Software Requirements Specification

for

Augmented Reality Software for Interior Design

Version 2.1 approved

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Revision History

Name	Date	Reason for Changes	Version
Raiyan Sayeed	21/3/2024	1.1 and 2.1 were added.	1.0
Mohammed Tanvir Hassan	30/3/2024	1.1 and 2.1 were modified.	1.1
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Raiyan Sayeed	10/5/2024	4.2 was modified.	2.1

1. Introduction

1.1 Purpose

This SRS document depicts the requirements for the "Augmented Reality Software for Interior Design", referred to as ARSID, version 1.0. The scope of this SRS document covers the complete software system, designed to provide an immersive AR experience for Interior designers, architects, and their clients.

The main goal of this software is to allow users to visualize designs in their actual physical location by the screens of their smartphones, tablets, etc. AR technology can help bridge the gap between abstract design concepts and reality, creating a more intuitive and fulfilling design experience. This approach aligns with current industry trends for digitalization and immersive technologies. This user-friendly approach fosters cooperation among designers, architects, and clients, improving design concepts. Efficient design processes would benefit both interior designers/architects and their clients. Clients will better understand recommended concepts, leading to more satisfying results.

The business requirements of this software include:

1.1.1. Providing a user-friendly interface.

1.1.2. Ensuring cross-compatibility across various devices (mainly smartphones and tablets) and operating systems.

1.1.3. Including high-fidelity visualizations that enable users (interior designers, architects and their clients) to make confident design choices, such as templates for different types of furniture, tools for altering the colors of walls and flooring materials, etc.

1.2 Document Conventions

The following Document Conventions were followed while writing this SRS document:

Convention	Description
Font	Times New Roman
Size	Section Headings: 18 Sub-Section Headings: 14 Sub-subsection Headings: 12
Bold	The headings were made **bold**. Certain keywords or phrases were **bold** to emphasize them.
Italic	Certain keywords or phrases were *italicized* to emphasize them.
Numbering	Sections and certain parts (for example, functional requirements) were numbered to make it easier to read.

1.3 Intended Audience and Reading Suggestions

1.3.1. Intended Audience: This Software Requirements Specification (SRS) document is designed to be a versatile document catering to various stakeholders involved in developing, deploying, and using the "Augmented Reality Software for Interior Design." The intended audience includes:

1.3.1.1. Developers: Responsible for building the software, developers should focus on the detailed functional requirements and system features to understand the technical specifications and constraints.

1.3.1.2. Project Managers: To oversee the project's progress, project managers should review the entire document, with particular attention to the milestones and the requirements prioritization to align development efforts with business objectives.

1.3.1.3. Marketing Staff: Tasked with promoting the software, marketing personnel should concentrate on the overview of system features and benefits, as well as the target market analysis, to craft compelling messages for potential users.

1.3.1.4. Testers: Responsible for verifying that the software meets its requirements, testers should scrutinize the functional requirements and the acceptance criteria to develop effective test cases.

1.3.1.5. Documentation Writers: Charged with creating user manuals and help guides, documentation writers should understand the system features and user interaction flows to provide clear and helpful instructions to the users.

1.3.2. Reading Suggestions: To maximize the utility of this document, readers are advised to approach it as follows:

1.3.2.1. Introduction (Section 1): All readers should begin with the Introduction to understand the purpose, scope, and context of the SRS.

1.3.2.2. Overall Description (Section 2): Provides a high-level view of the product, its functions, and user characteristics which is essential for all stakeholders.

1.3.2.3. System Requirements (Section 3): Critical for developers and testers, this section details the specific features and quality requirements of the software.

1.3.2.4. Design and Interface Requirements (Section 4): Contains technical details such as UML Diagrams and UI/UX specifications, primarily for developers and designers.

1.4 References

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2. Overall Description

2.1 Product Perspective

The "Augmented Reality Software for Interior Design" (ARSID) is designed to overcome the inherent complexities and inefficiencies in the traditional interior design process. The gap between abstract design representations and the tangible reality of physical spaces often leads to misunderstandings, client dissatisfaction, and costly post-design modifications. The development of ARSID is driven by the motivation to bridge this gap, thereby satisfying both designers and their clients.

In contrast to traditional interior designing approaches that rely on static drawings and 2D/3D renderings, ARSID will provide an interactive real-time AR environment (Tentative name: ***Live Camera***). This option enables users (premium users specifically) to visualize their proposed designs in real-time rather than on static image backgrounds, resulting in a better understanding between reality and expectations. Thus, ARSID is not only an upgrade to previous existing AR designing tools like Houzz, Ikea Place, Home Design 3D, Planner 5D, Floor Planner, RoOomy, AR Ruler, Dulux Visualizer, etc., but it will also provide an immersive and intuitive experience for the users. The integration of ARSID with larger systems will provide seamless functionality and will allow the import and export of design elements, templates, textures, etc. across multiple platforms as cross collaboration.
The business objectives of this software include:

2.1.1. Providing a user-friendly platform that streamlines the design process and increases designer and customer satisfaction by offering an extensive library of templates, textures, and other design components.

2.1.2. Reducing the time and cost associated with traditional design processes, thereby enhancing efficiency and profitability.

2.1.3. Introducing an immersive and interactive real-time environment (***Live Camera***) for premium users based on a subscription plan (monthly and yearly).

2.1.4. Improving communication between designers and clients, reducing misunderstandings, and ensuring project deadlines are fulfilled.

2.2 Product Functions

The "Augmented Reality Software for Interior Design" is designed to provide a comprehensive set of functions that cater to the needs of general people, professional interior designers and architects. The major functions of the product include:

2.2.1. User Authentication: Secure login and signup processes for user account management.

2.2.2. Profile Management: Allows users to edit their personal information and account settings.

2.2.3. Project Creation: Enables users to create new interior design projects using AR technology.

2.2.4. Template Management: Provides access to a library of 2D and 3D design templates, with options for premium users.

2.2.5. Search and Filter: Offers a robust search functionality with filters to find specific design elements.

2.2.6. Design & Editing: Features tools for modifying and customizing designs, including camera scan and manual modification options.

2.2.7. Notifications: Sends alerts and updates to users about new features, templates, and system updates.

2.2.8. Download and Sharing: Allows users to download and share their designs with others.

2.2.9. Work History: Maintains a record of all user-created designs for easy access and editing.

2.3 User Classes and Characteristics

The "Augmented Reality Software for Interior Design" is anticipated to be used by a diverse range of user classes, each with unique characteristics and needs. The following are the identified user classes:

2.3.1. Professional Interior Designers and Architects:

2.3.1.1. Frequency of Use: High

2.3.1.2. Product Functions Used: Full utilized, with emphasis on advanced design and manual modification features.

2.3.1.3. Technical Expertise: High

2.3.1.4. Security/Privilege Levels: Access to premium features and templates.

2.3.1.5. Educational Level: Professional degree in interior design or related fields.

2.3.1.6. Experience: Extensive experience in interior design projects.

2.3.2. Design Students:

2.3.2.1. Frequency of Use: Moderate to High.

2.3.2.2. Product Functions Used: Learning from basic design features.

2.3.2.3. Technical Expertise: Moderate to High.

2.3.2.4. Security/Privilege Levels: Standard user privileges.

2.3.2.5. Educational Level: Currently pursuing education in interior design or related fields.

2.3.2.6. Experience: Limited to coursework and practice projects.

2.3.3. DIY Home Decorators:

2.3.3.1. Frequency of Use: Low to Moderate.

2.3.3.2. Product Functions Used: Basic design functions, primarily camera scan and template application.

2.3.3.3. Technical Expertise: Low to Moderate.

2.3.3.4. Security/Privilege Levels: Standard user privileges.

2.3.3.5. Educational Level: Varied, non-specific to interior design.

2.3.3.6. **Experience:** Hobbyist level, with interest in home decoration.

2.3.4. Real Estate Agents:

2.3.4.1. Frequency of Use: Low.

2.3.4.2. Product Functions Used: Basic design functions to enhance property listings.
2.3.4.3. Technical Expertise: Low.
2.3.4.4. Security/Privilege Levels: Standard user privileges.
2.3.4.5. Educational Level: Varied, typically with a background in business or real estate.
2.3.4.6. Experience: Professional experience in real estate, limited design experience.

Most Important User Classes: The most critical user classes for this product are the ***Professional Interior Designers, Architects,*** and ***Design Students***, as they are expected to be the primary users who will utilize the full range of functionalities offered by the software. Their satisfaction and user experience are paramount to the success of the product.

Less Important User Classes: While all user classes are important, ***Real Estate Agents*** and ***DIY Home Decorators*** are considered less critical to satisfy, as their usage is expected to be less frequent and focused on a subset of the product's functionalities.

2.4 Hardware and Operating Environment

This software is mainly a mobile-based application designed to operate within the following hardware and software environment:

Components	Specifications
Processor	Quad-core 1.4 GHz or higher.
Memory	4 GB RAM or higher.
Storage	Minimum of 100 MB of free space for installation, and an additional 1 GB space for data storage.
Camera	Rear-facing camera with a minimum resolution of 13 MP.
Sensors	Gyroscope and accelerometer for motion detection and AR capabilities.
Display	HD (1280x720) resolution or higher
Operating System (OS)	Android: Android 8.0 (Oreo) and above iOS: iOS 12.0 and above
Software component	Utilizes ARCore for Android and ARKit for iOS to provide augmented reality features.

2.5 Design and Implementation Constraints

The development of this software is subject to the following design and implementation constraints:

2.5.1. Corporate and Regulatory Policies: Adherence to corporate policies regarding intellectual property rights, particularly in the use of third-party design templates and assets.

2.5.2. Hardware Limitations: The application is constrained by the processing power, memory, and storage capabilities of mid-range smartphones. AR functionalities require modern sensors and camera specifications which may not be available on older smartphone models.

2.5.3. Interfaces to Other Applications: The application must be able to interface seamlessly with various social media platforms for sharing designs. The application must be able to interface seamlessly with various social media platforms for sharing designs.

2.5.4. Specific Technologies, Tools, and Databases: The application will utilize ARCore and ARKit for augmented reality features, limiting it to platforms that support these frameworks. Cloud-based database solutions will be used for data storage, requiring reliable internet connectivity.

2.5.5. Parallel Operations: The application must manage parallel operations effectively, ensuring that AR processing does not hinder user interface responsiveness.

2.5.6. Language Requirements: The application will initially support English, with plans to include additional languages based on market demand.

2.5.7. Security Considerations: Implementation of robust authentication and encryption methods to safeguard user accounts and personal information. Regular security updates and patches to address emerging threats and vulnerabilities**.**

2.6 User Documentation

The following user documentation components will be provided to ensure that users can effectively utilize the "Augmented Reality Software for Interior Design":

2.6.1. User Manual: A comprehensive guide detailing how to use all features of the software, including setup, navigation, design creation, and troubleshooting.

2.6.2. Quick Start Guide: A concise document designed to help new users begin using the application quickly, covering the basic functions and operations.

2.6.3. Online Help: An integrated help system within the application providing context-sensitive assistance, FAQs, and tips for efficient use of the software.

2.6.4. Troubleshooting Guide: A resource to help users diagnose and resolve common issues they may encounter while using the application.

The user documentation will adhere to the International Standard for Technical Documentation (ISO/IEC 26514) to ensure clarity, completeness, and quality of information.

3. System Requirements

3.1 System Features

3.1.1 Login:

Functional Requirements:

3.1.1.1. Once the user launches the software/app, it shall allow users to log in with their registered username/email and password if the "Login" option is selected. The password shall be hidden.

3.1.1.2. The username/email and password shall be verified with database records.

3.1.1.3. If the login is successful, the home page of the user account shall be displayed.

3.1.1.4. If login is not successful, the user can try it again 5 times. After the 5^{th} time, an email shall be sent to the email address provided by the user as a warning or to notify the user of the unidentified login attempt. The user's login shall be blocked for 1 hour.

3.1.1.5. Users can only directly login using their Google or Facebook account.

Priority Level: High
Precondition: User has a valid account.

3.1.2. SignUp:

Functional Requirements:

3.1.2.1. The user needs to click on the "SignUp" option to go to the SignUp or Registration page if he/she does not have an account.

3.1.2.2. The user needs to provide their full name, DOB, unique mobile number, unique email address, gender, etc.

3.1.2.3. The user needs to write their password and confirm that password. Both of them shall be hidden.

3.1.2.4. The user needs to agree to the Terms & Conditions.

3.1.2.5. A verification email shall be sent to the email address of the new user with a link. The user shall confirm their registration by clicking on that link.

3.1.2.6. The system shall discard the registration information if the email is not verified within 5 minutes.

3.1.2.7. If the email address is not unique, a message box shall show that there is already a registered account with that email address.

Priority Level: High
Precondition: User has a valid email address.

3.1.3. Forgot Password?:

Functional Requirements:

3.1.3.1. In the case, that the user forgets his/her password while trying to log in, they can click on the "Forgot Password?" option which shall be available on the login page.

3.1.3.2. Once the user selects the "Forgot Password" option, they shall be prompted to enter their registered email address and the system shall verify it with the database.

3.1.3.3. If the email is verified, the system/app shall show the user two options for resetting their password:

3.1.3.3.1. **By email:** If the user selects this option, the system/app shall send an email to the user's registered email address with a link (the link shall be active for 5 minutes) that shall redirect the user to the password reset page.

3.1.3.3.1. By SMS: If the user selects this option, an OTP shall be sent to the user's registered mobile phone no. which shall be only applicable for 1 minute. After confirming the OTP, the user shall be redirected to the password reset page.

3.1.3.4. On the password reset page, the user shall be prompted to enter a new password and confirm the new password; which shall be verified by the system/app.

3.1.3.5. Once it's verified, the system shall update the user's password with the new password in the database.

3.1.3.6. The app shall notify the user that their password has been updated and redirect them to the login page so that they can log in to their account with the new password for security purposes.

Priority Level: High
Precondition: User has a valid account and access to their registered email.

3.1.4. Search Bar:

Functional Requirements:

3.1.4.1. Users can enter their search queries into the Search Bar.

3.1.4.2. Based on the user's input, the system shall provide search results displaying relevant templates and other interior design items from the database. The user can choose their desired template/item from the search results in their new project/design.

3.1.4.3. The Search Bar shall include filters that allow users to search specifically for a type of template or item.

3.1.4.4. The software/app shall update the search results based on the selected filters. The users shall also be able to rest the filters.

3.1.4.5. The software/app shall provide an option for users to sort the search results based on criteria such as relevance, popularity, and date added.

3.1.4.6. Users shall be able to see the highlighted search keyword in the search results.

Priority Level: High
Precondition: User has logged in.

3.1.5. Design function:

Functional Requirements:

3.1.5.1. After the user selects the "**Design**" option from the homepage, first he/she needs to select "**Make a new project**."

3.1.5.2. The user can select one of two options from the Design function: "**Camera Scan"** and "**Manual Modification".**

3.1.5.3. Camera Scan:

3.1.5.3.1. After the users select this option, the system shall ask for the user's permission to access the camera the first time the "Camera Scan" option is selected.

3.1.5.3.2. Once the user gives permission, the software shall turn on the camera within the application.

3.1.5.3.3. Users can then take a photo or picture of the room or place they want to design. It shall be possible to edit after the photo is taken.

3.1.5.3.4. Users should enter the measurements of the room so that the application properly calibrates the templates and items accordingly while placing them.

3.1.5.3.5. The software/app shall provide the users with a variety of options for editing the photo, such as 2D and 3D templates of household items (for example, chairs, tables, dining tables, sofas, almirahs, cupboards, beds, kitchen sinks, picture frames, accessories etc.), colors, and textures which are available in the database.

3.1.5.3.6. The software/app shall also provide templates for tiles on the floor, and designs for the walls of the room.

3.1.5.3.7. Users can drag, drop, and place templates on the photo of the room.

3.1.5.3.8. The software shall automatically calibrate the size of the objects of the templates according to the room size previously inputted by the user.

3.1.5.3.9. For premium users, the software shall provide additional templates, textures, designs, and colors, and a Live Camera function. The Live Camera feature differs from the normal camera function used by general users. General users need to take multiple photos of their rooms and places at different angles and remember templates used in previous pictures to avoid overlap in the same places. The Live Camera feature allows premium users to place their templates while the live camera is ongoing, allowing them to move around their room and customize their designs. Once they are done with their design, they can stop the live camera and save their design.

3.1.5.3.10. Users can confirm their design by selecting "OK", which shall automatically save this design in their "**Work History**".

3.1.5.3.11. Users can cancel their design by selecting "Cancel", which shall remove all the templates placed on the photo.

3.1.5.3.12. The users can also choose to download their project/design which shall be saved in both "**My Downloads**" and "**Work History**."

3.1.5.4. Manual Modification:

3.1.5.4.1. This mode is especially beneficial if the user is an architect or a professional interior designer.

3.1.5.4.2. After the users select this option, the system shall ask for the user's permission to access the camera, gallery, and files the first time the "Manual Modification" option is selected.

3.1.5.4.3. Users can take a photo using the camera inside the app or upload a photo from their gallery.

3.1.5.4.4. The user is then redirected to a "Drawing Board" where they can make their own custom templates, designs, textures, and colours which are not available in the database of the software. The users can use a stylus or a digital/smart pen to draw as well.

3.1.5.4.5. After that, the software/app shall render the user's drawings into 2D or 3D templates according to the user's preference.

3.1.5.4.6. Similar to the camera scan function, after the templates are placed on the photo, the system shall automatically calibrate the size of the objects of the templates according to the room size previously inputted by the user.

3.1.5.4.7. The software/app shall also provide an option for users to upload a custom template from their device.

3.1.5.4.8. Premium users can utilize additional drawing features and designs and also the Live Camera option which was mentioned previously.

3.1.5.4.9. Users can confirm their design by selecting "OK", which shall automatically save this design in their "**Work History**".

3.1.5.4.10. Users can cancel their design by selecting "Cancel", which shall remove all the templates placed on the photo.

3.1.5.4.11. The users can also choose to download their project/design which shall be saved in both "**My Downloads**" and "**Work History**."

Priority Level: High
Precondition: User is logged in.

3.1.6. Side Navigation:

Functional Requirements:

3.1.6.1. The software shall provide a side navigation bar for users to navigate through the application.

3.1.6.2. The side navigation bar shall include the following options: Profile Edit, Settings, and Logout.

3.1.6.3. If the users select the "**Profile Edit**" option, they shall have access to the profile editing page:

3.1.6.3.1. The profile editing page shall allow users to update their personal information.

3.1.6.3.2. The profile editing page shall provide an option for users to change their registered email address and change their password.

3.1.6.3.3. Change Email address:

3.1.6.3.3.1. When the 'Change Email' option is selected, the software shall prompt the user to enter their current email address and new email address.

3.1.6.3.3.2. A confirmation email shall be sent to the newly entered email address with a link (which shall be active for 5 minutes) that confirms the new email address.

3.1.6.3.3.3. After confirmation, the software/app shall update the new email address in the database.

3.1.6.3.3.4. The app shall notify the user that their email address has been updated and redirect them to the login page so that they can log in to their account with the new email address for security purposes.

3.1.6.3.4. Change Password:

3.1.6.3.4.1. When the 'Change Password' option is selected, the user shall be redirected to the Change Password page.

3.1.6.3.4.2. On the Change Password page, the user shall be prompted to enter their current password, and new password and confirm the new password; which shall be verified by the system/app.

3.1.6.3.4.3. Once it's verified, the system shall update the user's password with the new password in the database.

3.1.6.3.4.4. The app shall notify the user that their password has been updated and redirect them to the login page so that they can log in to their account with the new password for security purposes.

3.1.6.3.5. All the changes made in the user's profile shall be updated in the database.

3.1.6.4. The software/app shall allow users to access the settings page when the "**Settings**" option is selected.

3.1.6.4.1. The settings page shall allow users to customize their application experience.

3.1.6.4.2. Users can change the theme of the app in the settings.

3.1.6.4.3. Users can also turn on or off push notifications within the "Settings".

3.1.6.4.4. The software shall apply the changes made in the "Settings" immediately across the application.

3.1.6.4.5. The software shall provide an option to reset the settings to the default values.

3.1.6.5. The user shall log out of the software/app when the "**Log Out**" option is selected.

3.1.6.5.1. The software/app shall end the user's session when the 'Logout' option is selected.

3.1.6.5.2. After the user is logged out, the software shall redirect the user to the login page.

Priority Level: High
Precondition: User is logged in.

3.1.7. Notification:

Functional Requirements:

3.1.7.1. The software/app shall provide the users with a "Notification" which shall alert users of important events/updates.

3.1.7.2. It shall generate notifications on specific triggers, for example, new templates being added to the catalog, application updates, etc.

3.1.7.3. It shall also notify users of topics/templates according to their previous work or search preferences.

3.1.7.4. The users can allow these notifications to be also shown as Push Notifications on their devices which they can turn on or off in their settings.

3.1.7.5. If the users click on any notification, it shall give them a detailed view of that notification.

3.1.7.6. The software/app shall mark the notification as "Read" once it is viewed by the user.

Priority Level: Medium
Precondition: User is logged in and connected to the internet.

3.1.8. Subscription option:

Functional Requirements:

3.1.8.1. The software shall provide a "**Subscription**" option for the users if they want to access the additional features of the app.

3.1.8.2. Once the user clicks on the "**Subscription**" option, it shall redirect the user to a page that shall clearly explain the features which shall only be exclusive to the premium users. For example, extra 2D and 3D templates shall be available for the premium users. This shall be available within the application so that a general user can upgrade to a premium user if they want to.

3.1.8.3. If the user wants to upgrade to a premium user, they shall click on the "Confirm" option which shall redirect them to a payment gateway. The app shall process the payment of the user securely and give confirmation after the completion of the successful payment. The system shall update the status of the user from "general" to "premium" in the database after the payment.

3.1.8.4. Once the payment is successful, the software shall immediately give access to the premium features to the users.

3.1.8.5. The software/app shall allow the users to use these premium features as long as their subscription is active.

3.1.8.6. The software/app shall also provide an option for the users to cancel their subscriptions.

3.1.8.7. If the user chooses to cancel their subscription, the software/app shall terminate the premium access of the user at the end of their current billing period. The system shall again change the status of the user from "premium" to "general" in the database after the cancellation of the subscription.

Priority Level: Medium
Precondition: User is logged in.

3.1.9. My Downloads:

Functional Requirements:

3.1.9.1. When the user selects the "My Downloads" option on the homepage, the system shall display only the projects/designs that the user has downloaded.

3.1.9.2. Users can again edit their downloaded designs/projects if they want to.

3.1.9.3. Users can also delete their downloaded designs/projects from "My Downloads" if they want to. Before deletion of a design/project, the system asks the user for reconfirmation.

3.1.9.4. The software/app shall provide an option for users to share their downloaded designs/projects via email or social media platforms. The software shall ask for the user's permission before it shares their downloaded designs/projects.

Priority Level: High.
Precondition: User is logged in and has downloaded designs/projects.

3.1.10. Most Used and Favourite Templates:

Functional Requirements:

3.1.10.1. If the user selects the “Most Used and Favourite Templates” option on the homepage, the software/app shall display the templates that are frequently used by the user and other users of the application.

3.1.10.2. Users can use these templates for their new projects/designs.

3.1.10.3. The software/app shall update the "Most Used and Favorite Templates" section based on the user's usage and the overall usage of the templates by all users.

3.1.10.4. The software/app shall also provide an option for users to mark a template as a favorite as well, which shall then be displayed in this section. The users can also remove a template from their favorites.

Priority Level: High
Precondition: User is logged in.

3.1.11. Work History:

Functional Requirements:

3.1.11.1. When the users select the "Work History" option from the homepage, the software/app shall display the list of all of the projects/designs that the user has done from the first to the latest.

3.1.11.2. The system serializes the projects/designs according to their dates and also allows users to view the details of each project (like, size, time required to complete each project/design etc.).

3.1.11.3. Users can open and also edit the projects/designs from their Work History.

3.1.11.4. The software/app shall provide an option for users to share their designs/projects via email or social media platforms. The software shall ask for the user's permission before it shares their designs/projects.

Priority Level: High
Precondition: User is logged in and has completed projects/designs.

3.2 Non-Functional/Quality Requirements

QA1: Availability (AV): The login system shall be available 99.9% of the time.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.1

QA2: Performance (PE): The login system shall process login requests within 2 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.1

QA3: Usability (US): The login system shall provide clear error messages to guide the user when login fails.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.1

QA4: Performance (PE): The registration system shall process registration requests within 5 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.2

QA5: Integrity (IN): The registration system shall encrypt user passwords and secure the user's personal data.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.2

QA6: Usability (US): The registration system shall provide clear error messages to guide the user when registration fails.
Priority Level: High
Precondition: N/A
Cross-References: 3.1.2

QA7: Availability (AV): The registration system shall be available 99.9% of the time.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.2

QA8: Availability (AV): The Forgot Password functionality should be available 99.9% of the time to ensure users can always access their accounts.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.3

QA9: Performance (PE): The Forgot Password process should be completed within 5 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.3

QA10: Integrity (IN): The system should securely handle the user's email and new password data during the Forgot Password process.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.3

QA11: Usability (US): The Forgot Password process should be easy to understand and use for the end users.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.3

QA12: Performance (PE): The Search Bar should return search results within 2 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.4

QA13: Usability (US): The Search Bar should provide an intuitive interface for users to enter search queries and apply filters.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.4

QA14: Performance (PE): The design functions should operate smoothly, with camera access and photo capture occurring within 2 seconds, and rendering of AR objects in real-time.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.5

QA15: Usability (US): The design interface should be intuitive, allowing users to easily manipulate and place objects within their environment, with clear instructions for entering room measurements and using AR features.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.5

QA16: Reliability (RE): The design functions should consistently produce accurate AR renderings of interior spaces, without crashes or errors.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.5

QA17: Efficiency (EF): The application should efficiently use device resources, ensuring that AR functionalities do not drain the battery excessively or require unreasonable processing power.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.5

QA18: Performance (PE): The Side Navigation should respond quickly to user interactions, with each option loading within 2 seconds.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.6

QA19: Flexibility (FL): The Side Navigation should adapt to different screen sizes and orientations to provide a consistent user experience across different devices.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.6

QA20: Performance (PE): The Notification system should generate notifications and deliver them to the user's device within 2 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.7

QA21: Usability (US): The Notification system should provide clear and concise notifications, with an easy way for users to mark them as "Read."

Priority Level: High
Precondition: N/A
Cross-References: 3.1.7

QA22: Reliability (RE): The Notification system should consistently deliver notifications to users without any errors or delays.

Priority Level: High
Precondition: N/A

Cross-References: 3.1.7

QA23: Performance (PE): The Subscription system should process subscription requests and payment transactions within 5 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.8

QA24: Security (IN): The Subscription system should securely handle the user's payment data during the subscription process.
Priority Level: High
Precondition: N/A
Cross-References: 3.1.8

QA25: Performance (PE): The My Downloads system should load and display the user's downloaded projects/designs within 2 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.9

QA26: Usability (US): The My Downloads system should provide an intuitive interface for users to edit, delete, and share their downloaded projects/designs.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.9

QA27: Integrity (IN): The My Downloads system should securely handle the user's downloaded projects/designs and ensure that they can only be accessed by the user.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.9

QA28: Performance (PE): The system should display the "Most Used and Favorite Templates" within 2 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.10

QA29: Usability (US): The user interface should allow an easy understanding of how to use a template and how to mark a template as a favorite.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.10

QA30: Availability (AV): The "Most Used and Favourite Templates" feature should be available 99.9% of the time to ensure users can always access popular and favourite templates.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.10

QA31: Performance (PE): The Work History system should load and display the user's work history within 2 seconds under normal load conditions.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.11

QA32: Usability (US): The Work History system should provide an intuitive interface for users to view, edit, and share their past projects/designs.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.11

QA33: Integrity (IN): The Work History system should securely handle the user's work history and ensure that it can only be accessed by the user.

Priority Level: High
Precondition: N/A
Cross-References: 3.1.11

3.3 Project Requirements

Tools: The development and maintenance of this application will require the following tools to ensure quality and performance:

3.3.1. Integrated Development Environment (IDE): A suitable IDE such as ***Android Studio*** for Android app development and ***Xcode*** for iOS app development will be used for coding, debugging, and testing the application.

3.3.2. Version Control System: Git will be utilized for version control, with repositories hosted on platforms like GitHub to manage code changes and collaboration.

3.3.3. Automated Testing Tools: ***Selenium WebDriver*** will be employed for automating web application testing to ensure compatibility with web-based components and services.

3.3.4. Performance Testing Tools: Tools like ***Apache JMeter*** will be used to test performance, load, and stress aspects of the application.

3.3.5. AR Simulation Tools: AR simulation software will be required to test augmented reality features without the need for constant physical deployment.

3.3.6. Continuous Integration/Continuous Deployment (CI/CD) Tools: ***Jenkins*** or similar CI/CD tools will be used to automate the stages of app development, from building through testing to deployment.

3.3.7. Database Management Tools: Cloud-based database services will be managed using tools provided by the service provider, such as the Firebase console for Firebase databases.

3.3.8. Design and Prototyping Tools: Software like ***Sketch, Adobe XD,*** and ***Figma*** will be used for designing the UI/UX of the application.

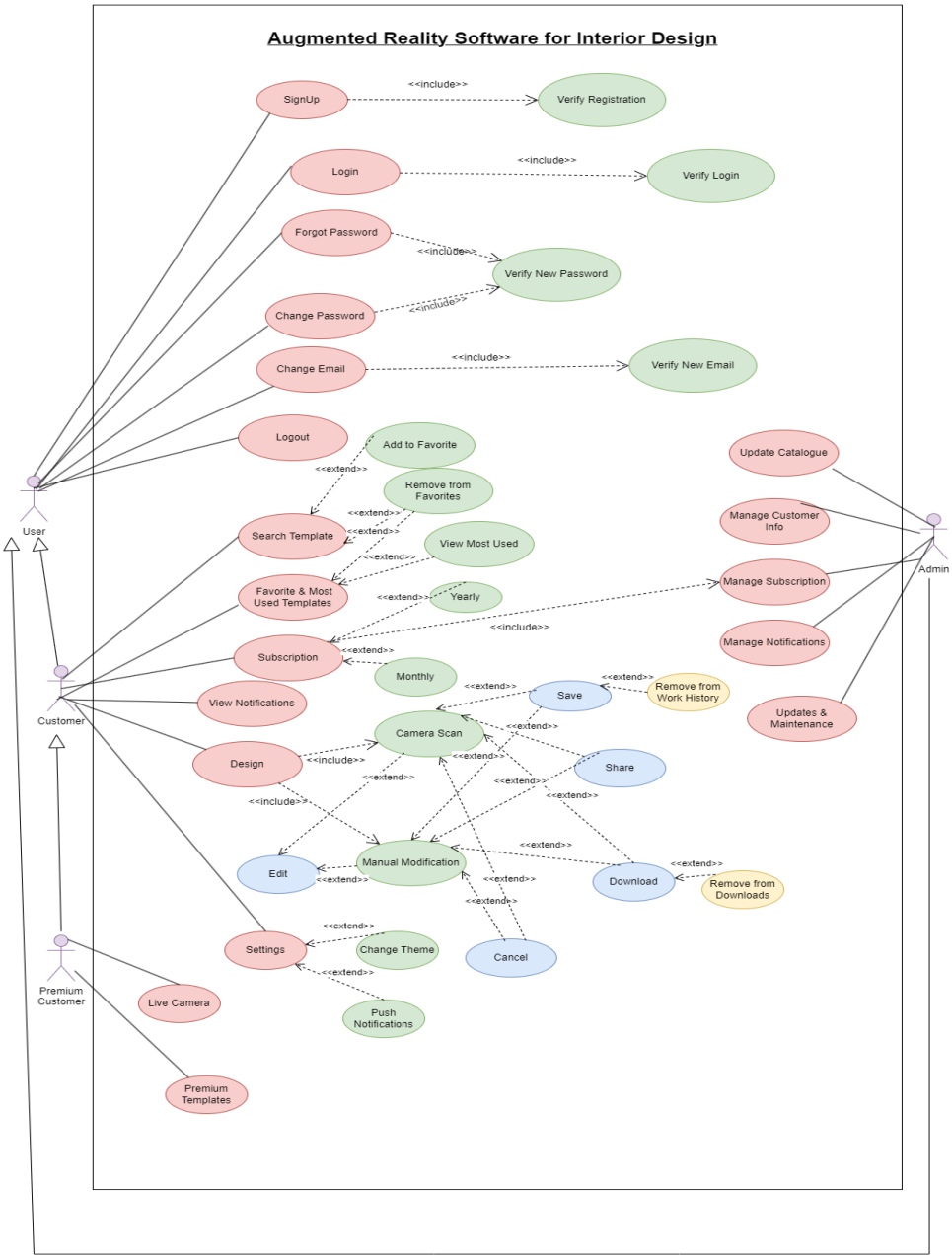
3.3.9. Analytics Tools: ***Google Analytics*** and other analytics tools will be integrated to monitor user engagement and app performance.

3.3.10. Security Testing Tools: ***OWASP ZAP*** or similar tools will be used for identifying security vulnerabilities within the application.

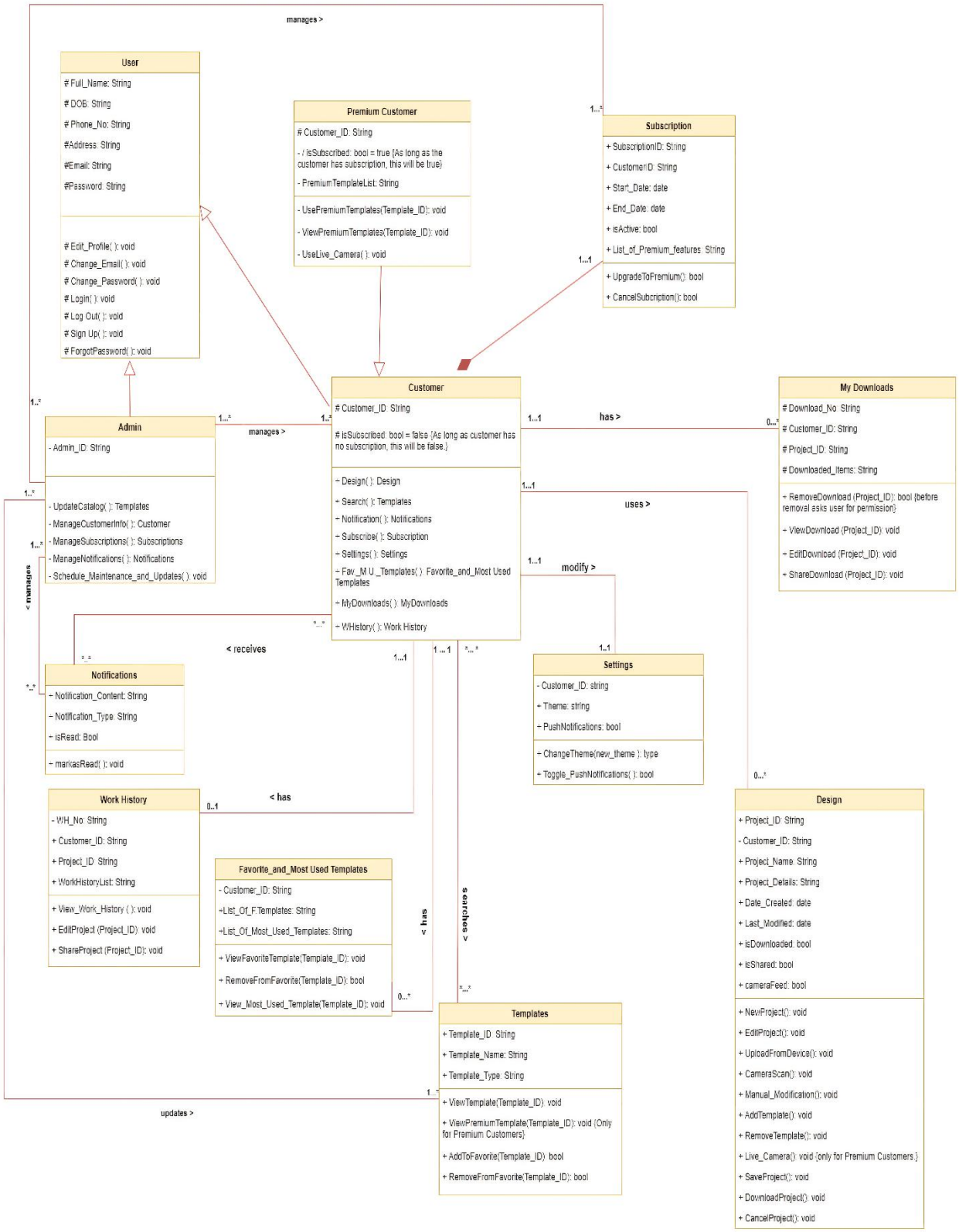
4. Design and Interface Requirements

4.1 UML Diagrams

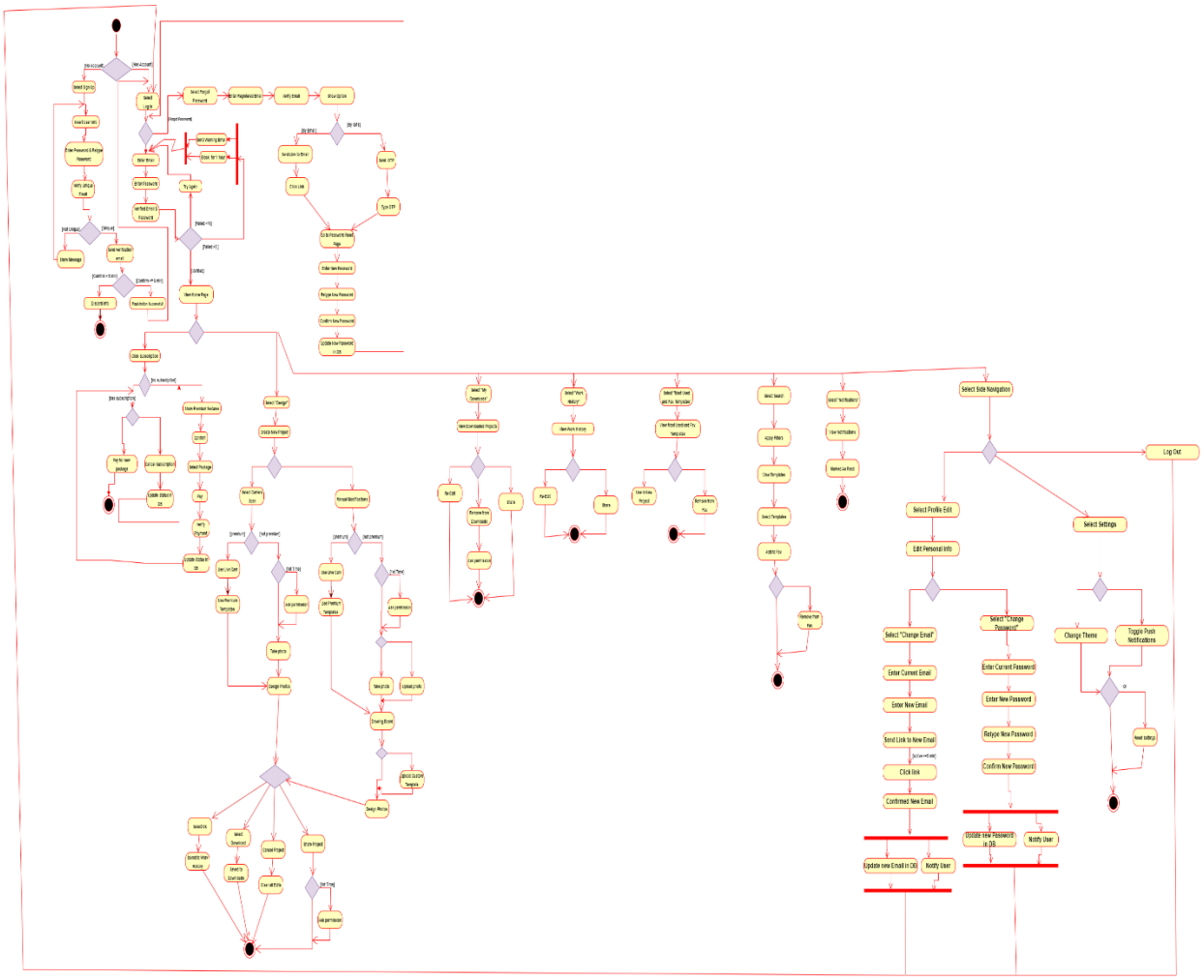
4.1.1. Use-Case Diagram:



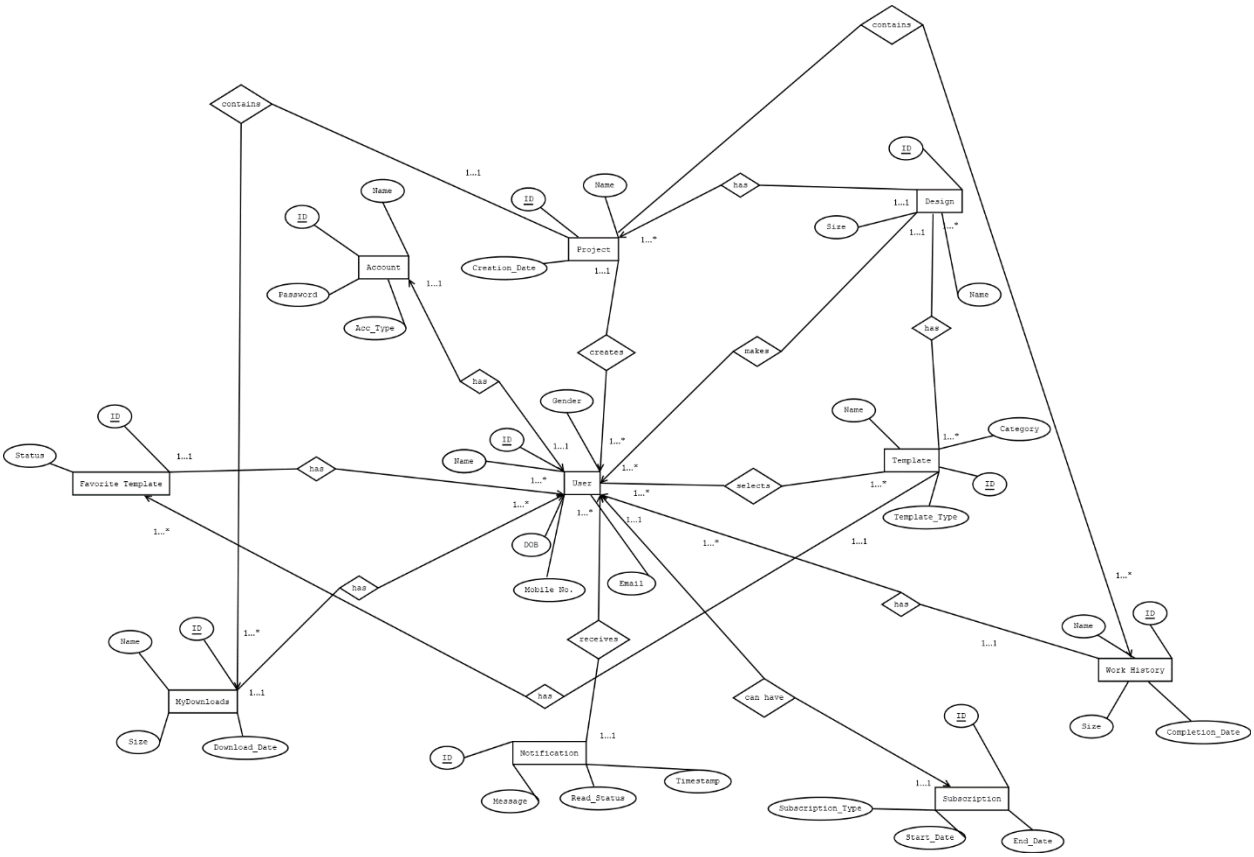
4.1.2. Class Diagram:



4.1.3. Activity Diagram:



4.1.4. ER Diagram:



4.2 Data Dictionary

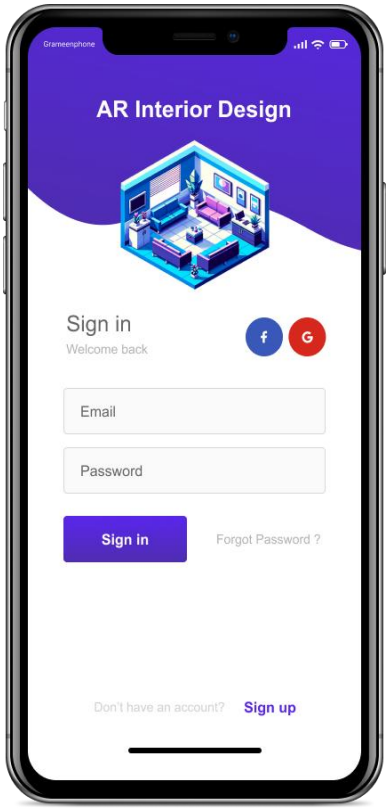
Entity	Attribute	Type/Size	Validation	Key
User	ID	Number (7)	1000000-9999999	Primary
User	Name	Text (20)	Required	
User	Gender	Text (6)		
User	Email	Text (20)	Required	
User	Mobile No.	Text (20)	Required	
User	DOB	Date (8)	Required	
Account	ID	Number (7)	1000000-9999999	Primary
Account	Name	Text (20)	Required	
Account	Password	Text (20)	Required	
Account	Acc_Type	Text	Required	
Account	User_ID	Number (7)	1000000-9999999	Foreign
Project	ID	Number (10)	1000000000-9999999999	Primary
Project	Name	Text (20)	Required	
Project	Creation_Date	Date (8)		
Project	User_ID	Number (7)	1000000-9999999	Foreign
Project	MyDownloads_ID	Number (14)	10000000000000-99999999999999	Foreign
Project	Work_History_ID	Number (15)	100000000000000-999999999999999	Foreign
Template	ID	Number (8)	10000000-99999999	Primary
Template	Name	Text (20)	Required	
Template	Category	Text		
Template	Template_Type	Text	Required	
Template	User_ID	Number (7)	1000000-9999999	Foreign
Template	Design_ID	Number (9)	100000000-999999999	Foreign
Template	Favorite_Template_ID	Number (11)	10000000000-99999999999	Foreign
Design	ID	Number (9)	100000000-999999999	Primary
Design	Name	Text (20)	Required	
Design	Size	Text		
Design	User_ID	Number (7)	1000000-9999999	Foreign
Design	Project_ID	Number (10)	1000000000-9999999999	Foreign
Design	Template_ID	Number (8)	10000000-99999999	Foreign
Notification	ID	Number (12)	100000000000-999999999999	Primary
Notification	Message	Text (50)	Required	

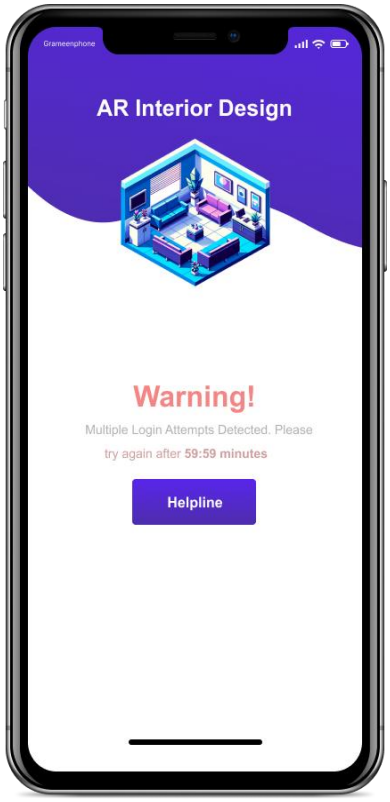
Notification	Read_Status	Bool	Required	
Notification	Time Stamp	Time		
Notification	User_ID	Number (7)	1000000-9999999	Foreign
Subscription	ID	Number (13)	1000000000000-9999999999999	Primary
Subscription	Subscription_Type	Text	Required	
Subscription	Start_Date	Date (8)	Required	
Subscription	End_Date	Date (8)	Required	
Subscription	User_ID	Number (7)	1000000-9999999	Foreign
MyDownloads	ID	Number (14)	10000000000000-99999999999999	Primary
MyDownloads	Name	Text (20)	Required	
MyDownloads	Size	Text		
MyDownloads	Download_Date	Date (8)	Required	
MyDownloads	User_ID	Number (7)	1000000-9999999	Foreign
Favorite_Templates	ID	Number (11)	10000000000-99999999999	Primary
Favorite_Templates	Status	Bool	Required	
Favorite_Templates	User_ID	Number (7)	1000000-9999999	Foreign
Work History	ID	Number (15)	Required	Primary
Work History	Name	Text (20)	Required	
Work History	Size	Text		
Work History	Completion_Date	Date (8)	Required	
Work History	User_ID	Number (7)	1000000-9999999	Foreign

4.3 UI/UX Design Specification

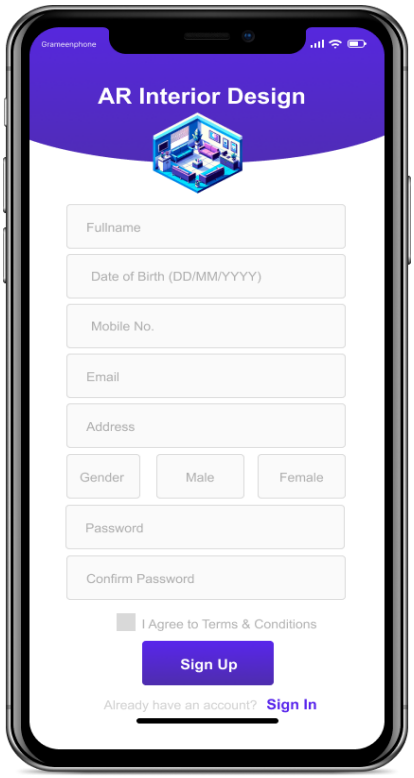
Figma was used for the UI/UX Design.

Login:

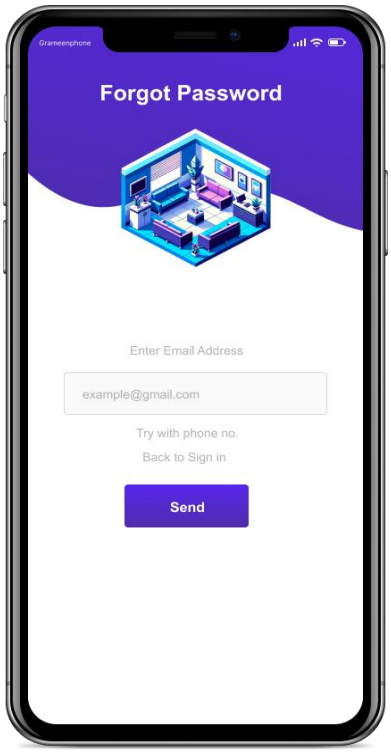


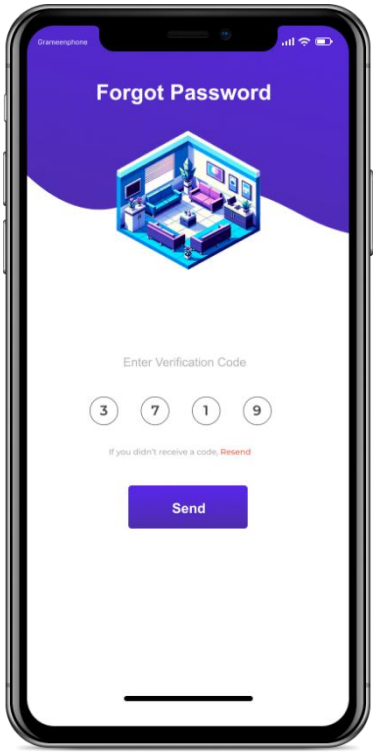


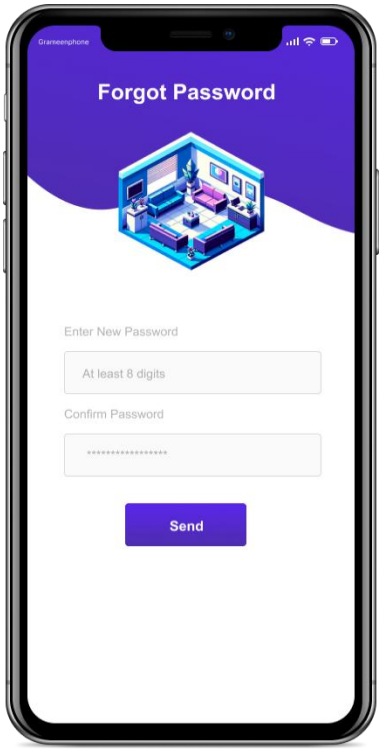
SignUp:



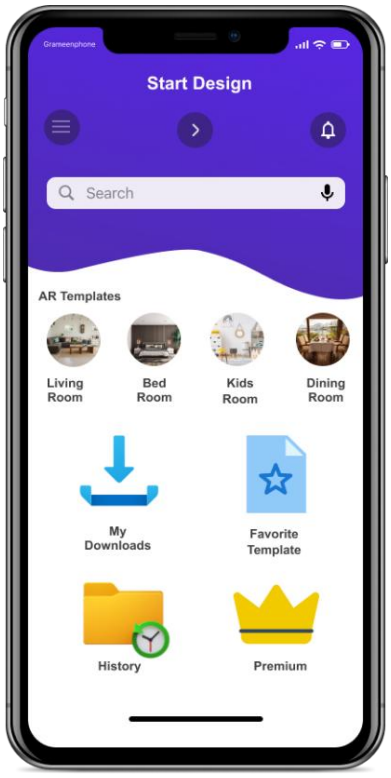
Forget Password:



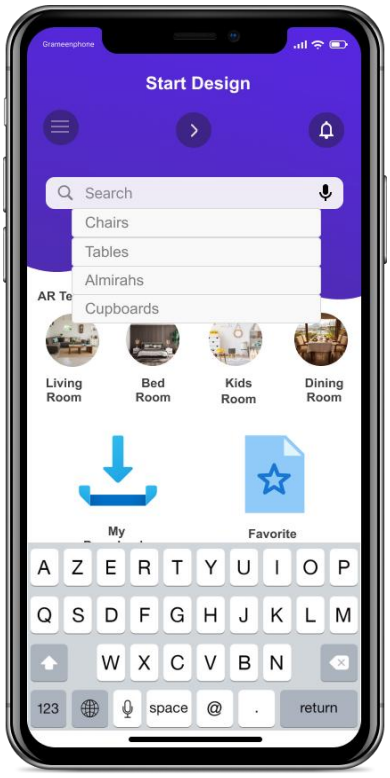


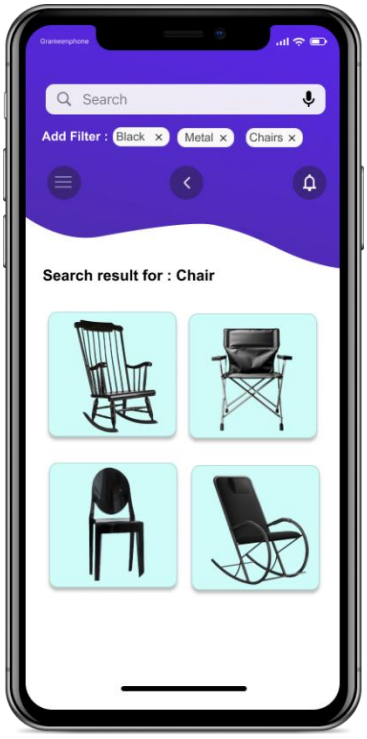


Homepage:

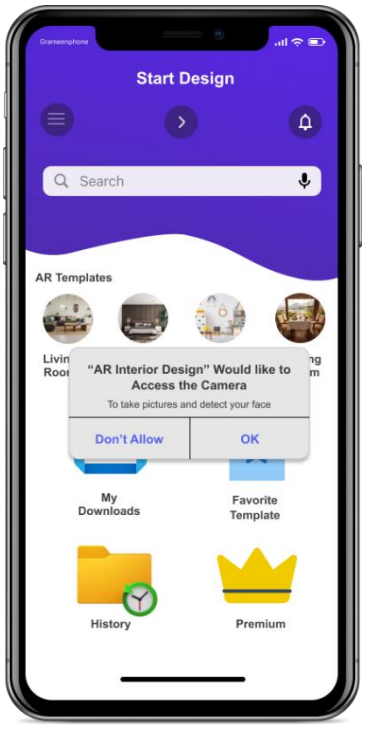


Search:





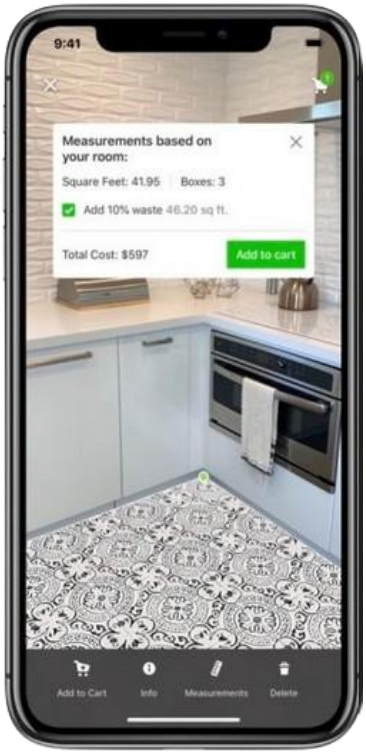
Design:

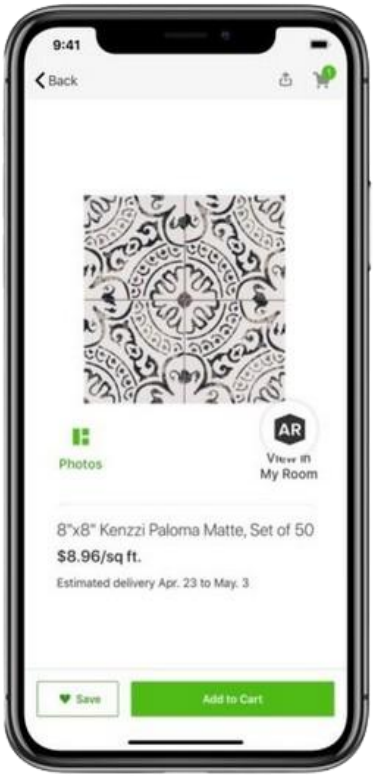



9:45 PM
Checklist
2D
3D
Wall
Modify Floorplan
Redo
Undo
Lighting
Dimensions
Lock All
Delete All

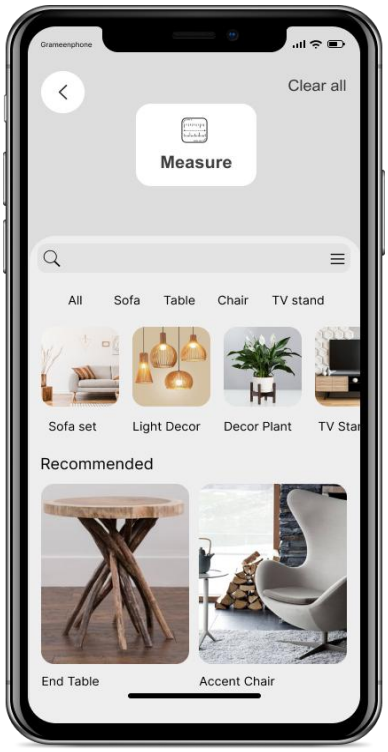

9:41
Undo
Add Point


9:41


9:41
Measurements based on your room:
Square Feet: 41.95
Boxes: 3
Add 10% waste 46.20 sq ft.
Total Cost: $597
Add to cart
Add to Cart
Info
Measurements
Delete

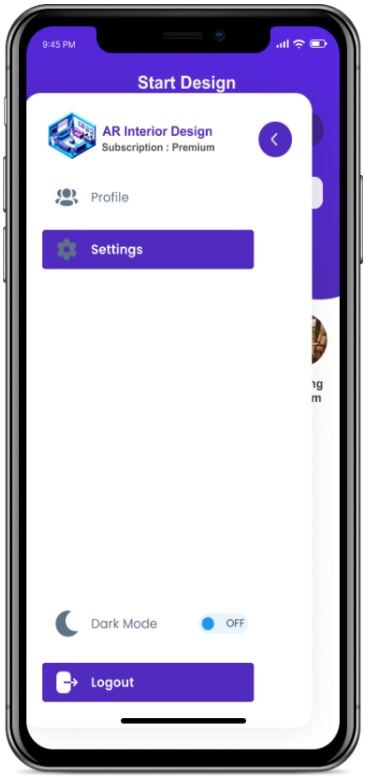


Custom Edit:

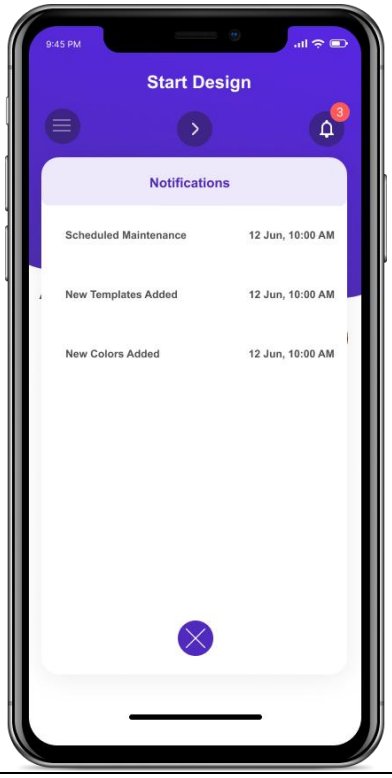


Live Camera:

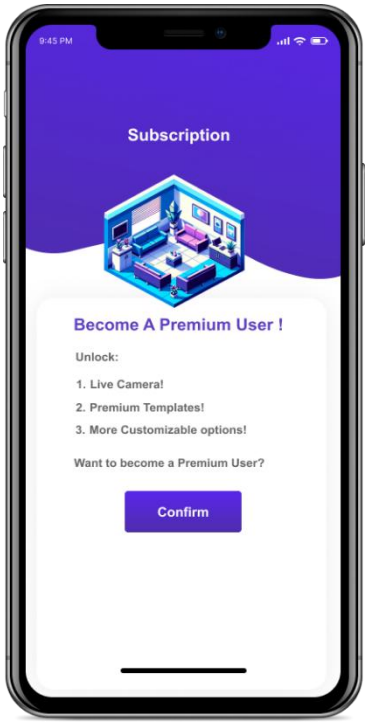
Side Navigation Bar:

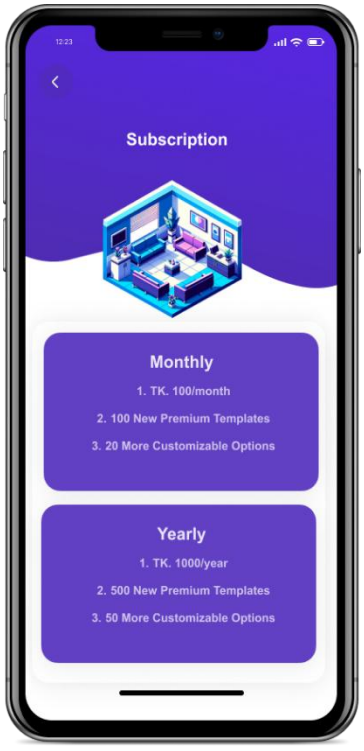


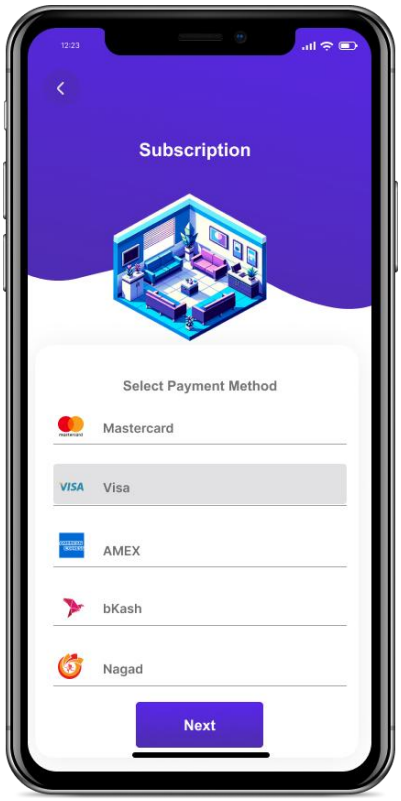
Notification:

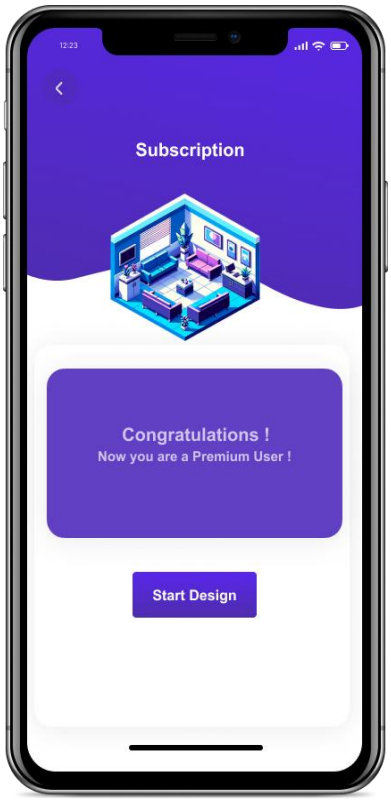


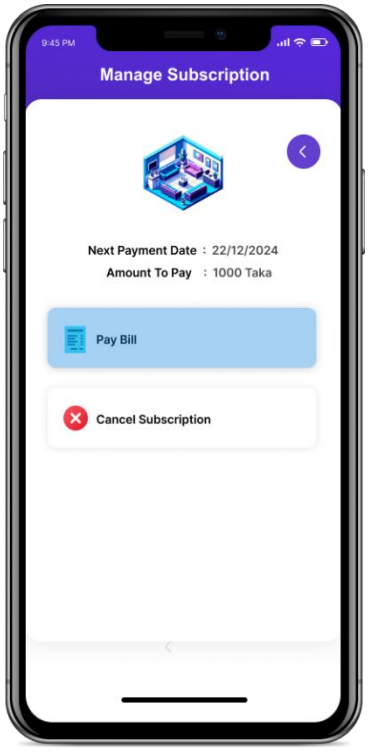
Subscription:



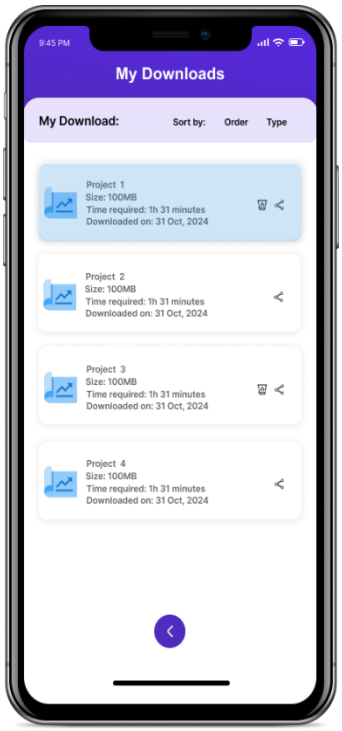








My Downloads:



Most Used & Favorite Templates:	Work History: