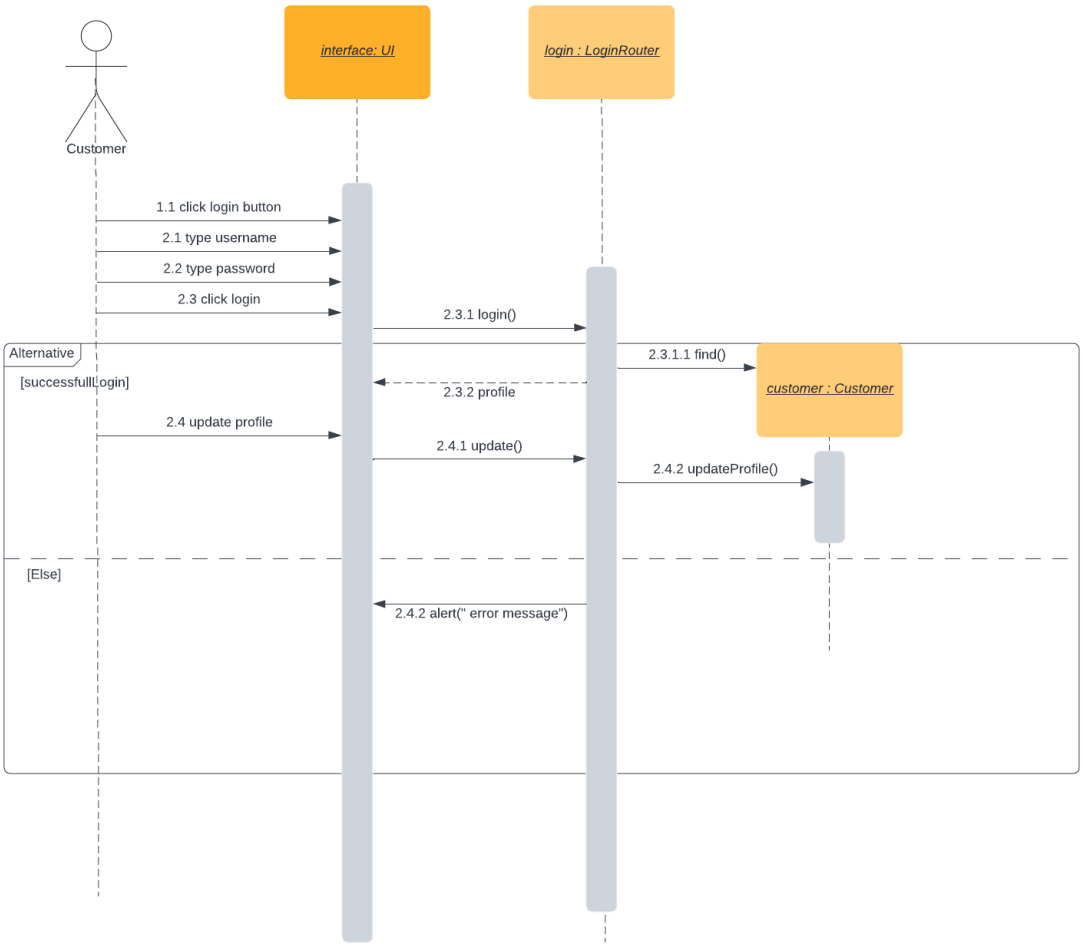

Figure [10]: Login and Update Profile Sequence Diagram

Create Order Sequence Diagram: To create an order, the user must first look at the product list. Pre Order the product they like and select its features (such as size, and number), and add it to the shopping cart. This process can be done as many times as you want. Afterward, he/she can approve the card and then create an order or cancel the product or products.
Search Sequence Diagram:

Share Post Sequence Diagram: In order to make a shared post, you must first enter the profile and then click the create new post button. Adding images, adding a description, and adding a product or user tags should be done on the post-creation page. Afterward, the share is made, and the shared message is received.

Update Post Sequence Diagram: Shared posts can be updated. For this, enter the profile and click on the option to edit the shared post, and edit the image, description and tags. Afterward, the update is completed with the update button.

Get Recommendation Sequence Diagram: To get suggestions, the user must first click on the suggestions button on the interface. After that, it will run into the background of the system. A list will be created and displayed on the page using the user's favorites, orders, and media information.

Sign Up Sequence Diagram: In this diagram, the user first enters all credentials such as mail, name, password, etc. Then the user clicks on the register button and gets a verification mail. In the backend, the system checks all credentials. If it is verified by the system, the account is created. If it is not verified, the user gets an error

Login and Update Profile Sequence Diagram: The user enters credentials and then clicks on the login button. If it is verified by the system, the user can log in to the application. If the user successfully logs into the application, the user can update his/her profile. If something goes wrong, the user gets an error.

3.5.5 State Machine Diagram

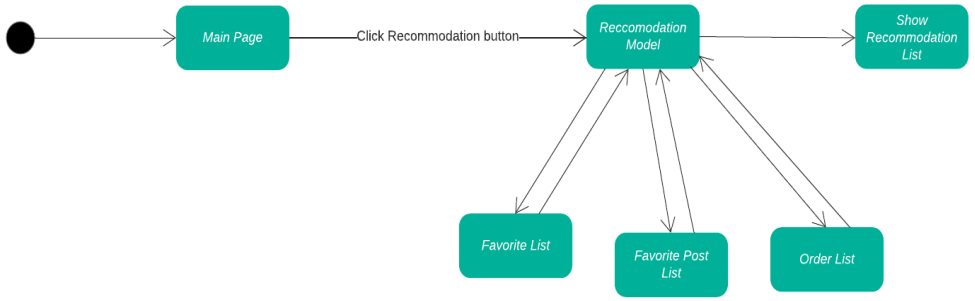

Figure [11]: Recommendation Model State Machine Diagram

The Recommendation Model is based on 3 different foundations. The first of these are the products that the user adds to the favorite list while browsing the application and previously added them. Secondly, it is the list of posts shared by users that they have favorited. The other List is the data kept specific to the system that we track the user. All of these combine to form a Recommendation list.

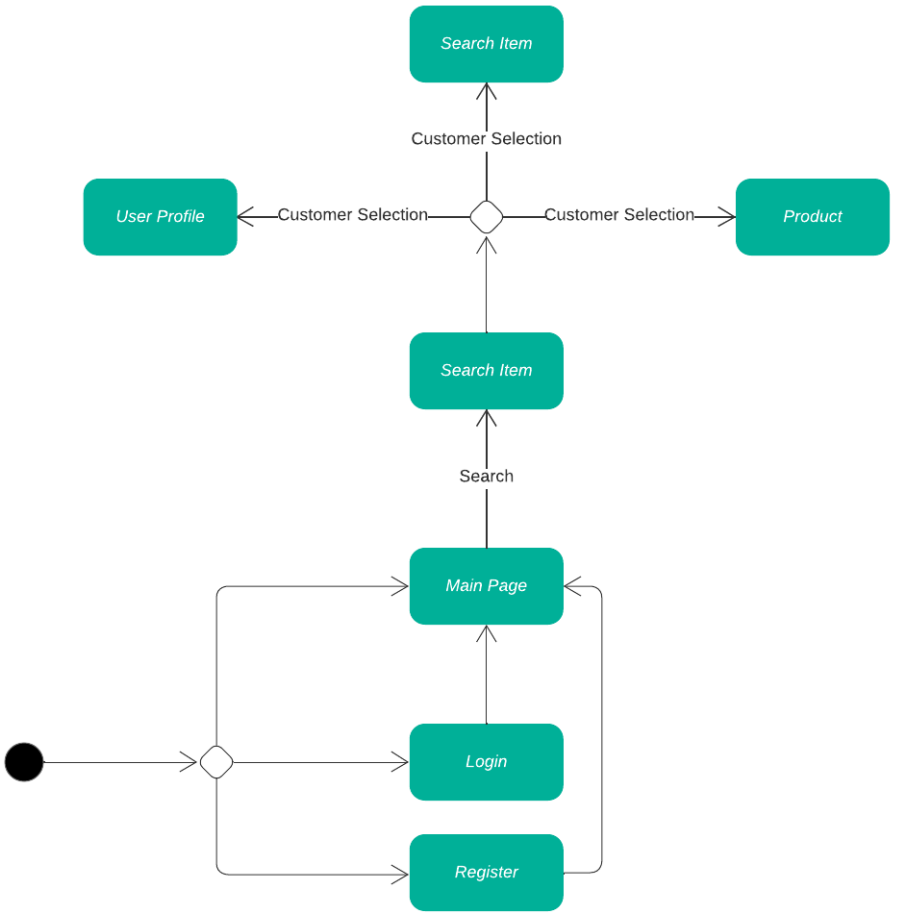

Figure [12]: Search Product State Machine Diagram

This diagram demonstrates how a user can make a search in the system. The keywords written by the user can be returned to three different objects which are product, user profile, and post. According to user choice, three different themes can be reached at the end of the search operation.

3.5.6 User Interface

3.5.6.1 Sign In Page

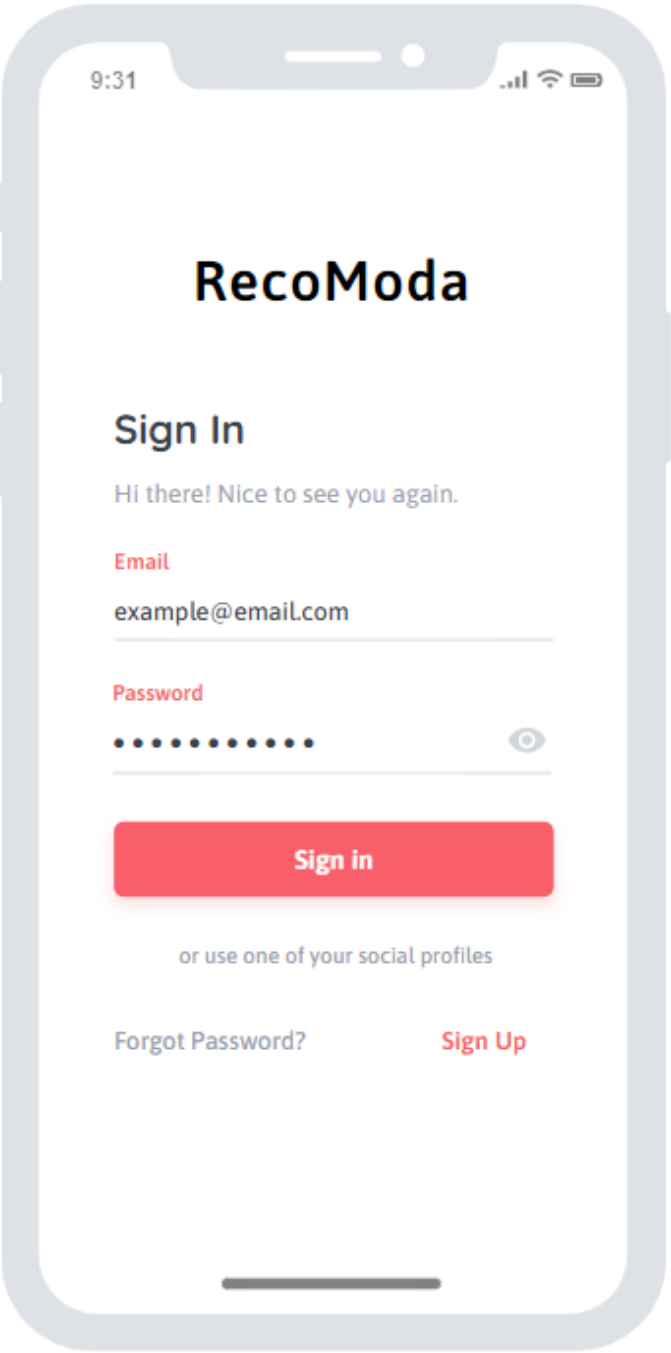

Figure [13]: Sign In Page

When you want to use the application, the application login screen appears. As seen above, you can log in to the application by using e-mail and password. Forgot password at the bottom, and other operations can be done in the sign up section.

3.5.6.2 Sign Up Page

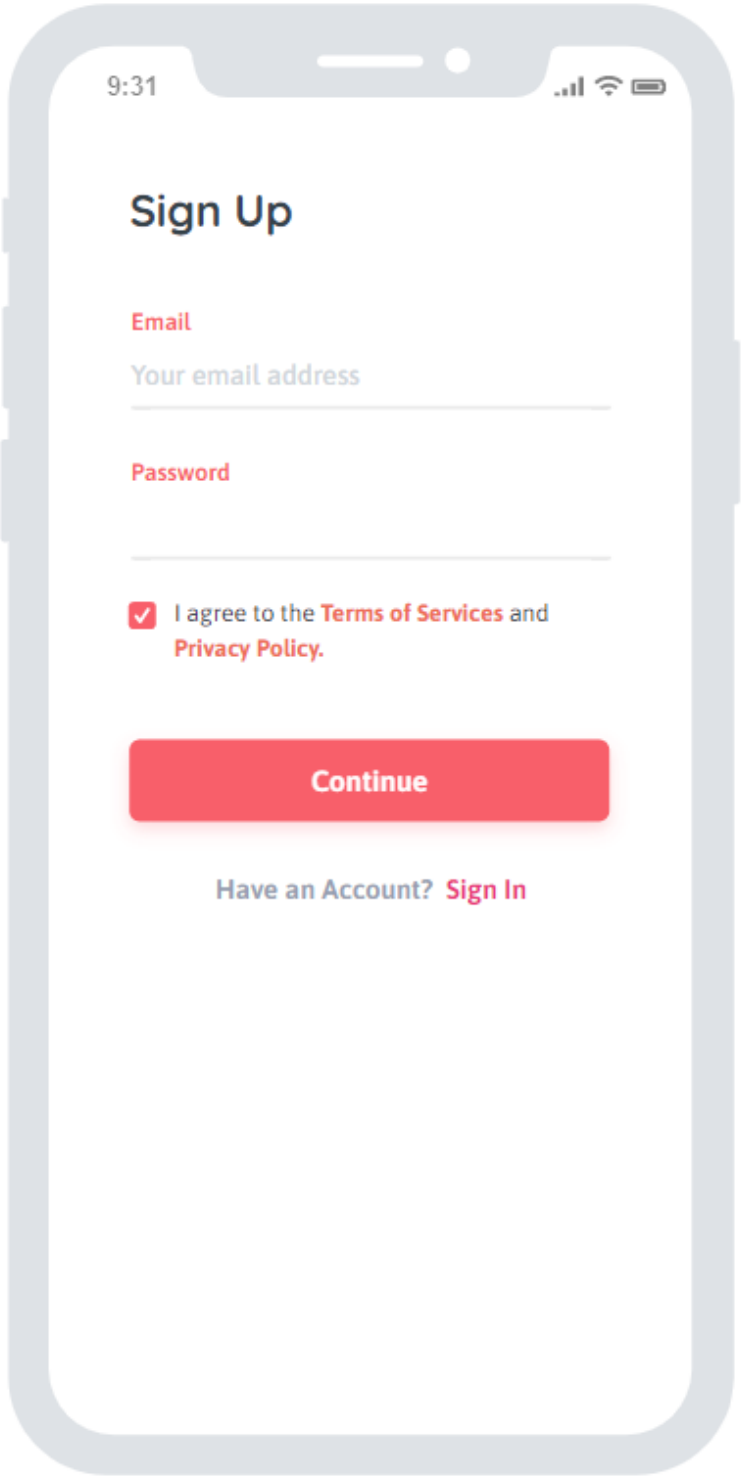

Figure [13]: Sign In Page

A simple interface has been designed for users who will become new members on the registration page. Password quality and double check will be checked while the application is being implemented.

3.5.6.3 Welcome Page

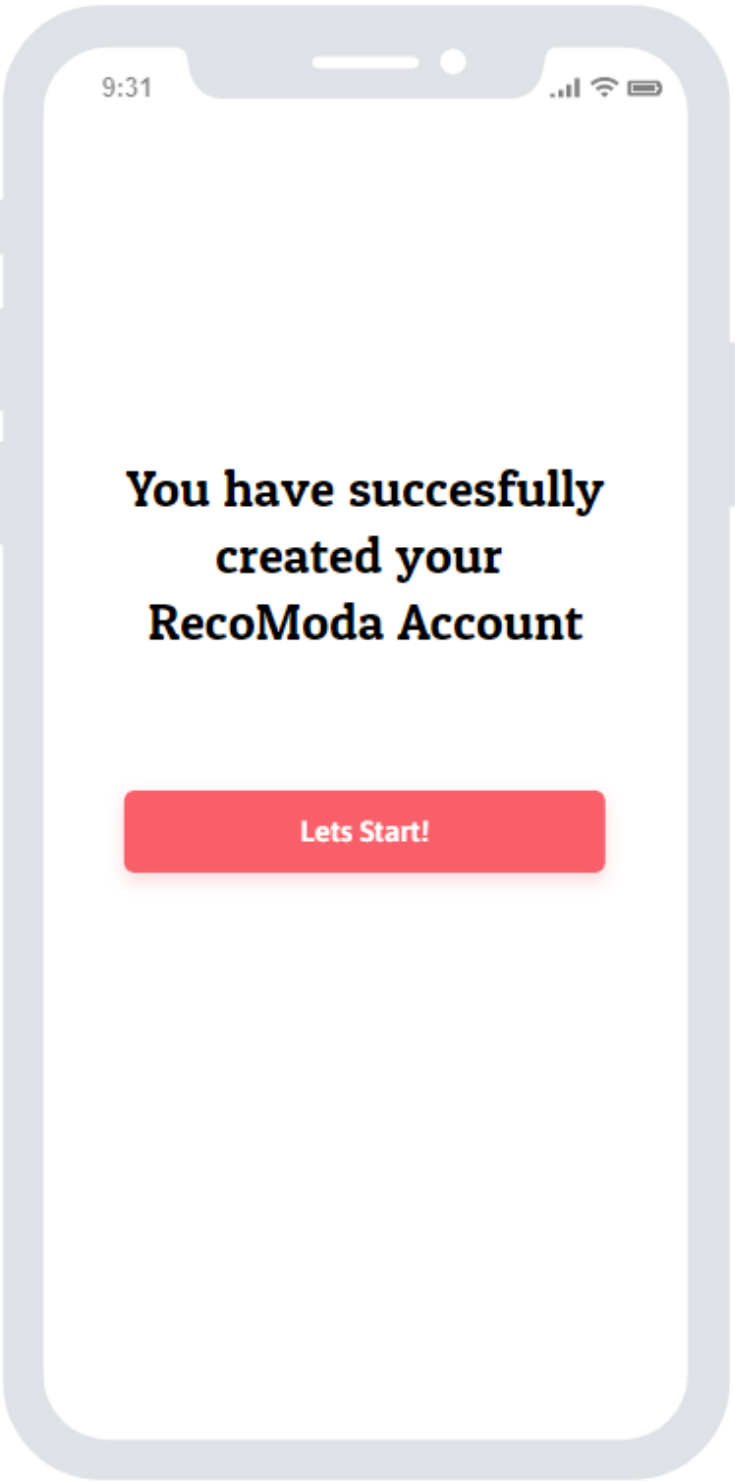

Figure [14]: Welcome Page

The above page appears as a welcome page to users after completing the registration process. After clicking the let's start button, they can log into their accounts.

3.5.6.4 My Account My Shared Posts Page

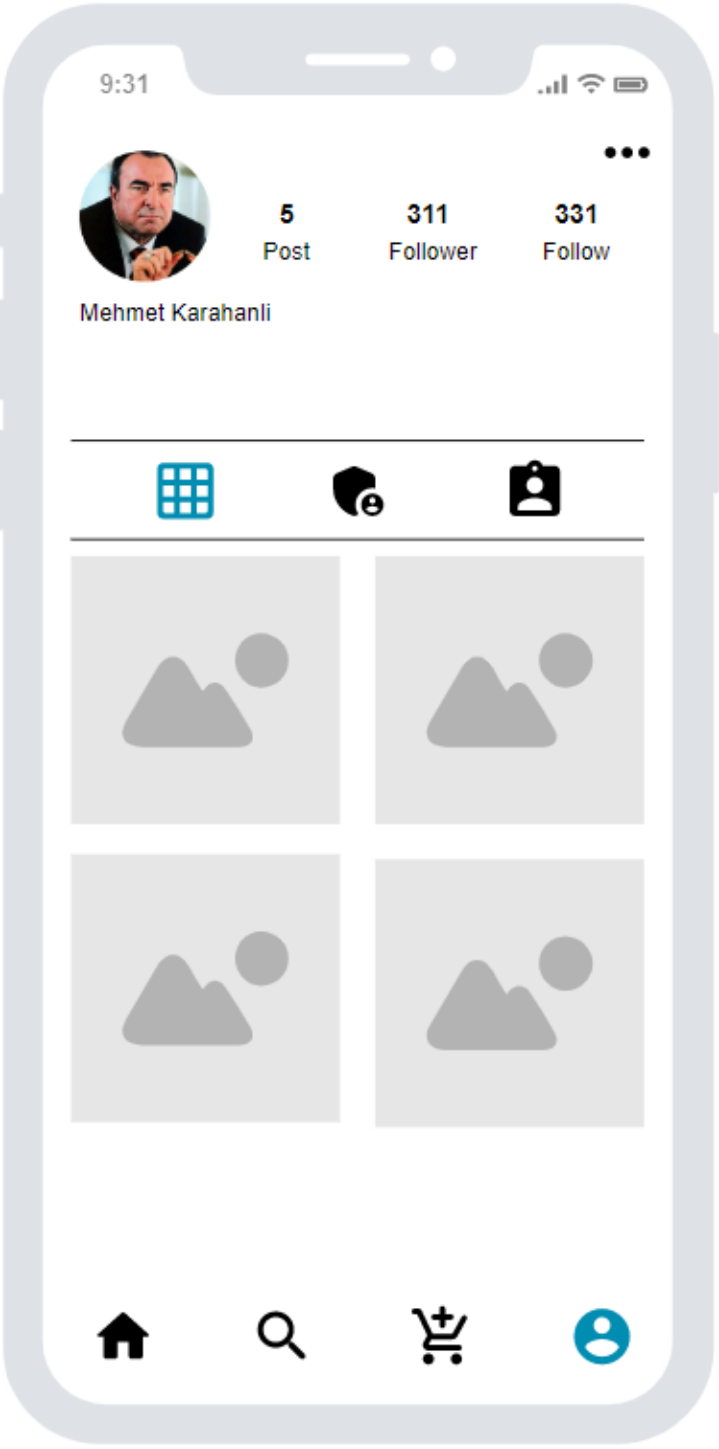

Figure [15]: My Account My Shared Posts Page

As can be seen in the application, there is a navbar at the bottom. On this page are our own published posts. You can see other details. In the minibar above, it can be understood that it is on the shared posts page, and from the navbar below, it is now on my profile page.

3.5.6.5 My Account My Closet Page

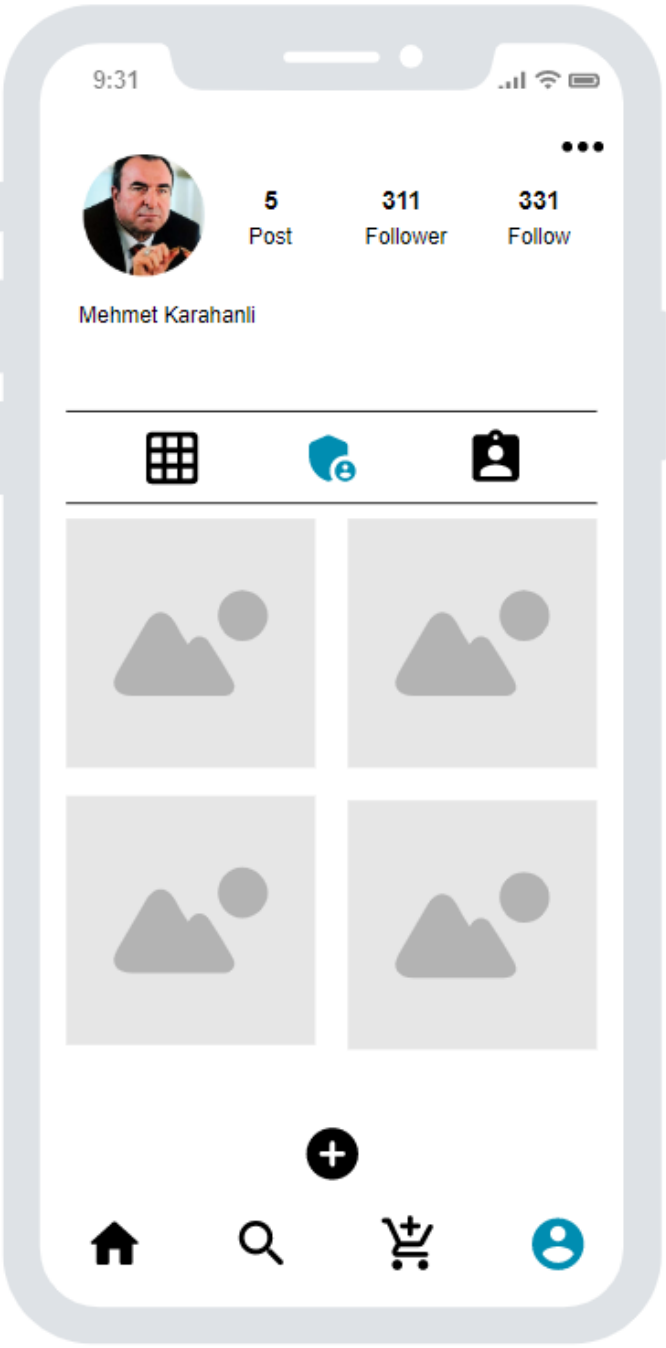

Figure [16]: My Account My Closet Page

On this page, there is information about the user's own closet. The user creates his own closet interface by taking photos of the outfits or the products he likes in the gallery, and this information forms the basis of the recommendation system. Photos can be added with the plus button at bottom via gallery or camera.

3.5.6.6 My Account My Tagged Posts Page

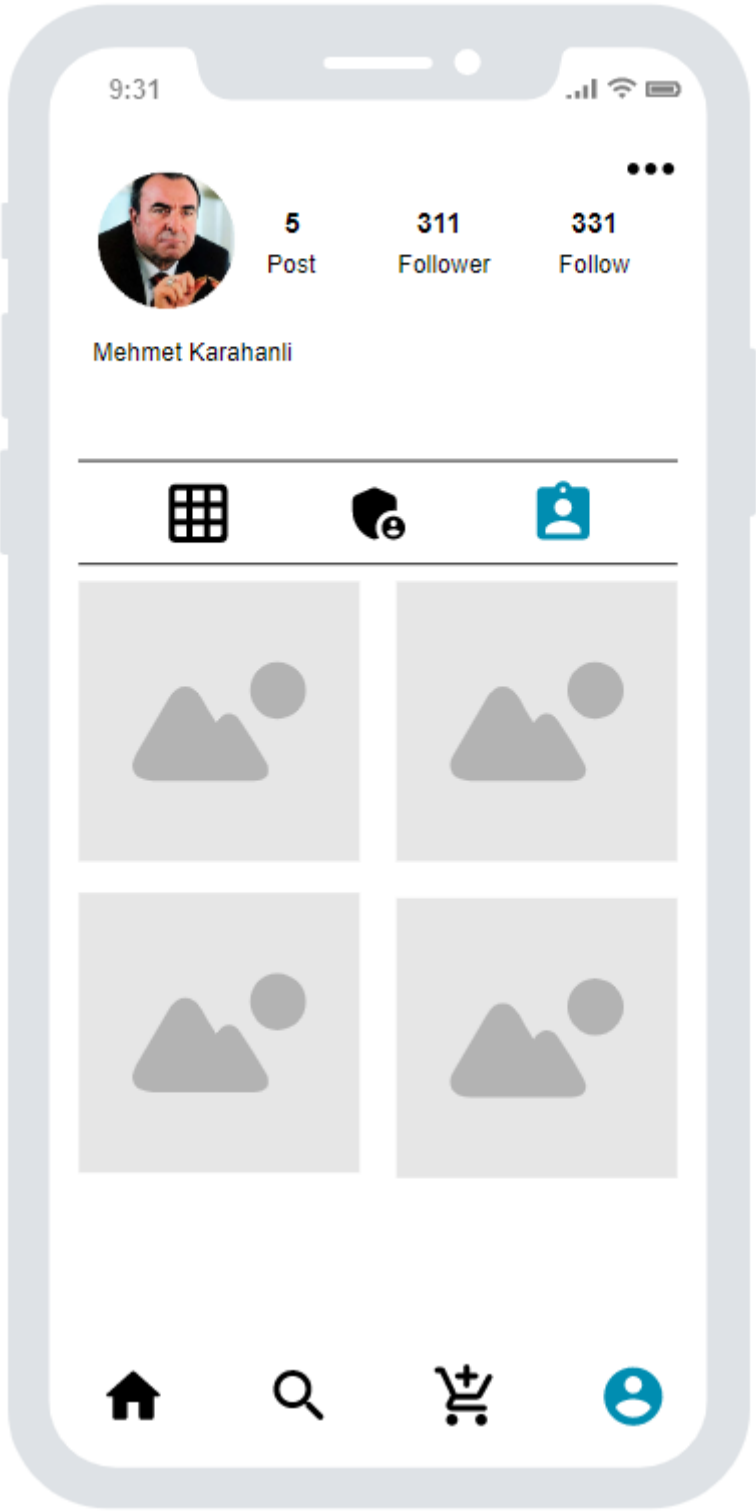

Figure [17]: My Account My Tagged Posts Page

On the page above, the posts that the users are tagged and shared by other users are visible.

3.5.6.7 Camera Permission Page

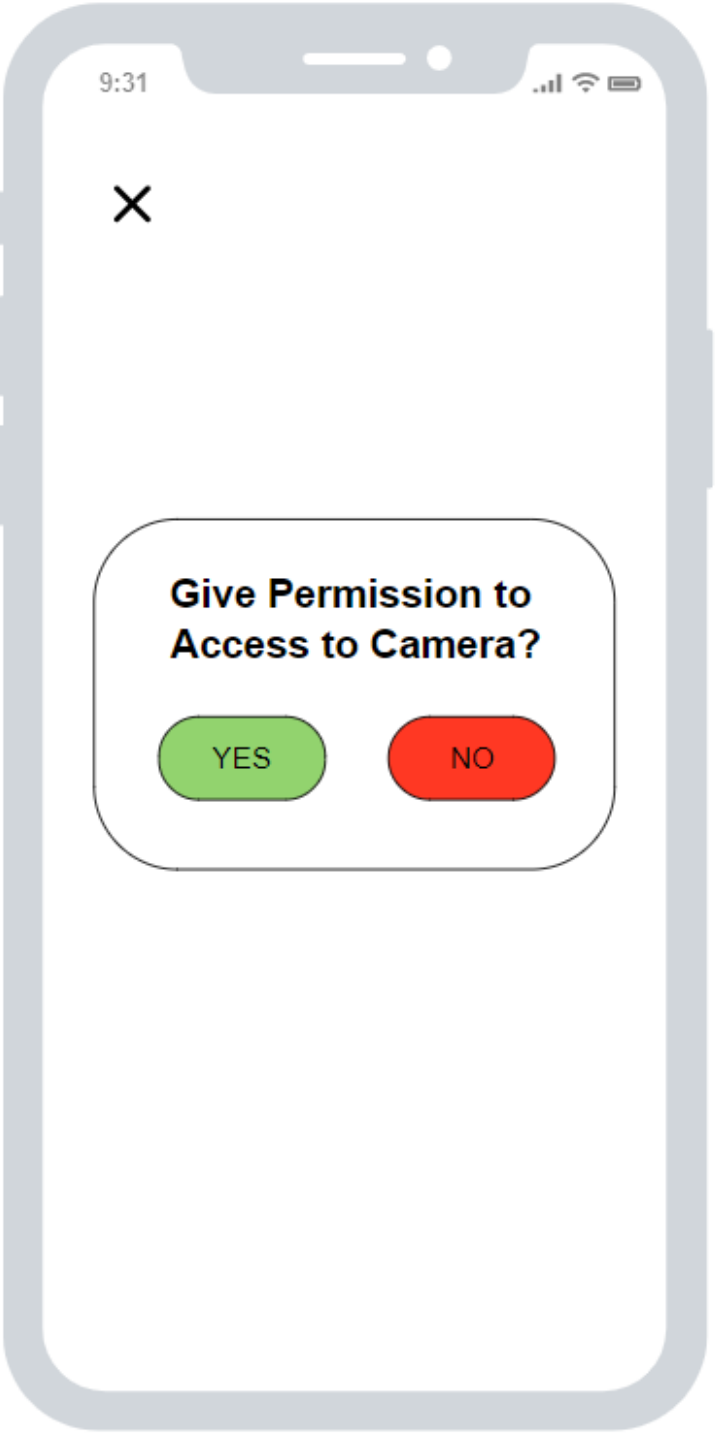

Figure [18]: Camera Permission Page

The above page gives us an idea about app permissions. The user wants to upload photos to the system by clicking the plus button on the page mentioned in 3.5.5.5. Here, permission will be taken once and will not be requested later.

3.5.6.8 Taking Photo Page

Figure [19]: Taking Photo Page

The screen that will be created during the photography phase has been tried to be shown above. The taken photo is uploaded to the system by the user and used in the suggestion system.

3.5.6.9 Settings Page

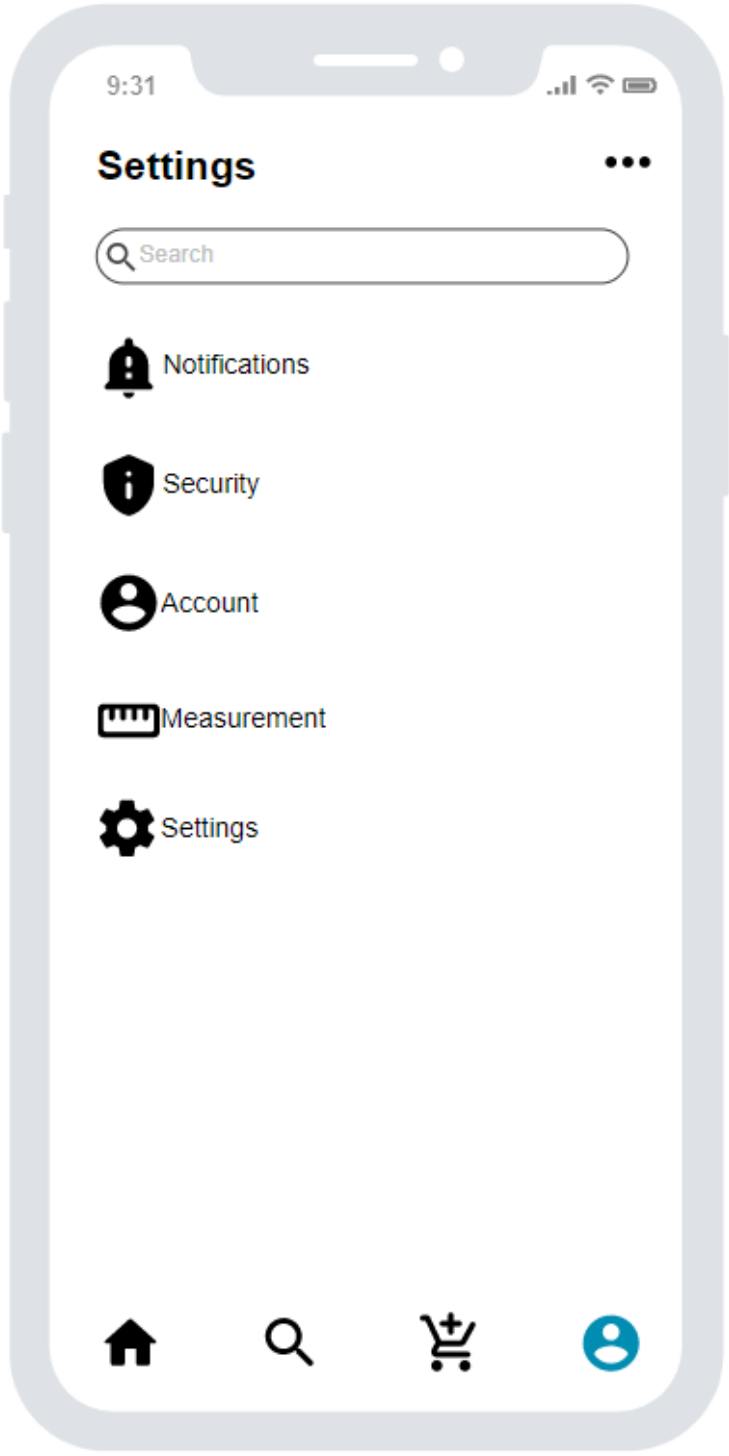

Figure [18]: Settings Page

The above page can be accessed by clicking the 3-dot icon on the previous pages. Here, the settings page is accessed and the above-mentioned 5 (highly likely to increase in the future) different features can be edited.

3.5.6.10 Measurement Page

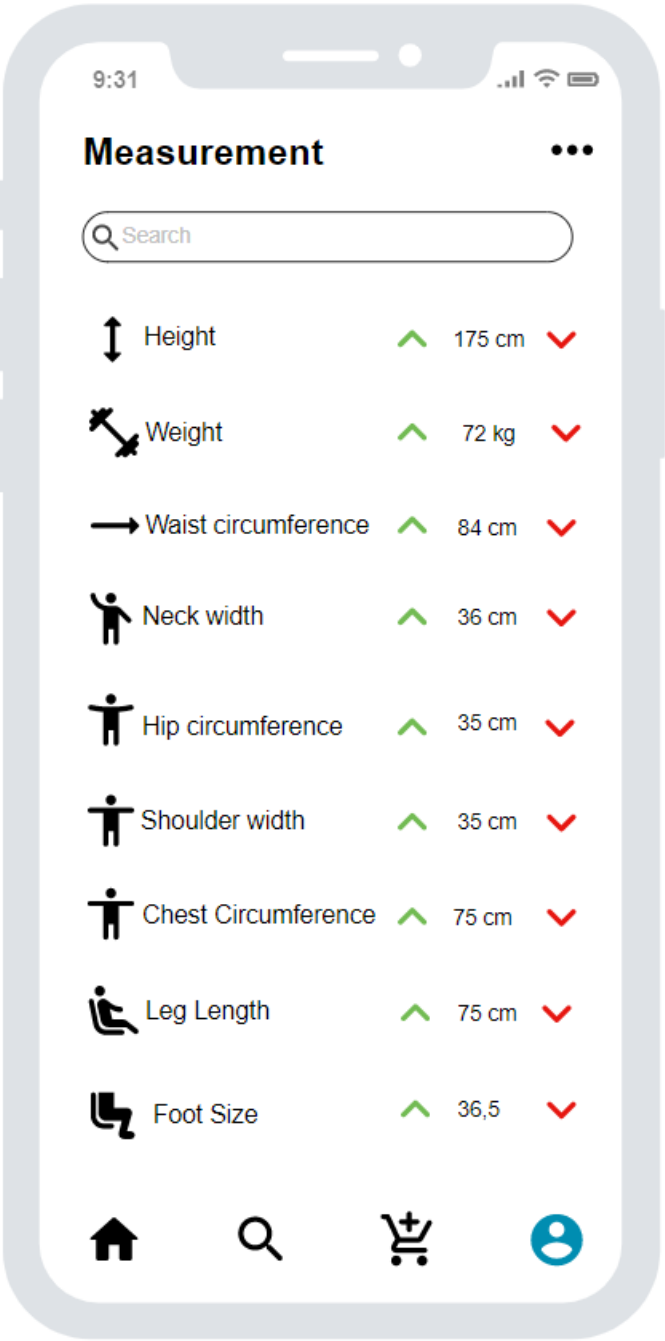

Figure [19]: Measurement Page

The above page is an example of the measurement page after the settings tab. other adjustment pages will be like this. Although different in interface, the logic is similar. Here, some body information of the user will be taken and used in the recommendation system.

3.5.6.11 My Account My Posts Page

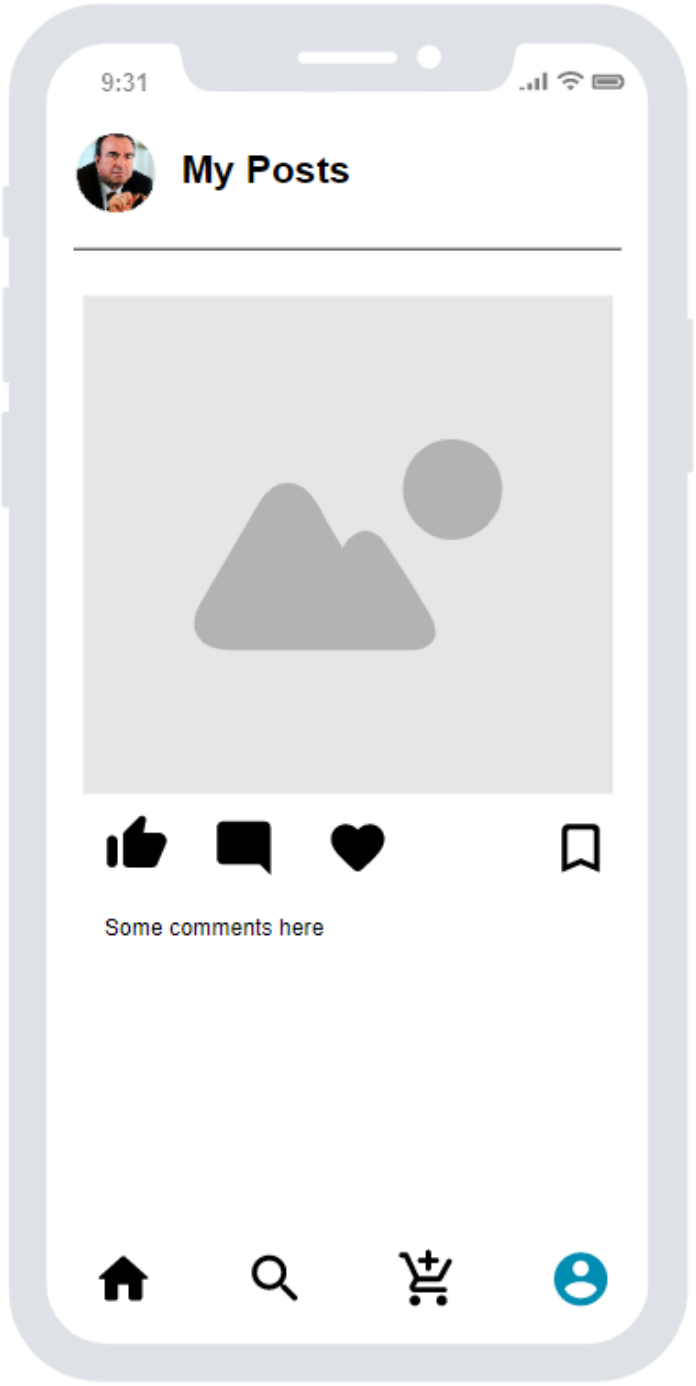

Figure [20]: My Account My Posts Page

The page above shows the flow page on the page where the user shares their combinations with other people. As can be seen in here, there are features such as likes and favorites in the posts.

3.5.6.12 My Account My Closet Page

Figure [21]: My Account My Closet Page

The page above shows the flow page on the page that is only for himself, which the user does not share with other people with his own clothes. If the user wishes, he will be able to share this combination and show it to other users.

3.5.6.13 My Account My Tagged Posts Page

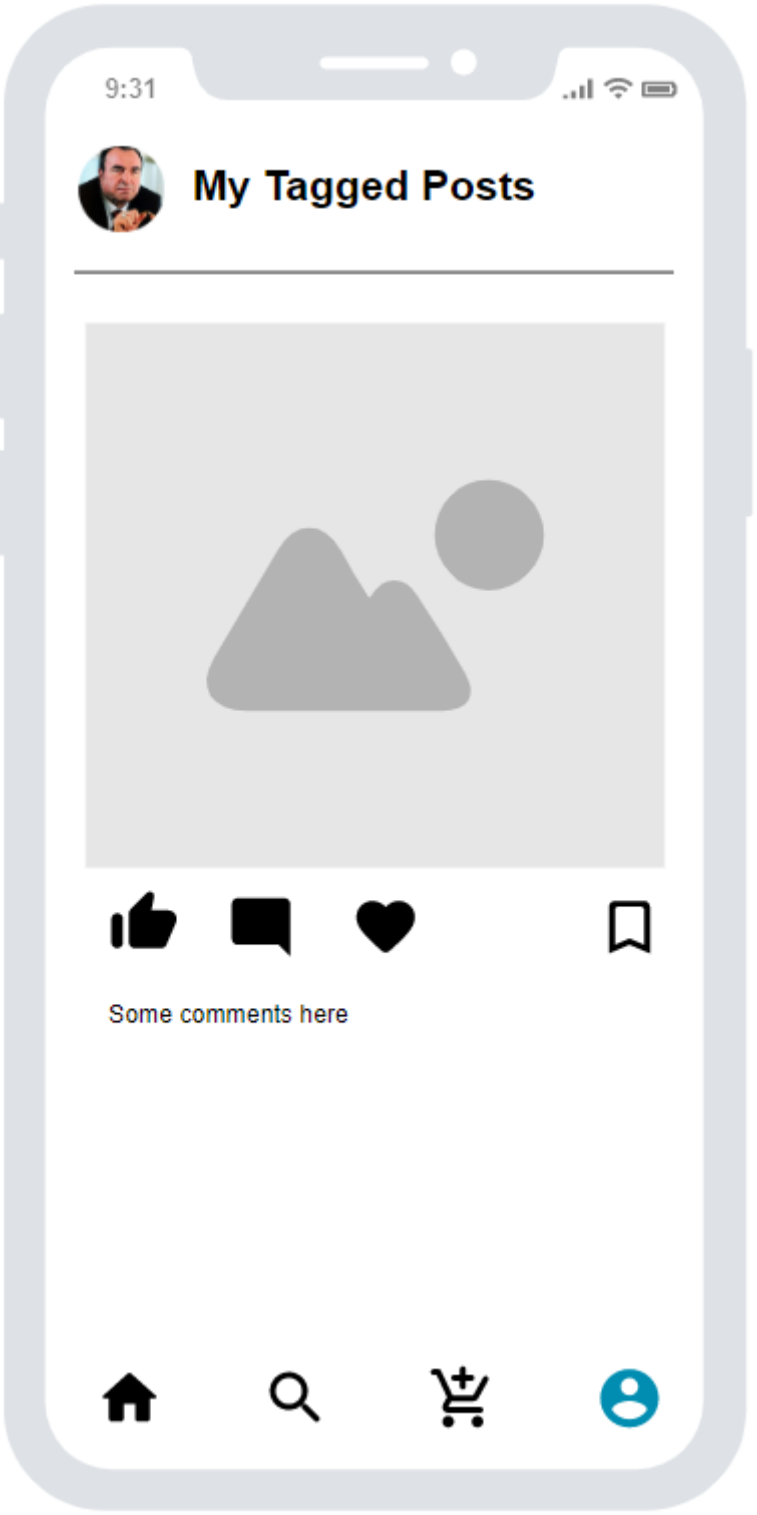

Figure [22]: My Account My Tagged Posts Page

The page above shows the posts that the user has been tagged in and shared by other users.

3.5.6.14 RecoModa Store Page

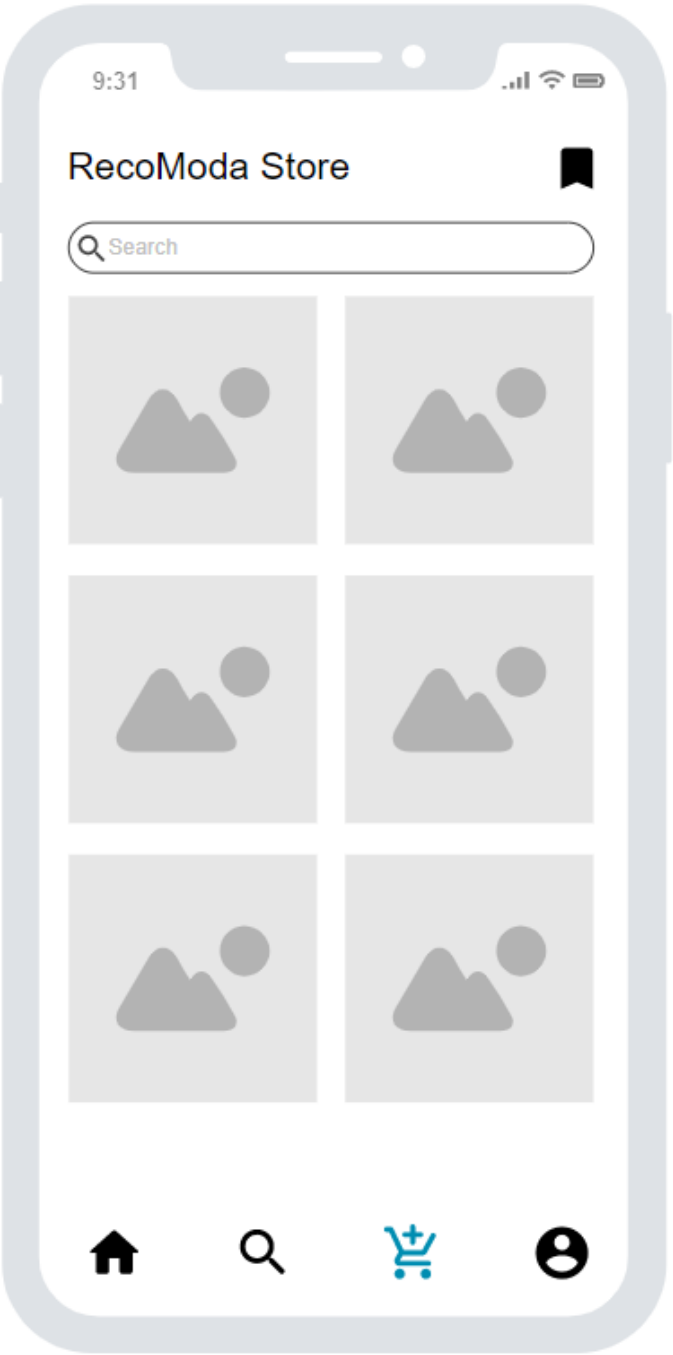

Figure [23]: RecoModa Store Page

According to the page suggestion system above, it is the page where the clothes and combinations recommended to the users are displayed. If the user wants, he can find the clothes he wants by making other searches.

3.5.6.15 RecoModa Store Your WishList Page

Figure [24]: RecoModa Store Your WishList Page

It is the page where the clothes and combinations recommended to the users according to the page suggestion system above are displayed, and the products that the user has favorited. If the user wants, he can find the clothes he wants by making other searches.

3.5.6.16 RecoModa Store Easy Shop Page

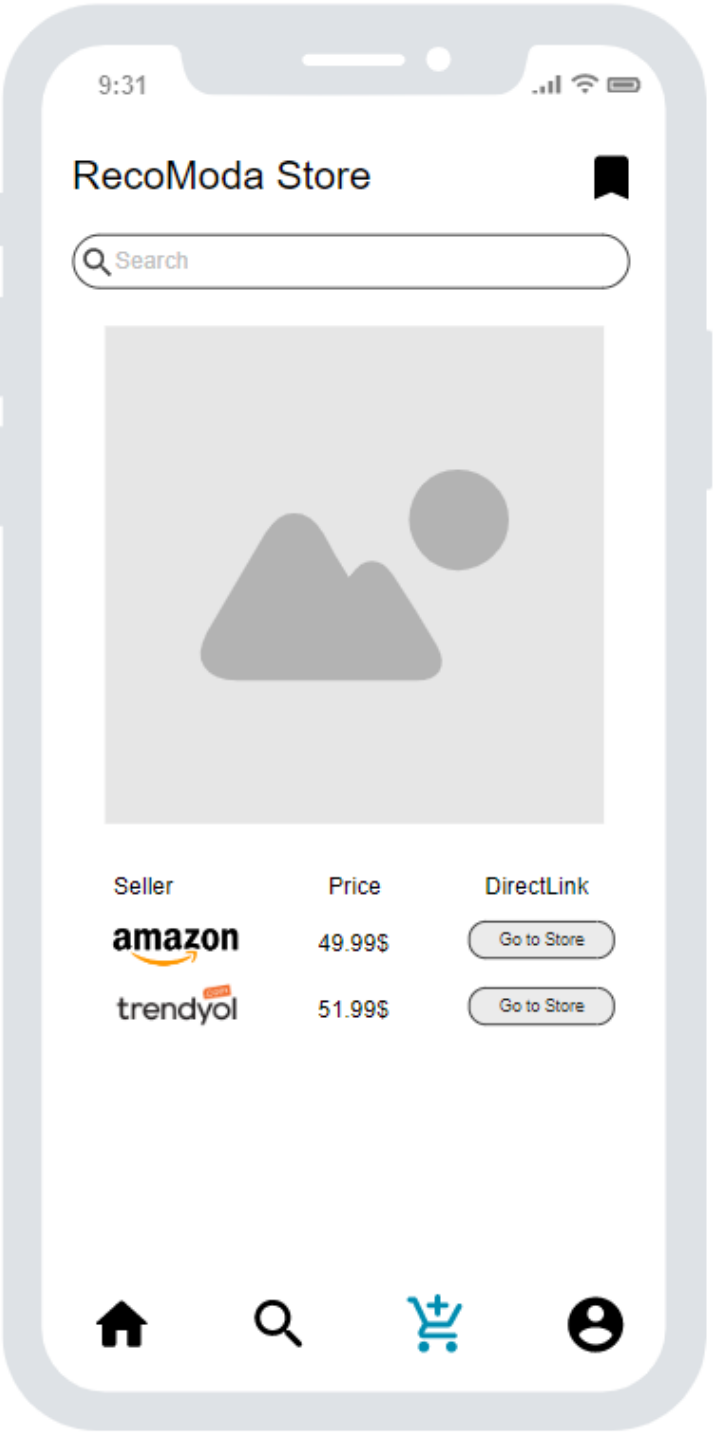

Figure [25]: RecoModa Store Easy Shop Page

Customers who click on the products on the above page can buy the clothes they want from different users by comparing the prices. Thanks to the direct link, they are directed to the desired shopping site.

3.5.6.17 Redirecting Permission Page

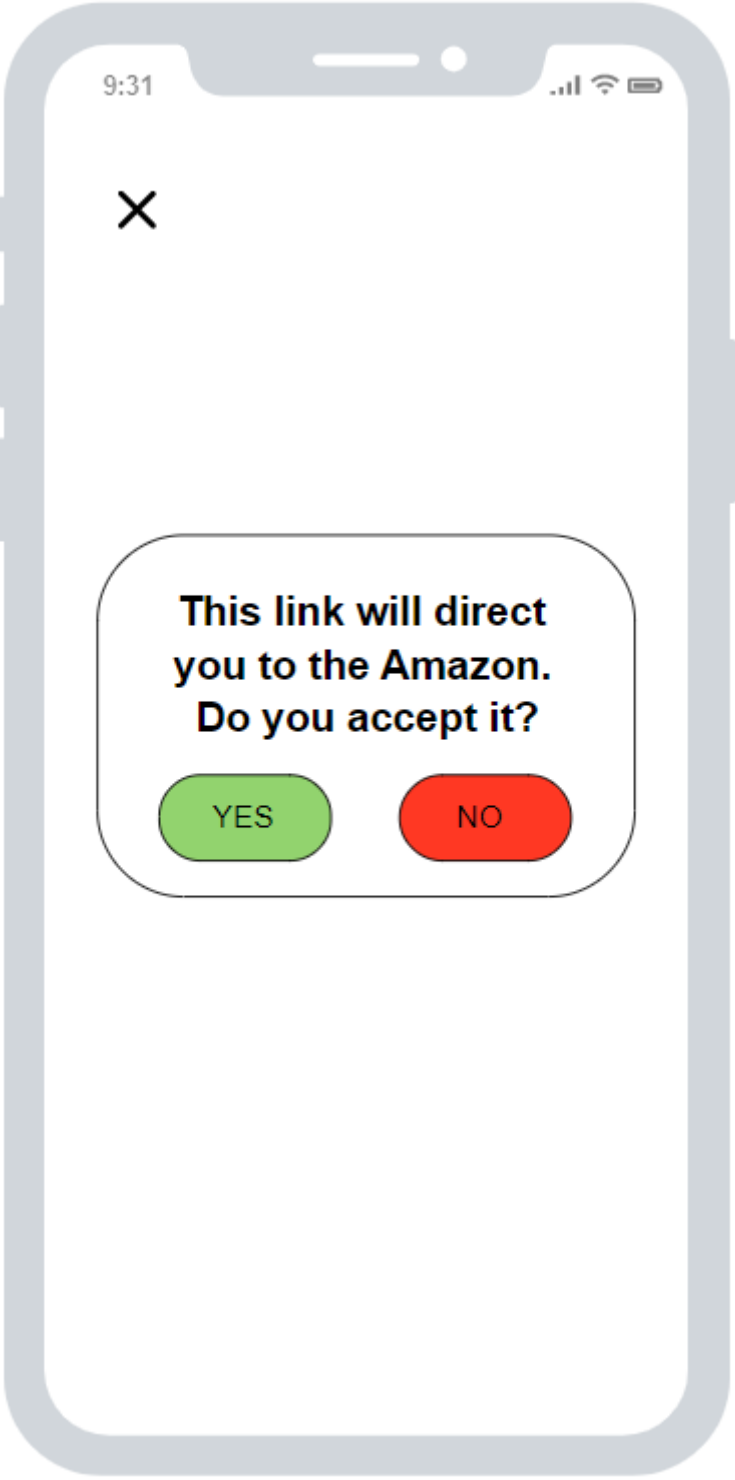

Figure [26]: Redirecting Permission Page

With the warning on the above page, users can reach first sales, such as Amazon or Trendyol, and permission should be obtained in this regard. Once approval is received, it is not necessary to fill it out again.

3.5.6.18 Discover Page

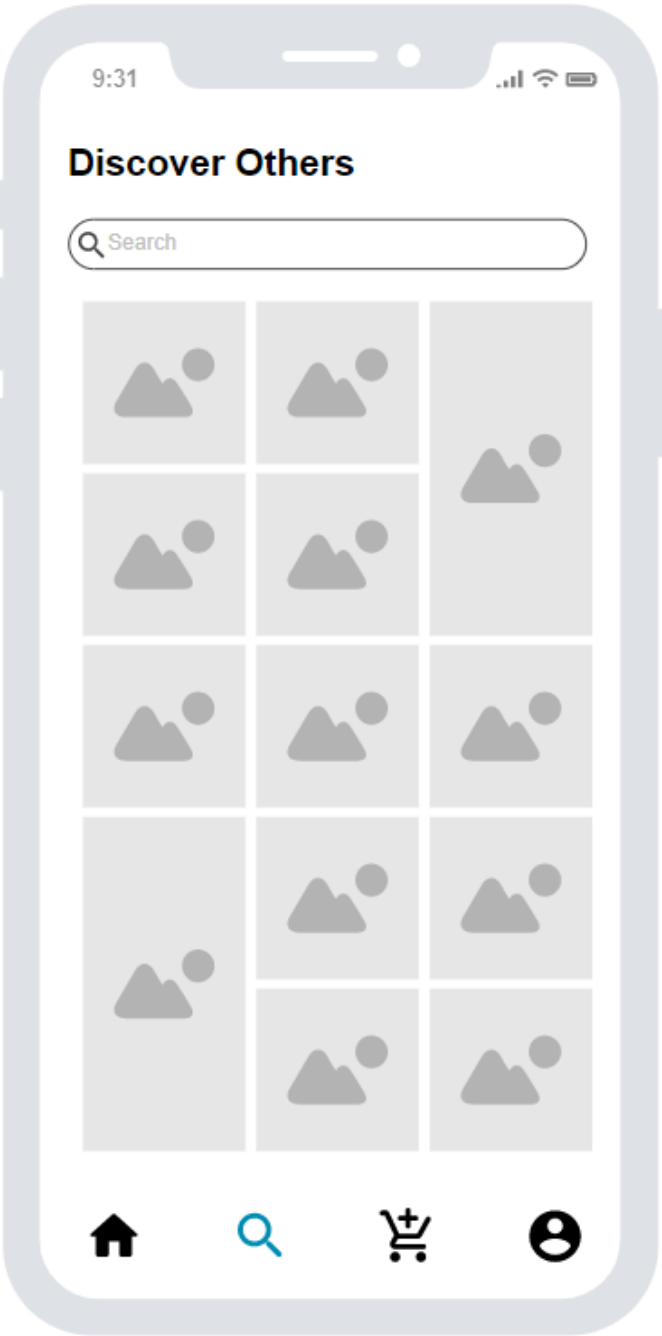

Figure [27]: Discover Page

The discovery page found above has been created by highlighting the combinations suitable for your style or most liked by the users. By navigating this page, you can connect with people who are ideal for you or search for them above.

3.5.6.19 Follow a Person Page

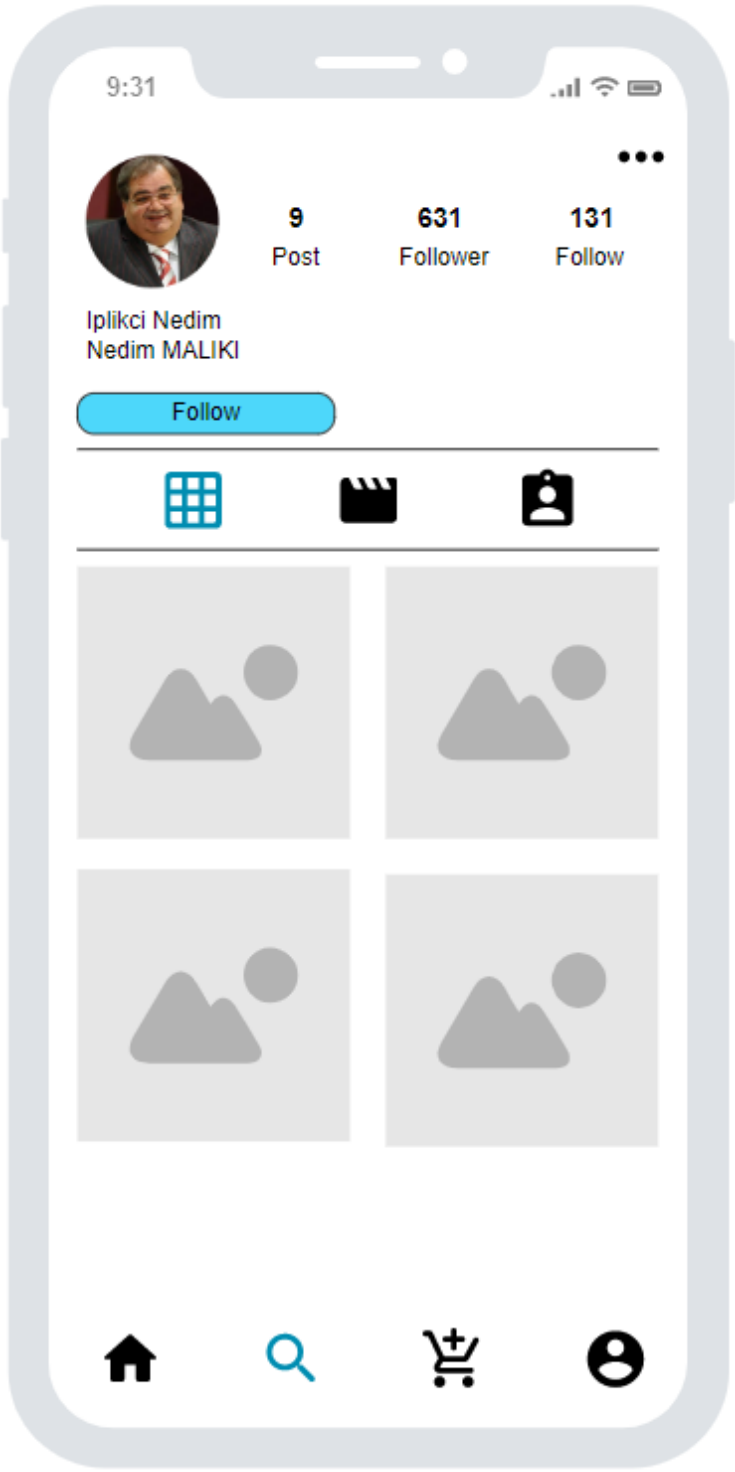

Figure [27]: Follow a Person Page

You can examine in detail the profiles of the people you have found on the "discover" page, or that you have reached by searching.

3.5.6.20 Home Page

Figure [27]: Home Page

You can see the flows of the people you follow with this page that appears on the first login to the application. Also, at the bottom of the page, you can directly go to the product shop with the given links.

4 Other Analysis Elements

4.1 Consideration of Various Factors in Engineering Design

Public health: There are no significant side effects that will harm the health of the individual taking RecoModa. We encourage users of our program not to stare at their phone's screen for too long because staring at the screen for too long is bad for their mental and eye health.

Public safety: The information to be utilized for the application is critical, and its secrecy is one of our top priorities. Credit card information, complete postal address, and body measurement information will be encrypted and safeguarded, and will not be shared with any third parties. However, because this information is critical, we will take all required safeguards against cyber attacks. We place a high value on data privacy in our practice, and we are well aware that any data breach may land us in legal problems.

Public welfare: RecoModa does not engage in any practices that are detrimental to the well-being of its users or put them under financial strain. RecoModa simplifies purchasing. Thus we urge that consumers spend in accordance with their income and keep track of their spending when shopping. Aside from that, we anticipate that our method will have a long-term favorable impact on the significant economy since it stimulates the market and boosts purchasing.

Global factors: RecoModa is designed to be utilized wherever in the world that Amazon serves. Because Amazon will handle sales and shipping, our application will be actively provided in all countries where Amazon is available. We will release our application in English so that it can be actively used by a large number of people.

Cultural factors: RecoModa is both a social and a retail app. Because fashion changes with culture, we anticipate that users will progressively develop diverse groups based on their cultural dress trends. However, we respect ethnic and fashion distinctions, and we try not to neglect culture or become a multicultural practice for everyone. We will continue our efforts to provide unprejudiced recommendations that are appropriate for the users' cultural dress styles, thanks to the application's suggestion system.

Social factors: Recomoda is an app that attempts to unite all of its users under the banner of fashion. Our application is both a social media and a commerce application. It is possible for users to follow each other, create content, and even get money from it. We set out to give people a free experience in a social setting. We want individuals to be able to speak with one another and grow in the fashion industry as long as the norms we set in this social environment are followed.

4.2 Risks and Alternatives

While designing RecoModa, we decided that we had to take some risks. Instead of hoping that these risks never occur, we carefully considered how we could address them when they did. First of all, we do an intensive data collection and storage process for our users. It points out that this information should be protected very carefully. However, no matter how strong a firewall is created, it is not possible to reduce the risk of cyber attacks to zero. For this reason, we planned in detail what we should do in case of such a possibility. First of all, we need to plan how we should respond quickly to this attack by creating a data breach response plan. Then, to examine all log activities, to understand how this breach happened, to quickly correct the weaknesses in this area, and to take action to reset the possibility of a similar attack in the future.

As a system, RecoModa needs outsourcing. Using the API information of Amazon Trendyol or similar shopping sites is vital for our application to work correctly. So here we took a risk and assumed this would happen. However, in case we cannot get an outsourcing, we need to increase the number of shopping sites we research and turn to different options. If we still fail despite this plan, we plan to try to focus our practice on a brand basis rather than more on a company basis. However, we will do our best to solve this risk from the beginning and to prevent any problems afterward. We use a machine learning method in our application, and machine learning needs a lot of data to process. To create this data, we need to have a serious user base. It would be a very optimistic approach to have such a large user base during the development phase of the application. If we do not reach the number of users we aim for, we consider small-scale advertising campaigns. If we still cannot reach our goal, we plan to create dummy data so that our model can learn.

4.3 Project Plan

The factors which affect the end product RecoModa are analyzed below.

Table 1: Factors that can affect analysis and design.

	Effect level	Effect
Public Health	1/10	There is no significant effect that will adversely affect the health of the person using RecoModa. We advise users of our application not to look at the mobile phone's screen for too long, because looking at the screen for a long time has a negative effect on mental and eye health.
Public Safety	8/10	The information to be used for the application is extremely important, and its confidentiality is one of the most critical issues for us. Information such as credit card information, full postal address, and body measurement information will be encrypted and protected and will not be shared with any 3rd parties. However, due to the importance of this information, we will take all necessary precautions against any cyber attack. We attach great importance to data privacy in our practice, and we are aware that any data breach will put our practice in legal trouble.
Public Welfare	5/10	RecoModa does not implement any practices that will negatively affect the well-being of the users and put them under economic pressure. As RecoModa makes purchasing much easier, we recommend that users spend according to their income and keep track of their expenses while shopping. Apart from this, we expect that our practice will have a positive effect on the major economy in the long run, as it stimulates the market and increases purchasing.

Global Factors	8/10	The RecoModa application is set to be used anywhere in the world, served by Amazon. Since the purchases and shipping will be handled by Amazon, our application will be actively offered in all countries where Amazon is available. We will release our application in English so that our application can be used actively by large masses.
Cultural Factors	7/10	RecoModa is a social app along with a shopping app. As fashion can change through culture, we expect users to gradually form different communities with their cultural clothing styles. However, we accept the differences in cultures and fashion; we try not to ignore culture and not to become a multicultural practice for everyone. Thanks to the suggestion algorithm of the application, we will continue our efforts to offer unprejudiced recommendations that are suitable for the cultural clothing styles of the users.
Social Factors	9/10	Recomoda is an application that tries to gather all its users under the roof of fashion. Our application is a social media application as well as a shopping application. It is possible for people to follow each other, produce content and even turn it into an income. We set out to provide users with a free experience in the social context. We aim to enable people to communicate with each other and to develop in the field of fashion as long as the rules we regulate in this social environment.

Table 2: Risks

Risk	Likelihood	Effect on the project	B Plan Summary
Information Leak / Data Breach	5/10	Depending on how big of a leak we have, it might cause a leak of very important information such as credit card information. And we might halt the program until we fix the breach problem.	Create a data breach response plan; gather the log of all activities, perform analysis on how the breach occurred, and mitigate vulnerabilities to prevent future incidents.
Lack of Outsourcing	6/10	Without getting proper outsourcing from Amazon or equivalent companies such as Trendyol in order to use the API, the application cannot function properly.	We need to analyze other outsourcing options. If none is available, we need to alter the project into more brand based rather than company based.
Gathering Users	4/10	Without enough users, our recommendation cannot work properly since we need data to train our model. Because of that we need to have a considerable amount of users.	We can advertise our application in some channels to gather users to RecoModa. If it also fails, we need to create lots of dummy users just to train the model.

Table 3: List of work packages

WP#	Work package title	Leader	Members involved
WP1	Design Analysis and Specifications	Güven Gergerli	All Members
WP2	Application Front-End	Nasuh Dinçer	Nasuh Dinçer, Tarık Buğra Karalı, Zülal Nur Hıdıroğlu
WP3	Application Back-End	Tarık Buğra Karalı	All Members
WP4	Data Privacy	Hakan Gülcü	Hakan Gülcü, Nasuh Dinçer, Tarık Buğra Karalı, Güven Gergerli
WP5	Recommendation Model	Güven Gergerli	Güven Gergerli, Hakan Gülcü
WP6	API Bot and Communication	Hakan Gülcü	Hakan Gülcü, Güven Gergerli, Nasuh Dinçer
WP7	General Test and Release	Zülal Nur Hıdıroğlu	All Members

WP 1: Design Analysis and Specifications			
Start date: 19.09.2022 **End date:** 13.11.2022			
Leader:	Güven Gergerli	**Members involved:**	All Members

Objectives: The task is to determine the requirements of the project, outline a plan, and sketch design charts for future use.

Tasks:

***Task 1.1 discuss* the project idea and determine goals:** The task is to discuss the project idea and get all ideas to discuss and determine a general goal for the project. This is the task where we discuss ideas and decide whether the ideas are feasible and suitable for our goals. At this task, we also gather ideas from our supervisor and innovation expert.

***Task 1.2 determining technology requirements and research*:** The task is to determine what kind of technologies are required for us to build the project. After we determine the technologies, if there is something we have not encountered before, we start researching and learning it beforehand.

***Task 1.3 determining technology requirements and research*:** The task is to determine what kind of technologies are required for us to build the project. After we determine the technologies, if there is something we have not encountered before, we start researching and learning it beforehand.

***Task 1.4 project specification report*:** The task is to share out and write the project specification document. In the paper, we consider constraints, professional and ethical issues, functional and non-functional requirements of our project. We have divided this task into equal parts for all members.

***Task 1.5 analysis and requirement report*:** The task is to share and write the analysis and requirement document. In the document, we consider functional, nonfunctional, and pseudo requirements, Scenarios, Use-Case Model, Object and Class Model, Dynamic Models, and User Interface. In addition, we discuss other analysis elements of factos in engineering design, risks and alternatives, project plan, ensuring proper teamwork, ethics of professional responsibilities, and planning for new knowledge. We have divided this task in equal parts for all members.

Deliverables

D1.1: *A summary of our project along with our mission and vision*

D1.2: *Github Page of RecoModa*

D1.3: *Project Specification Report*

D1.4: *Analysis and Requirement Report*

WP 2: Application Front-End

Start date: *7.11.2022* **End date:** *01.02.2023*

Leader:	Nasuh Dinçer	**Members involved:**	Nasuh Dinçer, Tarık Buğra Karalı, Zülal Nur Hıdıroğlu

Objectives: The task is to create the Front-End Application, which consists of how the application will look, how the user will interact with the application and other details.

Tasks:

Task 2.1 determine the workspace, technology, and work share: Starting on Front-End, the workspace will be determined, and the working habit will be set. Also, the specific technologies that will take part in Front-End will be determined and set. Also, the general work division for Work Package will be done in this task.

Task 2.2 draw sketches of pages that will exist on RecoModa**:** Before getting into the actual coding, the sketches will be drawn and approximated for the ease of the job. The sketches, will not go into extreme detail, but it will be very crucial for team members to have the same image in mind. After sketches, members will examine them and try to optimize them for the comfort of the users since we aim to be a user-friendly application as much as possible.

Task 2.3 coding of front-end**:** The fundamental part of coding will take place in this task. The members will start coding the Front-End accordingly with the sketches.

***Task 2.4-3.4 merging the front-end and with back-end*:** The created pages will be integrated with the back-end application in this task. The Task 2.3 and Task 2.4 are interchangeable during the implementation.

***Task 2.5 testing of front-end*:** After task 2.3 and task 2.4 are completed, the members will wrote test cases in order to evaluate the general efficiency and accuracy of the implementation. Every functionality will be tested, and if the test fails, the members will return tasks 2.3-2.4 to fix unwanted results.

Deliverables

D2.1: *Sketches of pages for RecoModa*

D2.2: *Front-End Application*

D2.3: *Test Cases for Front-End*

WP 3: Application Back-End			
Start date: *7.11.2022* **End date:** *01.02.2023*			
Leader:	Tarık Buğra Karalı	**Members involved:**	All Members

Objectives: The task is to determine the requirements of the project, outline a plan, and sketch design charts for future use.

Tasks:

Task 3.1 determine the workspace, technology, and work share: Starting on Back-End, the workspace will be determined, and the working habit will be set. Also, the specific technologies that will take part in Back-End will be determined and set. Also, the general work division for Work Package will be done in this task.

***Task 3.2 Set the server and create a database*:** The first task is to create the server where the application will run. After the server is set, it will be checked whether the server is suitable for our project in terms of efficiency. Then an

encrypted database will be created on the server. The database will hold all information about users.

***Task 3.3 coding of back-end*:** The actual part of coding will take place in this task. The members will start coding the Back-End. All communications with the server and database and processed by the front end will be implemented.

***Task 2.4-3.4 merging the front-end and with back-end*:** The created pages will be merged with the back-end application in this task. The Task 2.3 and Task 2.4 are interchangeable during the implementation.

***Task 3.5 testing of back-end*:** After task 3.3 and task 3.4 are completed, the members will wrote test cases in order to evaluate the general efficiency and accuracy of the implementation. Every functionality will be tested, and if the test fails, the members will return task 3.3-3.4 to fix unwanted results.

Deliverables

D3.1: *Server of RecoModa*

D3.2: *Database of RecoModa*

D3.3: *Back-End Application*

D3.4: *Test Cases for Back-End*

WP 4: Data Privacy

Start date: *28.11.2022* **End date:** *15.01.2023*

Leader:	Hakan Gülcü	**Members involved:**	Hakan Gülcü, Nasuh Dinçer, Tarık Buğra Karalı, Güven Gergerli

Objectives: The purpose of this package is to create an environment where we can ensure the security of information that we collect from users of RecoModa.

Tasks:

Task 4.1 research and planning on data privacy: The members of this package will research the latest data privacy methods and discuss what will be the approaches we will have on encrypting our database.

Task 4.2 privacy of user accounts and passwords**:** Users will have a unique username and password to enter the application. We will secure this information with data privacy methods so that these passwords are not leaked in any way. We will also ensure that users who forget their passwords can safely retrieve their passwords.

Task 4.3 privacy of user data**:** We collect various data from users. These data, namely credit card information, full postal address, and body metrics are very valuable data that must be secured by the application. The collected data is ensured to be kept only inside the application and not shared. But we will also secure the data by encryption methods for any unwanted cyber attack incidents.

Deliverables

D4.1: A summary of what methods will be used for data privacy

D4.2: Applied version Data-Privacy methods on Database

WP 5: Recommendation Model			
Start date: 14.11.2022 **End date:** 28.02.2023			
Leader:	Güven Gergerli	**Members involved:**	Güven Gergerli, Hakan Gülcü
Objectives: The task is to create the recommendation model that will be used on RecoModa, create a dataset for training, and tweak the performance and accuracy.			

Tasks:

***Task 5.1 planning on the model, approach, and technology*:** The task is to discuss and plan what will be used to create the model. Determine which model will be used for the recommendation model, how will be the approach, and then selection on the technologies that we will be using. For determining the technologies we will also conduct a research to find out which python library, for example, will be the most efficient for our model of choice.

***Task 5.2 create the dataset*:** The task is to create a dataset that we will use to train our model. Since our recommendation is based on many features of clothing, we are going to create an inclusive dataset. It is very likely that we might combine several datasets that are created by other people. The dataset will be updated with the actual data of users.

***Task 5.3 create the model*:** By the model and technology selection. We will create our model. The model will not be finalized in this task and will be tweaked in order to increase the efficiency and accuracy after tests.

***Task 5.4 test and tweak*:** The task is to test our model and find the inaccuracies generated by the model and eliminate them. We will also try to update our model as much as possible to get the best results in terms of both efficiency and accuracy.

***Task 5.5 implementing the model into the application*:** The task is to implement what we have done so far into the application and make sure it works correctly. It is crucial that the model keeps learning on model based on the selections of the user. Task 5.4 will be continued in this task as well if needed.

Deliverables

D5.1: A research report of model, approach, and technology selections

D5.2: The implementation of model

WP 6: API Bot and Communication

Start date: *14.11.2022* **End date:** *01.02.2023*

Leader:	Hakan Gülcü	**Members involved:**	Hakan Gülcü, Güven Gergerli, Nasuh Dinçer

Objectives: *In this package, we will create an API Bot which will scrape data from the shopping service that we will be using. This package also contains of the data management and communication of API Bot and RecoModa applications.*

Tasks:

***Task 6.1 researching the scraping methods*:** The task is to discuss and plan which scraping methods we will use and how do we update it regularly. We will try to choose the most efficient and most stable one.

***Task 6.2 implementing the API Bot*:** The task is to implement the API Bot based on our research. The Bot will collect data regularly from the shopping service, such as Amazon. We will try to make the bot as much efficient as possible.

***Task 6.3 test and tweak*:** The task is to test our bot and find if there are any inaccuracies and if so eliminate them. We will also try to update our bot at this task as much as possible to get the best results in terms of efficiency.

Deliverables

D6.1: A research report of scraping bots

D6.2: The implementation of API Bot

WP 7: General Test and Release

Start date: *15.02.2023* **End date:** *01.03.2023*

Leader:	Zülal Nur Hıdıroğlu	**Members involved:**	All Members

Objectives: In this package, we will be conducting a general test on near-finishing product. After we do all test cases, we will plan the release of version 1.0.
Tasks: ***Task 2.1 general test*:** In this task, we will be creating general test cases to make sure the application works as intended and is bug-free. We aim to create a compelling test case set to try every feature on RecoModa. If a test fails, we will be conducting the reason and try to eliminate it. ***Task 2.2 release*:** After general tests are over and it is ensured that the application works correctly, we will release the version 1.0 of RecoModa. We will have a meeting of future requirements and needs and outline a new plan.
Deliverables ***D2.1:*** General test cases ***D2.2:*** The release of RecoModa

4.4 Ensuring Proper Teamwork

To encourage everyone to contribute, we divided the complete task among ourselves. We split the overall task so that everyone could specialize in a focused area. We have various disciplines that require attention, such as front-end developing, back-end developing, database management, and machine learning. In addition, we will make extensive use of APIs of shopping sites such as Amazon API and Trendyol, which requires data scraping. To summarize, we will need to share these massive subjects among us. For example, each of us will focus primarily on one subject and be the lead developer of that subject, while also participating in the other roles as a minor developer. We will be focusing on data as 2 people, namely Güven and Hakan. And for front-end / back-end development as 3 people, namely Tarık, Nasuh, and Zülal.

4.5 Ethics and Professional Responsibilities

Since the RecoModa application is a recommendation application for its users, it will collect various information from users and analyze them. Our aim in the application is to provide a good user experience as well as data privacy so that users feel safe while using the application. All data (age, gender, weight, height) obtained from the user during the data collection phase will not be shared with any other 3rd party applications or prohes. Data that cannot be shared include a user name, password, location, user email and photos taken by camera devices, photos uploaded by the user himself, and other user information. While signing up for the application, users will encounter terms and conditions and will be informed accordingly. Our system will act according to KVKK rules, therefore, there should be no concerns about data breaches and ethical issues in our RecoModa application.

Another point that we care about being ethical is the subject of copyright. The RecoModa application will carry out a meticulous study of labor and ethics and will develop with open-source libraries. While the application is being developed, when external code is added, an ethical attitude will be displayed by purchasing or by contacting the code owner.

4.6 Planning for New Knowledge and Learning Strategies

Ever since the project ideas were discussed, we constantly talked about what challenges we would face and what we would learn while coming up with the implementation. After the RecoModa idea matured, we thought about what new information we would need and how we would get the findings. While the project is being implemented, we will research and develop on various topics such as database systems, machine learning, and implementing applications through React Native.

The purpose of choosing a different topic in this way is to make our project a valuable learning experience. Since this project is the most important project in our educational life, it will be difficult for us to combine various domains, but it will also be instructive. To talk about details, we will use the React Native framework while developing the application. This will allow us to build an application that can be used on multiple platforms, i.e. both iOS and Android, while taking advantage of React's rich libraries. However, since none of us has significant experience using React Native, it will be a great learning experience for all members, and 3 people on the

team will focus on it. We plan to acquire the knowledge we need on this subject through online learning and some hands-on experiences, namely learning by doing. On the other hand, 2 of our friends will develop a machine-learning recommendation system, and machine-learning models will be developed at this stage. At this stage, since our friends are not very experienced, it will be a very good learning experience for them as well.

As a result, it will be a very good learning experience for us, as there will be a detailed backend, a detailed data structure and rich data structure, a UI design that will attract the attention of the Users, and finally an advanced machine learning model. In the meantime, we will use online resources to obtain the information we will need, we will learn from each other, and we will learn by experimenting. We will also get help from people who are knowledgeable in the field; We would like to point out that these will correspond to learning strategies such as online learning, peer learning, learning by doing, and interviewing experts.

5 Glossary

React Native: React Native is an open-source UI software framework created by Meta Platforms, Inc. It is used to develop applications for Android, Android TV, iOS, macOS, tvOS, Web, Windows, and UWP by enabling developers to use the React framework along with native platform capabilities. It is also being used to develop virtual reality applications at Oculus. [3]

Node.js: Node.js is an open-source server environment. Node.js is cross-platform and runs on Windows, Linux, Unix, Mac OS, etc. Node.js is a back-end JavaScript runtime environment. Node.js runs on a JavaScript Engine (i.e. V8 engine) and executes JavaScript code outside a web browser. [4]

6 References

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