

3D Model Building Application

Bachelor of Sciences in Information Technology

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Report Approval

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Abstract

In today's era when it comes to building construction we often rely on blueprints or paper designs to show clients how their building will look. However sometimes these designs fail to convey the appearance of the building leading to disappointment or a realization that it doesn't meet their expectations after construction is complete.

The "**3D Buildings**" project introduces an online platform where users can create detailed 3D models of buildings before Construction. This application's goal is to give users the ability to create, view, and share precise, detailed, and 3D models of buildings and other structures, as well as a variety of features and capabilities to help with the design process.

This involves a user interface with features like template demos, personalized model creation, design requests, and order Placement. The application utilizes React Native and React JS Technologies. The software tools that enable architects, engineers, and other design professionals to create three- dimensional models of buildings and other structures make up the majority of the 3D Buildings application's scope, which can be quite broad.

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Chapter 1

Introduction

The purpose of this Building Designer programme is to help users create intricate models of buildings and other architectural structures. For the purpose of creating and organizing building projects, it provides a variety of tools and features that are targeted towards clients, architects, engineers, and construction experts. [1]

With the ability to incorporate walls, floors, roofs, doors, windows, and architectural details, users may construct complex models of structures. To give these models a more realistic appearance, they can add more details, colors, and textures. Drag-and-drop capability and the ability to add doors, windows, and other architectural details are made possible by the application, which makes the modelling process easy and quick. In order to speed up and streamline the modelling process, it offers a library of pre-made models and tools. [2]

Furthermore, the programme enables the modelling of environmental elements like lighting, pipelines as well as power outlets. Users may preview and evaluate how the building will look in various scenarios thanks to this functionality. All things considered, the Building Designer programme is a powerful tool for accurate and thorough planning and design

of building projects. It enables experts, like architects, to develop and visualize models that help refine designs prior to the start of construction.

1.1 Background

Offering a full toolkit for a range of stakeholders, including clients, architects, engineers, and construction professionals, the Interactive 3D Building Designer programme signifies a substantial shift in the architectural design process. It completely changes how ideas are conceptualized and carried out by making it easier to create complex three-dimensional models of buildings and other structures. With the use of this digital platform, users may visualize and meticulously design basic structural elements like doors, windows, roofs, and walls. It allows for the addition of textures, colors, and fine details, which elevates the models' realism above simple modelling. Beyond visual depiction, the application's amazing power continues. It also has the ability to simulate diverse environmental features, like lighting, pipelines, and other crucial components, giving a better idea of how the design might function in various scenarios. It completely changes how ideas are conceptualized and carried out by making it easier to create complex three-dimensional models of buildings and other structures. [2]

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Beyond visual depiction, the application's amazing power continues. It also has the ability to simulate diverse environmental features, like lighting, pipelines, and other crucial components, giving a better idea of how the design might function in various scenarios. The application's user-friendly features, which include drag-and-drop capabilities, an intuitive toolkit, and a library of pre-made models, are all part of its easy-to-use design. These

characteristics greatly accelerate the modelling process, allowing stakeholders to quickly and effectively create complex and well-informed designs. Essentially, the Interactive 3D Building Designer software serves as a link between the planning stage and the building phase. It gives customers the ability to envision and fine-tune architectural marvels before construction commences by converting abstract concepts into concrete, precise blueprints.

1.2 Problem Description

In today's era when it comes to building construction we often rely on blueprints or paper designs to show clients how their building will look. However sometimes these designs fail to convey the appearance of the building leading to disappointment or a realization that it doesn't meet their expectations after construction is complete. [3]

Moreover with the population growth, in our country space for constructing buildings is becoming scarce. As an example let's consider Pindi (Pakistan) where there is room for constructions. Due to this constraint additional floors are being added to existing buildings without planning. Unfortunately this lack of planning extends to aspects like sewerage pipes and electricity wires. Consequently we witness water flowing openly on streets and a tangled mess of electricity wires due, to the absence of a thought out plan.

1.3 Objectives

Our objective is to provide a platform that allows users to easily design their buildings' outside and interior, including the placement of pipelines and electrical outlets, in a comprehensive 3D model. Customers will be able to choose the colors and sizes that best suit

their needs. If customers would rather not construct their own models, they can choose built-in models for increased simplicity.

Users will eventually get the finished model after completing the design of their building models and making payment. Customers also have the choice to ask us for custom designs. When you place an order, we'll start building according to their blueprint.

We hope to empower users with our application, which was created with React Native and React JS, by giving them the ability to independently design customized 3D building models. Our thorough approach is what distinguishes us from other applications. Rather from just providing a platform for creation, we also offer integrated 3D models, personalization choices, and the ability to request unique designs—all from within a single application.

By combining several features into a single app, this unified approach not only streamlines the user experience but also saves consumers significant time and effort. Our platform also has the benefit of a virtual reality preview, which lets users see their models in a VR setting. With the help of this tool, users can make any necessary changes or adjustments prior to the start of building.

With a variety of modelling features and the bonus of a virtual reality preview, our application essentially acts as a one-stop shop for customers, giving them complete control and clarity over their building plans prior to the start of construction.

1.4 Purpose and Scope

As we know the population in our country is increasing very fast if we take the example of Pindi (Pakistan) there is no space to construct buildings, so they are constructing more floors onto the buildings without a proper plan, and there is no proper plan for sewerage

pipes and electricity wires. The purpose of this application is to provide the clients with a proper plan before constructing the building, one more reason for this project is, most clients do not get from blueprints what actually is going to build and after the construction of buildings, many times the user does not satisfy and wants some changing which are not possible at that time and this also causes a loss in money and time, with the help of this application client will clearly see how well the actual building look like and able to change things before construction starts. [4] The software tools that enable architects, engineers, and other design professionals to create three- dimensional models of buildings and other structures make up the majority of the 3D Buildings application's scope, which can be quite broad. [5]

3D Buildings application's key features and capabilities might include the following:

Imagination and modelling: Users may be able to create and alter 3D models of buildings, including floor plans, elevations, and perspectives, using the application. Through rendering and visualization tools or in real-time, users may be able to view and navigate their models. **Mapping of materials and textures:** It's possible that users will be able to apply materials and textures to the surfaces of their models, which will give them the appearance of real-world materials like concrete, metal, or wood. **Sharing and cooperation:** Tools for collaboration may be included in some applications for 3D building designers, allowing multiple users to simultaneously work on the same project. Other than PDFs, image files, and 3D printing files, users may also be able to share their models with others. **Compatibility with other tools:** AutoCAD, Revit, and Sketch Up are just a few of the software applications that integrate with many of the 3D building designer applications.

In general, this application's goal is to give users the ability to create, view, and share precise, detailed, and 3D models of buildings and other structures, as well as a variety of features and capabilities to help with the design process. Modules of 3D Buildings application are:

- User
- Architecture
- Admin

1.5 Solution Application Areas

The 3D Buildings application is a groundbreaking solution that addresses diverse challenges and opportunities across various sectors: [5] Urban Planning and Development: The application enables urban planners and developers to visualize and optimize building designs within expanding urban landscapes, fostering sustainable and aesthetically pleasing environments. Architectural Design and Visualization: Architects and designers leverage the application to bring creative visions to life, experimenting with designs and materials for innovative and captivating structures. Construction and Engineering: Engineers benefit from detailed 3D models that anticipate construction challenges, aiding in planning infrastructure placement and reducing costly delays. Real Estate and Property Development: The application enhances real estate marketing efforts by creating realistic virtual tours, aiding buyers and investors in decision-making. [7] Education and Training: The application offers architecture and engineering student's hands-on learning and practical experience in designing structures.

Chapter 2

Literature Review

2.1 Comparison of Competitive Apps

There are three applications that are related to my application but they don't have the proper solution to the Problem. They just provide a platform where you can design a model of the building nothing else a user cannot earn, and cannot request the model if he does not want to create his own or he does not have enough time to create it. [6]

Floor Plan Creator [1] Users of the creator application are able to create floor plans that are both precise and detailed in the Floor plan. They can see them in 3D and design the interior of their home by adding furniture. When going shopping, people take their floor plans with them to see if there is enough room for new furniture. This Application can have rooms of any shape on multiple floors (only with straight walls). Automatic calculation of the room's level area, walls, and perimeter; Symbol count, 3D tour mode, and Symbol library: doors, windows, furniture, electrical, a fire survey, and user-defined dimension lines to be displayed.

- Undo (Back one step).

-
- Redo (forward one step).
 - Paste (last thing you copy).
 - 3D (3D model).
 - Share (Share on any social media).
 - Export (Save in files).
 - Print (Print on paper).
 - Settings.
 - Help.
 - Tutorial (How to use).

The limitations of the application are listed below.

- Only makes a model.
- No login option.
- Cannot place order.
- Cannot track order.
- No edit profile option.
- No built-in design.
- No chat option.
- Cannot track option

Home Design 3D: [2] is an application that makes it easier than ever to design and remodel your house in 3D. Home Design 3D is an accessible interior design application that puts a professional finish at your fingertips. Now is the time to build your multi-story house! No limit on the number of floors. The Floor Plan Creator app lets Users design their plot, rooms, and dividers in two dimensions and three dimensions, change the height or thickness Of the walls, make corners, add doors and windows with fully re sizable joinery, and design and decorate both the inside and outside of their home. Choose from over a thousand accessories to personalize your decor and show off your style, which can range from the most traditional to the hottest! Any object can be edited by changing its size, Color, position on the walls, and altitude.

- Textures (Add any kind of text).
- Screen Shot.
- Contact Support.
- Visit.
- Built-in rooms (Share on any social media / Print on paper).
- Built-in walls (Save in files).
- Compass
- Help.
- Tutorial (How to use).
- Undo (Back one step).
- Redo (forward one step).
- Paste (last thing you copy).

-
- 3D (3D model).
 - Share (Share on any social media).
 - 3D Export (Save in files).
 - Print (Print on paper).
 - Settings.
 - Help.
 - Tutorial (How to use).

The limitations of the application are listed below.

- Only makes a model.
- No login option.
- Cannot place an order.
- No edit profile option.
- Built-in Designs only for home.
- No Chat Option.

Planner 5D: Design Your Home [2] is an application that lets users create stunning interiors for their home or room by utilizing the various tools in the Planner 5D floor plan creator app. Using the app's interior design layouts and AR Room visualization or 3D room planner, you can build your dream home with love. Using ready-made projects, you can easily incorporate any house decor, both inside and out. The selection of a floor plan, the creation of a blueprint, or a room design in Planner 5D is unrestricted: bedroom,

living room, bathroom, or kitchen. Decorate the room's interior: vases, lamps, paintings, clocks, curtains, and more you can design a gym, cafe, or restaurant using the application, in addition to home interior design and room planning.

- Screen Shot.
- Contact Support.
- Lighting.
- Built-in windows, Lawns and rooms.
- Help.
- Tutorial.
- Undo and redo.
- Paste.
- 2D and 3D.
- Share.
- 3D Export.
- Tutorial.
- Partitions.
- Garage Doors and Stairs.

The limitations of the application are listed below.

- Only makes a model.

- No login option.
- Cannot place an order.
- No edit profile option.
- Built-in Design only boxes.
- No Chat Option.

Features	Application			
	Floor Plan Creator [1]	Home Design 3D [2]	Planner 5D: Design Your Home [3]	Proposed System
Registration	X	X	X	✓
Verification	X	X	X	✓
Create Design	✓	✓	✓	✓
Demo designs	X	✓	✓	✓
Upload My Design	X	X	X	✓
My Designs	✓	✓	✓	✓
Ask for Design	X	X	X	✓
Place an order	X	X	X	✓
Chatting	X	X	X	✓
Built-in rooms	X	X	✓	✓
Built-in walls	✓	X	✓	✓
Built-in windows	✓	✓	✓	✓
Lighting	X	X	X	✓
Undo and Redo	✓	X	✓	✓
2D and 3D	✓	✓	✓	✓
Tutorial	X	X	✓	✓
Stairs	X	X	✓	✓
partitions	✓	X	✓	✓
Track Order	X	X	X	✓
Architectures help	X	X	X	✓
Pipelines	X	X	X	✓
Electricity Points	X	X	X	✓

FIGURE 2.1: Applications Comparison

2.2 Feature Extraction

3D Building Modeling and Visualization:

Creation of detailed three-dimensional models of buildings, including interiors, exteriors, and architectural elements. Real-time visualization of designs to provide users with an immersive experience. Exploration of different angles and perspectives for a comprehensive understanding of the building's appearance.

Interior and Exterior Customization:

Customization of interior layouts, furniture placement, and decorative elements. Exterior design options, including facades, landscaping, and outdoor features. Integration of textures, colors, and materials for realistic visualization.

Collaborative Platform:

Collaborative workspace allowing architects, engineers, users, and administrators to work together. Real-time communication and feedback exchange through built-in chat and comment features. Multi-user editing and design review for seamless collaboration.

Order Placement and Tracking:

User-friendly interface for placing orders for virtual reality models. Transparent tracking system to monitor the progress of orders and design iterations. Efficient order management for architects to fulfill client requests.

Built-in Design Library:

Pre-made design templates for users to choose from, providing a starting point for customization. Access to a diverse range of architectural styles, layouts, and themes. Design repository for architects to show case their portfolio and attract clients.

Realistic Environmental Simulation:

Simulation of lighting conditions to visualize how natural and artificial light will affect the building. Incorporation of environmental factors such as shadows, reflections, and sunlight trajectory. Visualization of the building's appearance under different weather conditions.

User Profile and Portfolio:

User registration and login for personalized experiences and project management. Creation of user profiles to track design history, preferences, and collaborations. Architect portfolio showcasing completed projects and expertise.

Mobile Compatibility:

Cross-platform compatibility for accessibility on both mobile devices. Seamless transition between different devices for continuous design and collaboration.

Educational and Training Resources:

In-app tutorials and guides for users to learn how to use the application effectively. Educational content on Architectural design principles, interior decoration, and construction concepts.

Integration with Design Software:

Integration with industry-standard design software such as AutoCAD, Revit, and Sketch Up. Import and export Compatibility for seamless data transfer and collaboration.

Secure Data Management:

Data encryption and secure storage of user profiles, designs, and project details. Regular data backups and recovery Options to prevent loss of critical information.

Feedback and Rating System:

User feedback collection to improve application usability and features. Architect rating and review system to ensure Quality service and accountability.

Chapter 3

Requirement Specification

We have included a thorough breakdown of the proposed system's requirements in this chapter. We have examined the limitations of our system and also discussed both functional and non-functional requirements. We utilized the existing system for requirements analysis. We've also discussed our diagram used cases.

3.1 Present System

The current architectural design tools offer basic 3D modeling with limited visualization, lack collaborative features for efficient teamwork, provide sparse design options, and lack realistic environmental simulations. They also lack user profiles and portfolios, restrict accessibility and learning, and suffer from data security and accountability issues. In summary, these tools fall short in delivering comprehensive, collaborative, and secure architectural design solutions. [7]

3.2 Limitation of Present System

Not Very Realistic:

The current 3D models don't look exactly like real buildings, which can cause differences between what's planned and what's built.

Hard to Work Together:

Architects and others can't easily work on designs at the same time, making it tough to share ideas and make changes together.

Few Design Choices:

There aren't many ready-made designs to choose from, so people have to start from scratch, which takes more time.

Can Miss Important Details:

The computer simulations don't show things like how the lighting or weather will affect the building, which could lead to problems later.

Not Very Safe or Clear:

Information and designs might not be kept safe, and there's no way to give feedback or rate the work, which can lead to confusion and mistakes.

3.3 Proposed System

An effective tool that lets customers see their house plans in great detail before construction is done is a 3D house building program. This program gives users a realistic depiction

of their plans by creating and displaying 3D models of dwellings using cutting-edge technology.

This is a useful tool for architects as well as homeowners. Before building ever starts, homeowners can visualize how their house will look and feel, which helps them make well-informed design selections. For architects, it becomes a useful tool for more vividly showing and explaining designs to clients.

Although there are obstacles to overcome, such as those related to accuracy, user experience, and content generation, these can be addressed. With persistent technological progress and committed improvement, a 3D house construction application has the potential to immense potential to become an invaluable tool for users to visualize and refine their building designs.

Here are the key points of the proposed system:

- It overlays a 3D house model onto the real world environment.
- It allows users to walk around the 3D house model and interact with it in a natural way.
- It has the potential to be a valuable tool for homeowners and architects.

Features	Proposed System
Registration	
Verification	Done
Create design	Done
Upload my design	Done
My design	Done
Place an order	Done
Chatting	Done
Build in room	Done
Build in walls	Done
Build in windows	Done
Undo an Redo	Done
2D and 3D	Done
Track Order	Done
Architectures help	Done

TABLE 3.1: Features Of Proposed System

3.3.1 Advantages of proposed system

Realistic visualization:

Users can see how their house design will look in the real world before it is built.

Interactive experience:

Users can interact with their house design in a natural way, such as walking around it or changing the furniture.

Collaboration:

Users can collaborate with others on house designs, such as getting feedback from family and friends.

Cost-saving

Users can save time and money on the house building process by visualizing their designs before they commit to construction

3.4 Hardware Requirements

- A Laptop / Desktop
- Connected with Internet Minimum of 4GB ram or more.
- Single Network Connection (So that other devices within network can connect through network URL)

3.5 Software Requirements

We will use react native language as the front end because react native is the best and most popular language for both android and iOS application development. [11]

Tools

- Visual Studio (for coding) [10]
- Android Studio (for android emulator)

3.6 Models and Integration

The 3D Building Application is organized according to a user-centric model, with several levels supporting different functions. In order to create, view, and place orders, users interact with an intuitive User Interface. The Application Layer, which serves as a bridge between user interactions and back end activities, sits at the center. It responds to user queries and communicates with the Business Logic layer, which is in charge of critical processes including model creation and design rendering.

While the Database maintains persistent user profiles, designs, and orders, the Data Layer oversees the storage and retrieval of critical information. APIs facilitate smooth integration, allowing for effective data transfer between tiers and guaranteeing a holistic user experience from model visualization to first design.

3.7 Intended Audience

Engineers and design experts may use the programmer to develop intricate 3D models of structures, test out different concepts, and mimic environmental aspects like lighting.

Professionals in the building and real estate industries can use the programmer to help visualize and plan Construction projects, improving decision-making and accurately representing finished constructions.

Property owners and purchasers can create and see their ideal homes or structures before they are built, ensuring satisfaction with the result. Students and educators can use the app as a useful learning tool to help architecture and design students put design principles into practice and visualize their ideas.

Owners: Users of the application can experiment with various layouts, designs, and components when remodeling or renovating their homes. **Designers of interiors:** The platform provides a space

3.8 Limitations of project

Hardware Requirements:

In order to utilize 3D modelling features, users may need particular hardware, which could restrict accessibility.

Design Realism:

Because of limitations in software representation, 3D models might not accurately represent real-world construction outcomes. [8]

User Learning Curve:

Non-technical users may find it difficult to get used to the application's 3D modelling and navigation.

Data Privacy

Storing sensitive architectural designs online raises data security concerns.

Integration Challenges:

Providing smooth communication between 2D and 3D modelling software functionalities may pose integration challenges

3.9 Functional Requirements

Functional requirements are a crucial element of any system as they are tailored to meet the needs of both the proposed system and its users. Since every system has its own set of specific functional requirements determined by its elicited requirements, our system also has its own set of functional requirements.

User Module

- **User Registration**

As a user, I want to register on the platform to seamlessly navigate the application and elevate my resume.

Description: Users can register on the platform.

Output: Successful registration and redirection to the application.

Processing: Users provide necessary information for registration.

Input: User-provided registration details.

Primary Actors: Client User.

- **User Login**

As a registered user, I want to log in to access the application's features.

Description: Registered users can log in using their credentials.

Output: Successful login and access to the user dashboard.

Processing: System verifies user credentials.

Input: User-provided login credentials.

Primary Actors: Client User.

- **Create Design**

As a user, I want to create a 2D design with drag-and-drop options and visualize it in 3D.

Description: Users can use drag-and-drop functionality to create 2D designs with pre-defined elements.

Output: Visualization of the 2D design in 3D.

Processing: System processes user's design choices.

Input: User-dragged elements for 2D design.

Primary Actors: Client User.

- **My Design**

As a user, I want to view and manage the designs I have uploaded or created in the application.

Description: Users can access the "My Design" section to view a list of designs they have uploaded or created. Additionally, users can select from demo designs available in the application.

Output: List of user-uploaded designs and demo designs.

Processing: The system retrieves and displays the list of designs for the user.

Input: User interaction involves selecting a design from the list.

Primary Actors: Client User.

- **Place Order**

As a user, I want to place an order for a selected or uploaded design, which will be shown to architects. After the design is accepted, it should be further processed.

Description: Users can place an order for a selected or uploaded design. The order details will be presented to architects for review. If the architect accepts the order, the design is moved to the next processing stage.

Output: Order details presented to architects for review.

Processing: The system processes the order details and presents them to architects. If accepted, the design is moved for further processing.

Input: User provides order details, and architects accept or decline the order.

Primary Actors: Client User, Architect User.

- **Admin Module**

Manage Architects

As an admin user, I want tools to efficiently manage architect data.

Description: Admins can view and manage registered architects.

Output: List of registered architects.

Processing: Admins access the "Manage Architects" section.

Input: Admin login and request for architect data.

Primary Actors: Admin User.

- **Manage Users**

As an admin user, I want tools to efficiently manage user data.

Description: Admins can view and manage registered users.

Output: List of registered users.

Processing: Admins access the "Manage Users" section.

Input: Admin login and request for user data.

Primary Actors: Admin User.

- **Track Orders**

As an admin user, I want tools to track design orders.

Description: Admins can track the status of design orders, including accepted and declined orders.

Output: Order tracking details.

Processing: Admins access the "Track Orders" section.

Input: Admin login and request for order tracking.

Primary Actors: Admin User.

Architect Dashboard

- **Architect Registration**

As an architect, I want to register on the platform.

Description: Architects can register by providing necessary information.

Output: Successful registration and redirection to the architect dashboard.

Processing: Architects provide necessary information for registration.

Input: Architect-provided registration details.

Primary Actors: Architect User.

- **Architect Login**

As a registered architect, I want to log in to access the architect dashboard.

Description: Registered architects can log in using their credentials.

Output: Successful login and access to the architect dashboard.

Processing: System verifies architect credentials.

Input: Architect-provided login credentials.

Primary Actors: Architect User.

- **Design Tasks**

As an architect, I want to view the list of design tasks, including accepted and declined orders.

Description: Architects can view their assigned design tasks.

Output: List of design tasks with status.

Processing: System retrieves and displays design tasks for the architect.

Input: Architect login and request for design tasks.

Primary Actors: Architect User.

- **Architect Profile**

As an architect, I want to add and manage my professional information.

Description: Architects can add and manage professional information, including experience, skills, education, and certifications.

Output: Updated architect profile.

Processing: Architects access the "Architect Profile" section.

Input: Architect login and request for profile management.

Primary Actors: Architect User.

3.10 Non-Functional Requirements

User Experience:

Intuitive interface, responsive design.

Performance:

Quick reaction speeds and effective 3D model loading for a smooth user experience.

Privacy and Security:

From the viewpoint of system development Putting strong encryption techniques and safe authentication procedures into practice to protect data.

Integration and Compatibility:

Compatibility with a range of browsers and devices to increase accessibility. The ability to integrate with external technologies and synchronize data seamlessly.

3.11 Use cases

A graphical representation of a client's potential conversations with a framework. It displays how a user will engage with the system. The use cases for our system are as follow:

3.11.1 Main Use Case Diagram

The following Figure 1 shows the various conditions involved, the actors, and their roles in interacting with the web application. The main use case diagram for our system is depicted in Figure 3.2 to demonstrate how our framework work.



FIGURE 3.1: User Case

3.11.2 Descriptive Use Cases

3.11.2.1 User Registration Use Case

Use-Case Name	Registration
Use-Case ID	101
Priority	High
Primary Actor	User
Description	A user registers on the platform to seamlessly navigate the application.
Basic Flow	User provides required information and completes registration.
Alternative Flow	If validation fails at any point, the system displays error messages
Precondition	User intends to access the service/system.
Post-condition	User registration is successfully completed.

TABLE 3.2: Use-Case Description for User Registration

Description:

A user registers on the platform to seamlessly navigate the application and elevate their resume. Through the sign-up form, the user provides necessary information, leading to successful registration and redirection to the application. In the alternative flow, if the user does not get registered, the system dismisses the sign-up page.

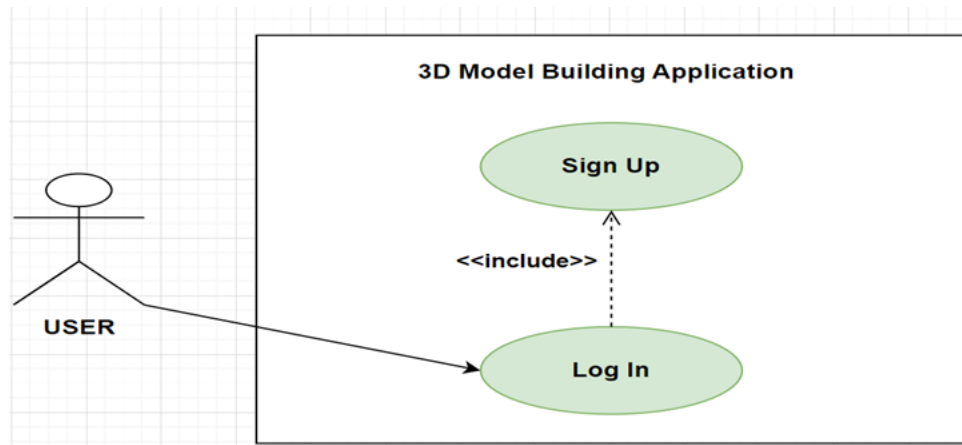


FIGURE 3.2: User Registration

3.11.2.2 User Login

Use-Case Name	Login
Use-Case ID	02
Priority	High
Primary Actor	User
Description	A registered user logs in to access the application's features.
Basic Flow	click the login button, grants access to the dashboard.
Alternative Flow	If verification fails, the system displays an error message.
Precondition	The user will click the login button.
Post-condition	The user is logged in and has access to the user dashboard.

TABLE 3.3: Use-Case Description for login

Description:

A registered user logs in to access the application's features. The system verifies user credentials, leading to successful login and access to the user dashboard.

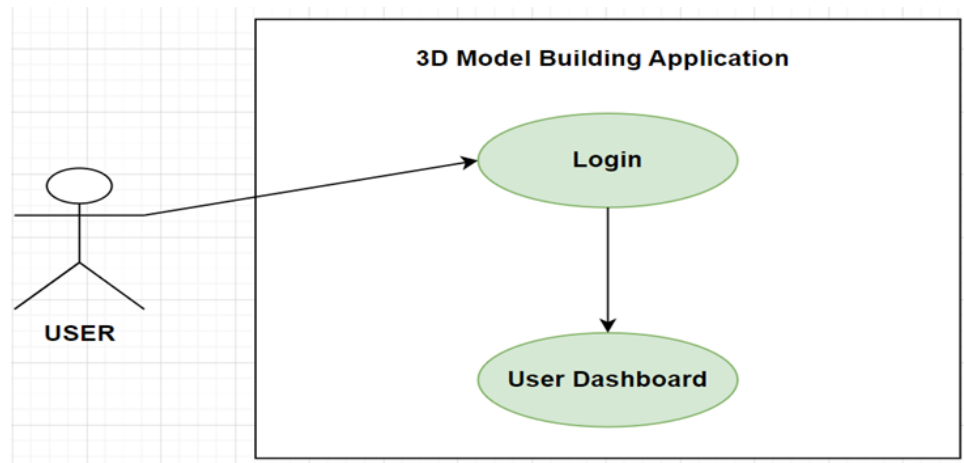


FIGURE 3.3: User login

3.11.2.3 Create Design

Use-Case Name	Create Design
Use-Case ID	03
Priority	High
Primary Actor	User
Description	User creates a 2D design with drag-and-drop options and visualizes it in 3D
Basic Flow	User creates a 2D design with drag-and-drop options and visualizes it in 3D
Alternative Flow	The user can undo/redo actions. Discard the design and start over.
Precondition	The user is logged in and has access to the "Create Design" screen.
Post-condition	The 2D design is saved, and the system visualizes it in 3D

TABLE 3.4: Use-Case Description for Create Design

Description

Users effortlessly create 2D designs with drag-and-drop features, incorporating predefined elements like living rooms and kitchens. The system seamlessly converts these designs into 3D visualizations, providing an intuitive planning experience for users.

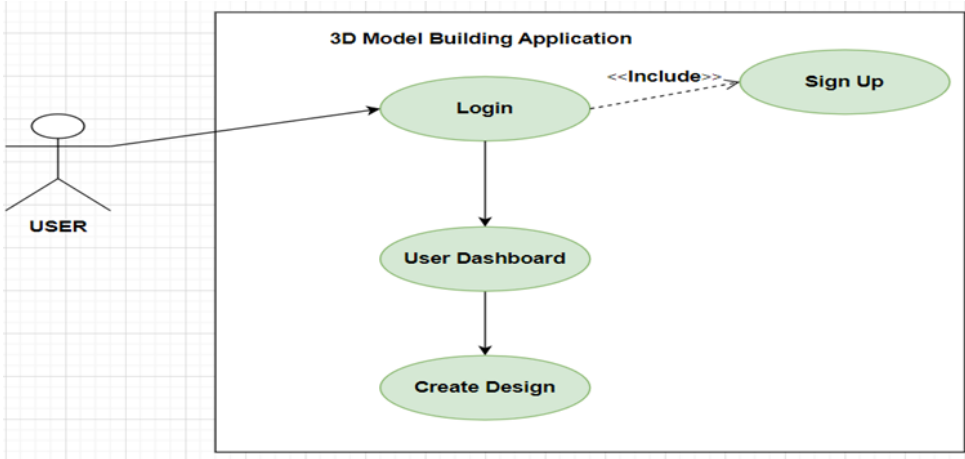


FIGURE 3.4: Create Design

3.11.2.4 My Design

Use-Case Name	My Design
Use-Case ID	04
Priority	Medium
Primary Actor	User
Description	A user views and manages the designs they have uploaded or created in app
Basic Flow	User selects a design from the list.
Alternative Flow	None
Precondition	User is logged in.
Post-condition	User views or manages a selected design.

TABLE 3.5: Use-Case Description for My Design

Description

Users access the "My Design" section to view and manage their uploaded designs and demo designs available in the application. This feature allows users to conveniently select and interact with their existing design portfolio.

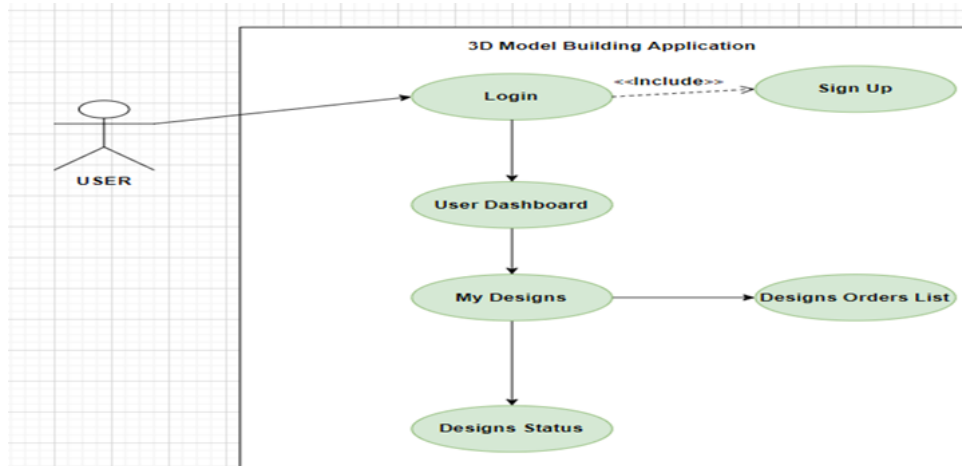


FIGURE 3.5: My Design

3.11.2.5 Place An Order

Use-Case Name	Place an order
Use-Case ID	05
Priority	Medium
Primary Actor	User
Description	order placed, selected or uploaded design, and details are presented
Basic Flow	User selects a design from the available designs or uploads their own design
Alternative Flow	User cancels the order.
Precondition	User is logged in, and a design is selected or uploaded.
Post-condition	Order details are presented to architects for review.

TABLE 3.6: Use-Case Description for place an order

Description:

Users place orders for selected or uploaded designs, providing order details such as quantity and specifications. The system processes these orders, presenting them to architects for

review. After acceptance, the design is further moved in the processing pipeline. Users have the option to cancel orders if needed.

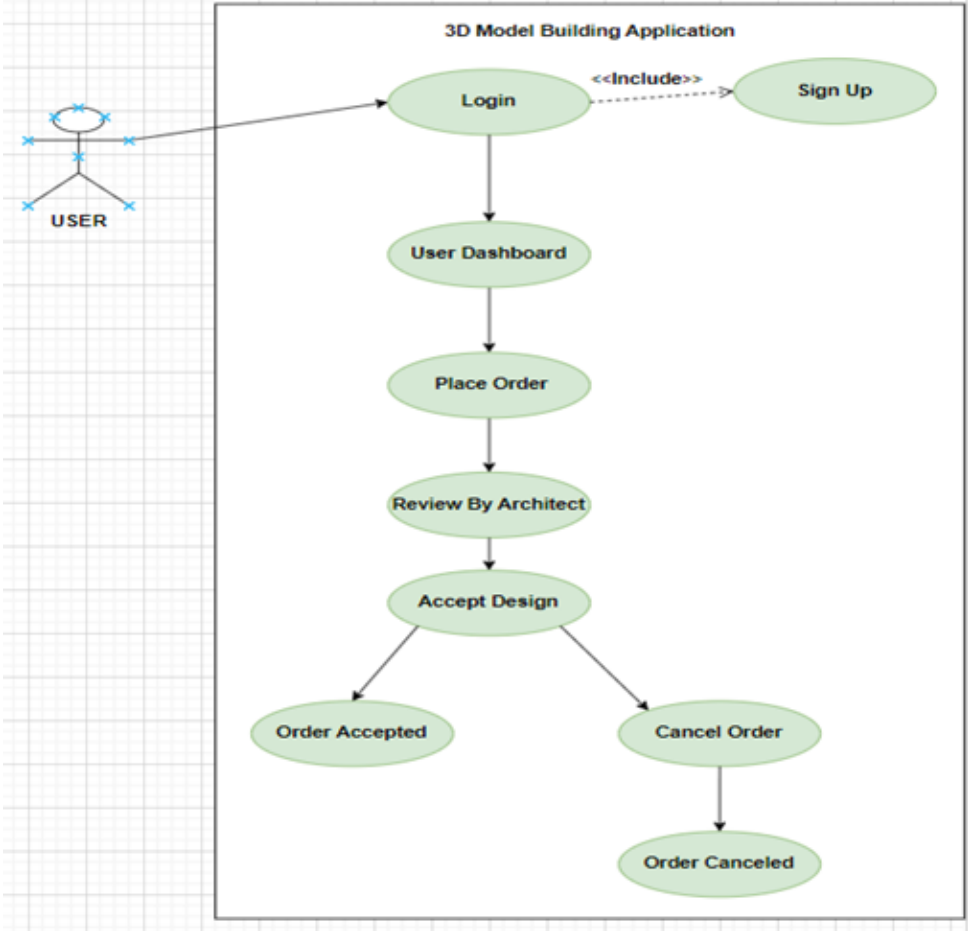


FIGURE 3.6: Place An Order

3.11.2.6 Manage Architects

Use-Case Name	Manage Architects
Use-Case ID	06
Priority	Medium
Primary Actor	Admin
Description	An admin efficiently manages architect data.
Basic Flow	The admin views and manages architect data.
Alternative Flow	If there are no registered architects, the system informs the admin.
Precondition	Admin will "Manage Architects" section the list of registered architects.
Post-condition	An admin efficiently manages architect data.

TABLE 3.7: Use-Case Description for Manage Architects

Description:

Admin users access the "Manage Architects" section to efficiently view and manage registered architects. This functionality provides a comprehensive overview, allowing admins to track architect data and ensure a well-maintained architect database in the application.

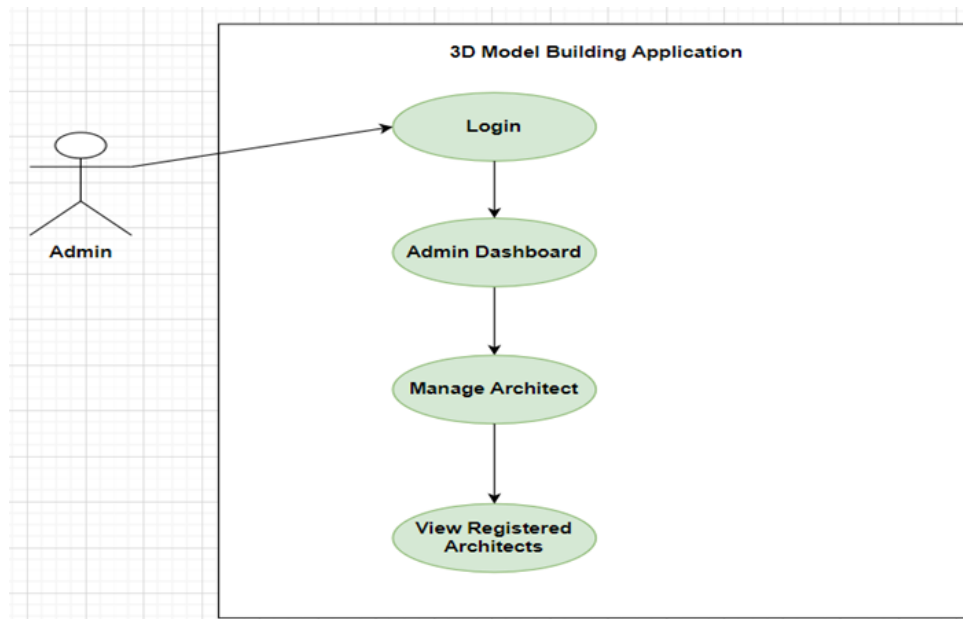


FIGURE 3.7: Manage Architects

3.11.2.7 Manage Users

Use-Case Name	Manage Users
Use-Case ID	07
Priority	Medium
Primary Actor	Admin
Description	An admin efficiently manages user data.
Basic Flow	The admin views and manages user data.
Alternative Flow	If there are no registered users, the system informs the admin.
Precondition	Admin will "Manage Users" section and display the list of registered users.
Post-condition	The admin efficiently manages user data.

TABLE 3.8: Use-Case Description for Manage users

Description:

Admin users utilize the "Manage Users" section to efficiently view and manage registered users. This feature provides admins with a centralized view of user data, facilitating effective user management and ensuring a well-organized user database in the application.

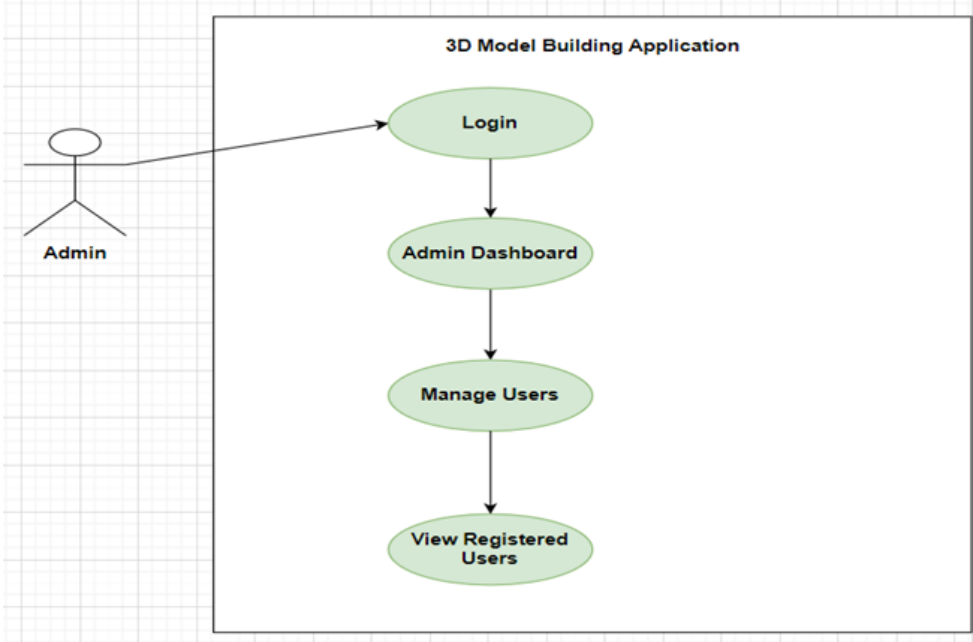


FIGURE 3.8: Enter Caption

3.11.2.8 Track Orders

Use-Case Name	Track order
Use-Case ID	08
Priority	Medium
Primary Actor	Admin
Description	An admin efficiently tracks design orders.
Basic Flow	The admin tracks the status of design orders.
Alternative Flow	If there are no design orders, the system informs the admin.
Precondition	Admin will "Track Orders" . It will display design order details.
Post-condition	The admin efficiently tracks design orders

TABLE 3.9: Use-Case Description for Track Orders

Table 11 Track Orders

Description:

Admin users access the "Track Orders" section to monitor the status of design orders, including those that are accepted or declined. This functionality provides a streamlined approach for admins to stay informed about the progress of design tasks and ensures effective tracking and management of orders.

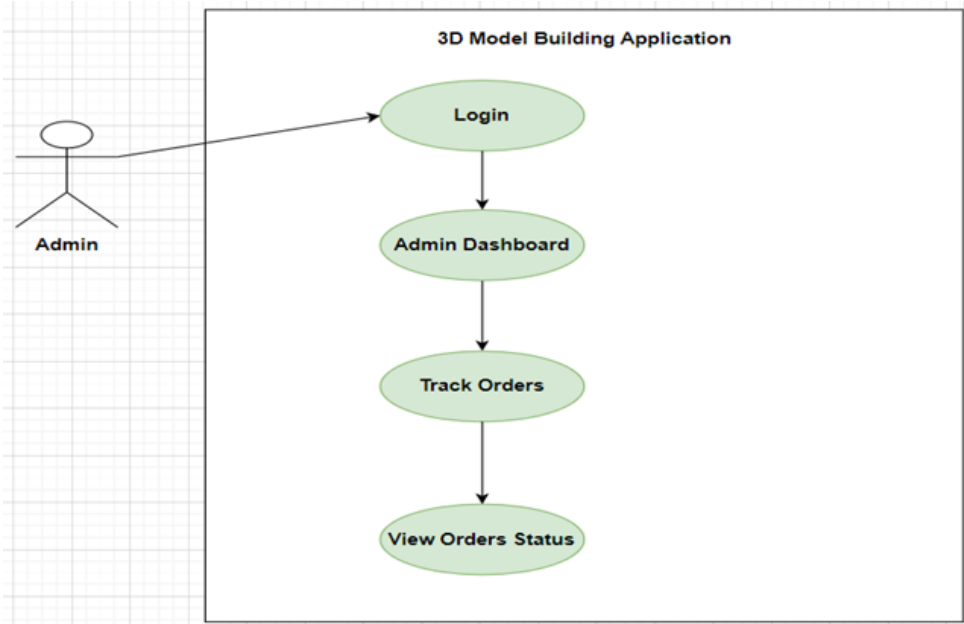


FIGURE 3.9: Track order

Chapter 4

System Design

This chapter is based on the design and architecture of the proposed system. The chapter consists of system architecture, GUI design, design constraints, modeling, and structure of the system.

4.1 System Architecture

Frontend

- React JS
- React Hooks
- React
- Router Redux

Backend

- Typescript
- Unity
- React Native

Database

Firebase is free and open-source. And is a widely used relational database management system (RDBMS)

4.2 Database Design

The database schema consists of several tables, including User, Architect, Design, Order, TrackOrder, UserRequest, Upload Design, and Admin. The User and Architect tables store user and architect details, respectively, while the Design table captures information about created models. Orders placed by users are recorded in the Order table, with tracking handled by the TrackOrder table. User requests for design services are stored in UserRequest, and additional design-related information uploaded by users is managed in UserUpload. Administrators are represented in the Admin table, overseeing user, architect, and order management.

Table	Attributes	Primary Key (PK)	Foreign Key (FK)
User	Attributes: UserID (Primary Key), Username, Password, Email, UserType, PaymentDetails	UserID	-
Architect	Attributes: ArchitectID (Primary Key), Username, Password, Email, Experience, Certification, Education, Skills	ArchitectID	
Design	Attributes: DesignID (Primary Key), Title, Description, 2DModel, 3DModel, Status, OrderDate,	DesignID	
Order	Attributes: OrderID (Primary Key), UserID (Foreign Key), DesignID (Foreign Key), OrderDate, PaymentStatus	OrderID	UserID, DesignID
Track Order	Attributes: TrackID (Primary Key), OrderID (Foreign Key), ArchitectID (Foreign Key), Status, UpdateDate	TrackID	OrderID, ArchitectID
UserRequest	Attributes: RequestID (Primary Key), UserID (Foreign Key), ArchitectID (Foreign Key), RequestDate, Status	RequestID	RequestID, UserID
Upload Design	Attributes: UploadID (Primary Key), UserID (Foreign Key), Photo, Marlas, Floors, Elevation, RoomCount	UploadID	UserID
Admin	Attributes: AdminID (Primary Key), Username, Password, Email, etc.	AdminID	

FIGURE 4.1: Schema Table

4.2.1 ERD (Entity Relationship Diagram)

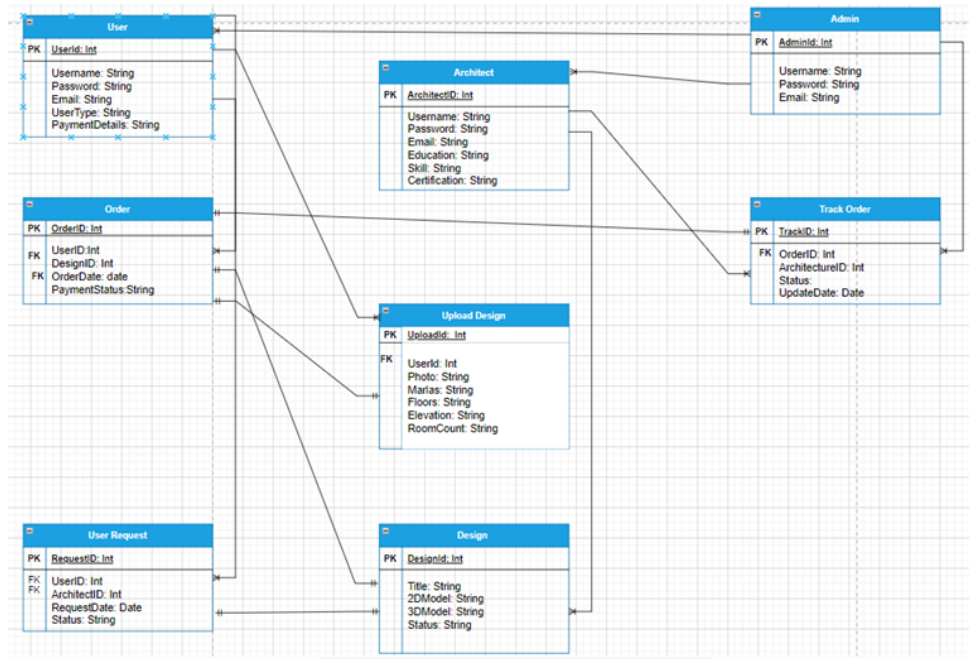


FIGURE 4.2: ERD Diagram

Schema:

User

Attributes: UserID (Primary Key), Username, Password, Email, UserType, Payment-Details

Architect

Attributes: ArchitectID (Primary Key), Username, Password, Email, Experience, Certification, Education, Skills.

Design

Attributes: DesignID (Primary Key), Title, Description, 2DModel, 3DModel, Status, OrderDate

Order

Attributes: OrderID (Primary Key), UserID (Foreign Key), DesignID (Foreign Key), OrderDate, PaymentStatus.

TrackOrder

Attributes: TrackID (Primary Key), OrderID (Foreign Key), ArchitectID (Foreign Key), Status, UpdateDate.

UserRequest

Attributes: RequestID (Primary Key), UserID (Foreign Key), ArchitectID (Foreign Key), RequestDate, Status.

UserUpload Attributes: UploadID (Primary Key), UserID (Foreign Key), Photo, Marlas, Floors, Elevation, RoomCount.

Admin Attributes: AdminID (Primary Key), Username, Password, Email.

User to Order: One-to-Many (One user can place multiple orders)

User to User Request: One-to-Many (One user can make multiple design requests)

User to Upload Design: One-to-Many (One user can upload multiple designs)

Architect to Design: One-to-Many (One architect can have multiple designs)

Architect to TrackOrder: One-to-Many (One architect can track multiple orders)

Design to Order: One-to-One (Each design is associated with one order)

Design to UserRequest: One-to-One (Each design request corresponds to one design)

Design to Architect: Many-to-One (Many designs can be created by one architect)

Order to TrackOrder: One-to-One (Each order has one tracking status)

Order to Upload Design: One-to-One (Each order can have one uploaded design)

Admin to User: One-to-Many (One admin can manage multiple users)

Admin to Architect: One-to-Many (One admin can manage multiple architects)

Admin to TrackOrder: One-to-Many (One admin can track multiple orders)

Design methodology

Agile Approach: Employ agile principles with Scrum framework for flexible and iterative development.

Sprint-Based Work: Divide project into time-bound Sprints focusing on specific features.

User-Centric Design: Prioritize user feedback, usability testing, and continuous improvement.

Cross-Functional Collaboration: Foster teamwork among development, design, testing, and other teams.

Adaptability: Embrace change, gather feedback, and adjust project direction as needed.

4.3 Sequence Diagram

The sequence diagrams for the scenarios in the 3D building application depict a clear progression of Interactions. During user registration and verification, the system validates and stores user details, sending a verification email for confirmation. Creating and customizing designs involves user selection, interactive tool usage, and saving designs.

Placing an order includes user selection, submission, and order processing with tracking. Collaborative design and Feedback encompass user-architect interaction, feedback provision, and design refinement based on input. These diagrams illustrate the step-by-step flow, enhancing understanding of the application’s dynamic processes.

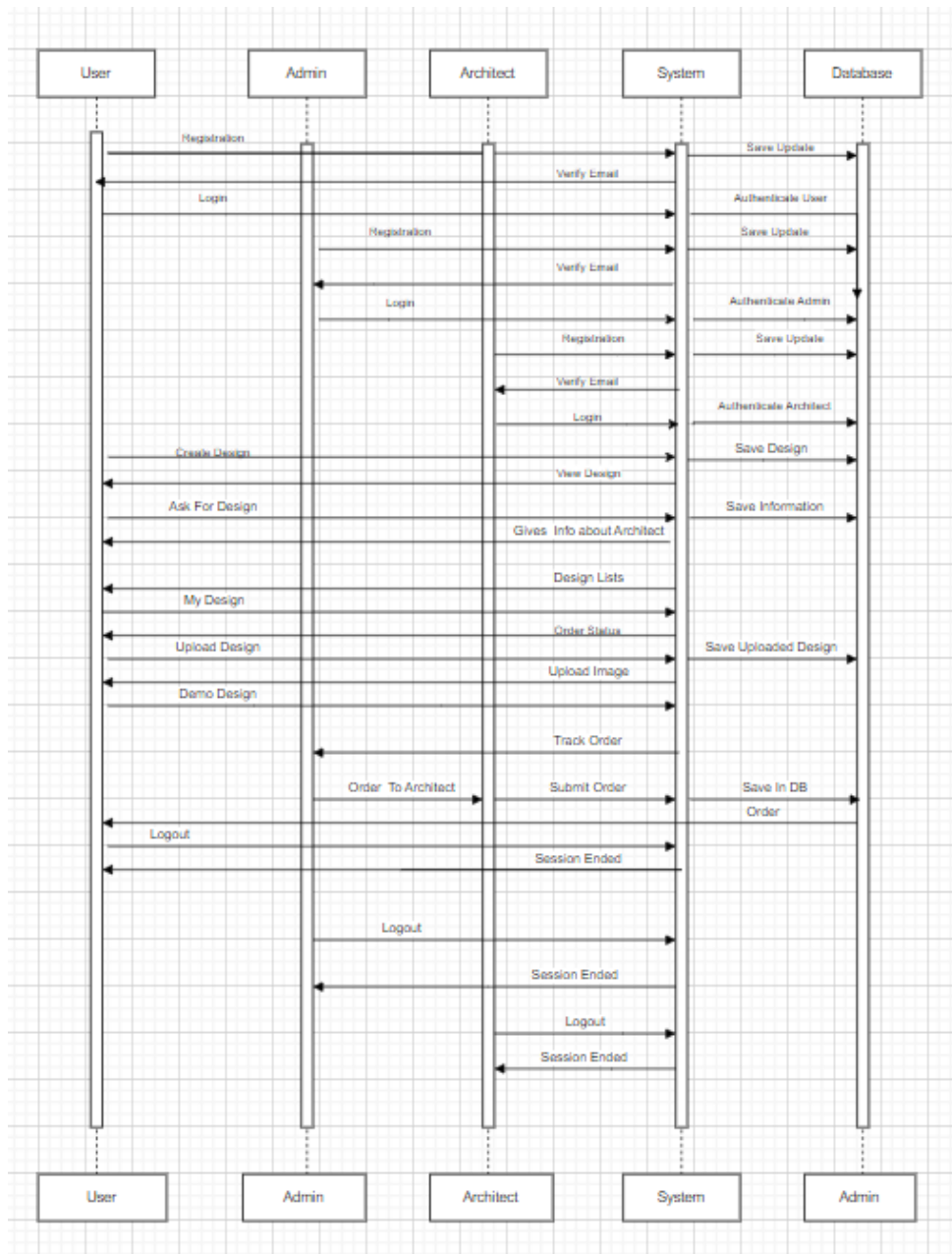


FIGURE 4.3: Sequence Diagram

4.4 Activity Diagram

The 3D building modelling application's dynamic process is depicted in the activity diagram. User registration is the first step, and then there are verification and login procedures. Choosing interior and exterior options, utilizing design tools, and saving progress are all part of the **"Create Design"** task.

Order tracking, design submission, and visualization choice selection are all included in the **"Place an Order"** process. Collaborative design projects are aided by **"Chatting"** and **"Architecture Help"** two collaborative activities.

Furthermore, the design process is enhanced with **"Built-in Features"** such as walls, windows, and rooms. Last but not least, **"Tutorial"** and **"2D/3D Views"** help to direct users and promote communication. This diagram provides a clear visual depiction of the user experience and outlines the application's operational logic in relation to the functionalities of 2D and 3D modelling.

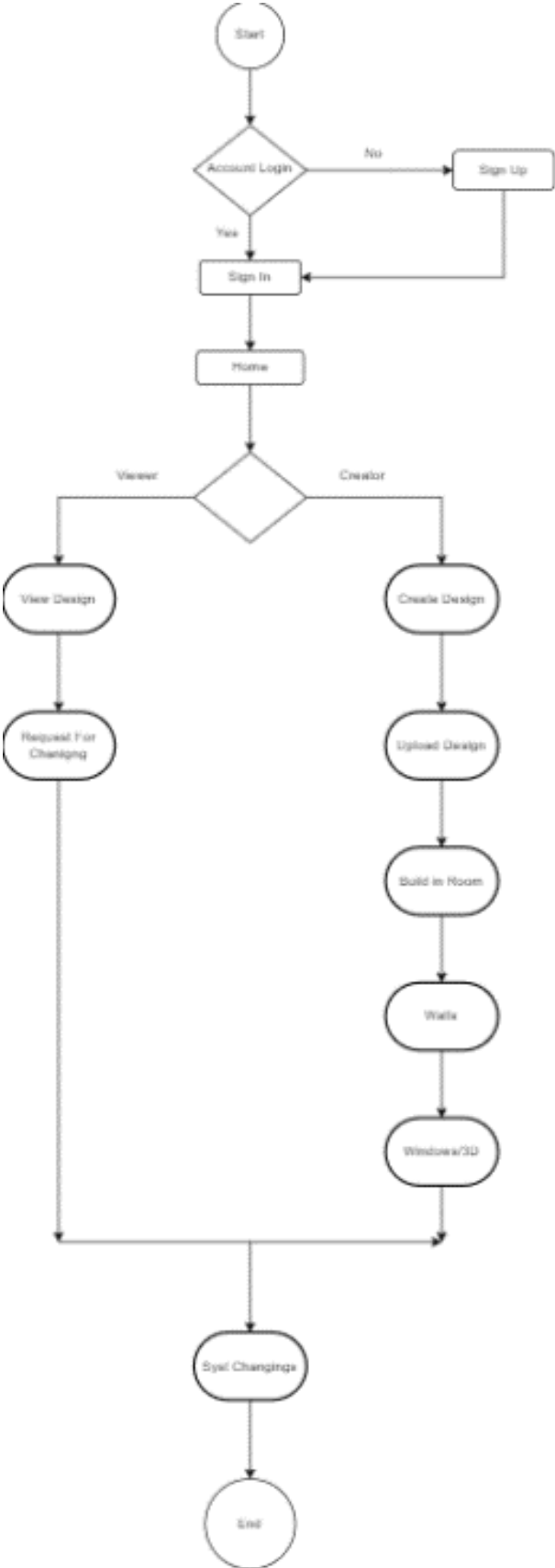


FIGURE 4.4: Activity Diagram

4.5 High level design

The 3D building application's database architecture is essential since it serves as a thorough repository for a variety of data needs. It is composed of essential tables designed for particular functions:

User Credentials: Oversees user authentication and registration information.

User Profile: Holds individualized user data to improve interactions.

Design Templates: Provides users with per-designed alternatives.

User Designs: Holds models made by users inside the programmer.

Orders: Keeps track of and oversees architectural model requests.

Collaboration Logs: Enables users to log their real-time communications with one another.

Architect Portfolio: Displays the work samples of architects.

Educational Resources: Provides users with access to learning tools and materials.

Integration Logs: Records information about integration and compatibility with outside tools.

Reviews and feedback from users are recorded for ongoing enhancement.

Because of the organized database design, users may manage data more effectively and seamlessly with the features of the programmer users' abilities to design, collaborate, and order architectural models.

4.5.1 Data Flow Diagram

The below figures describe how the data flows through out the process

DFD Basic Notation

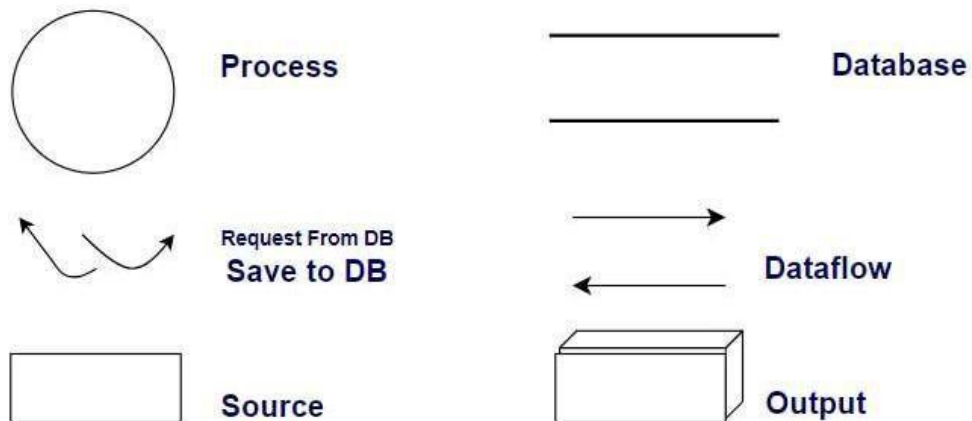


FIGURE 4.5: Data Flow Diagram

4.5.2 Level 0 Data Flow Diagram

The Level 0 DFD provides a high-level overview of the main processes and data flow in the system, highlighting interactions between external entities and processes. The primary entities in the system are Users, Admins, and Architects, each with specific interactions with the system.

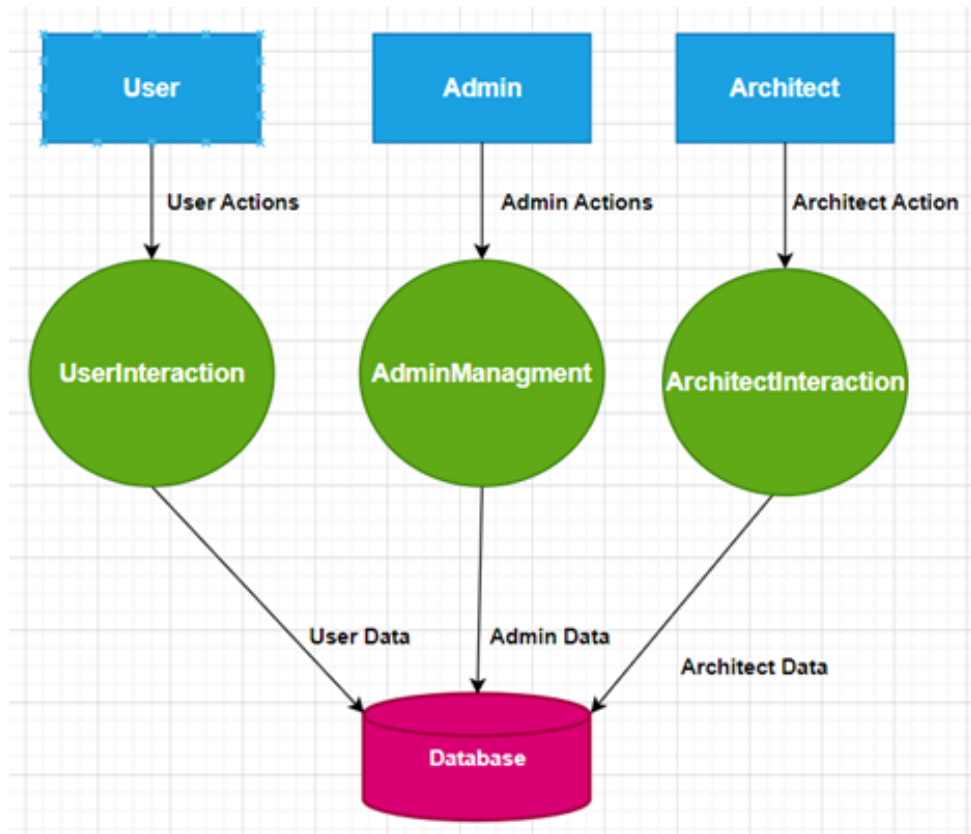


FIGURE 4.6: Context Diagram

4.5.3 Level 1 DFD For User Interaction

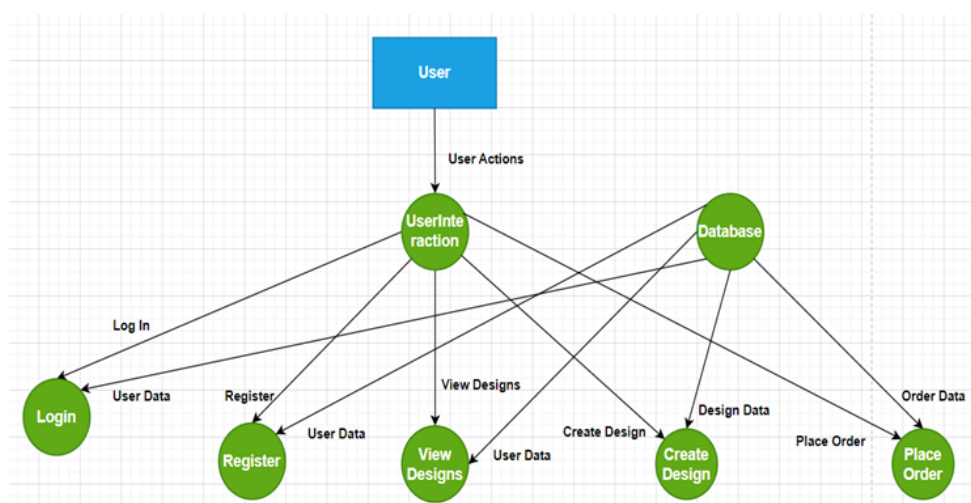


FIGURE 4.7: level 1 user

4.5.4 Level 2 DFD For Registration

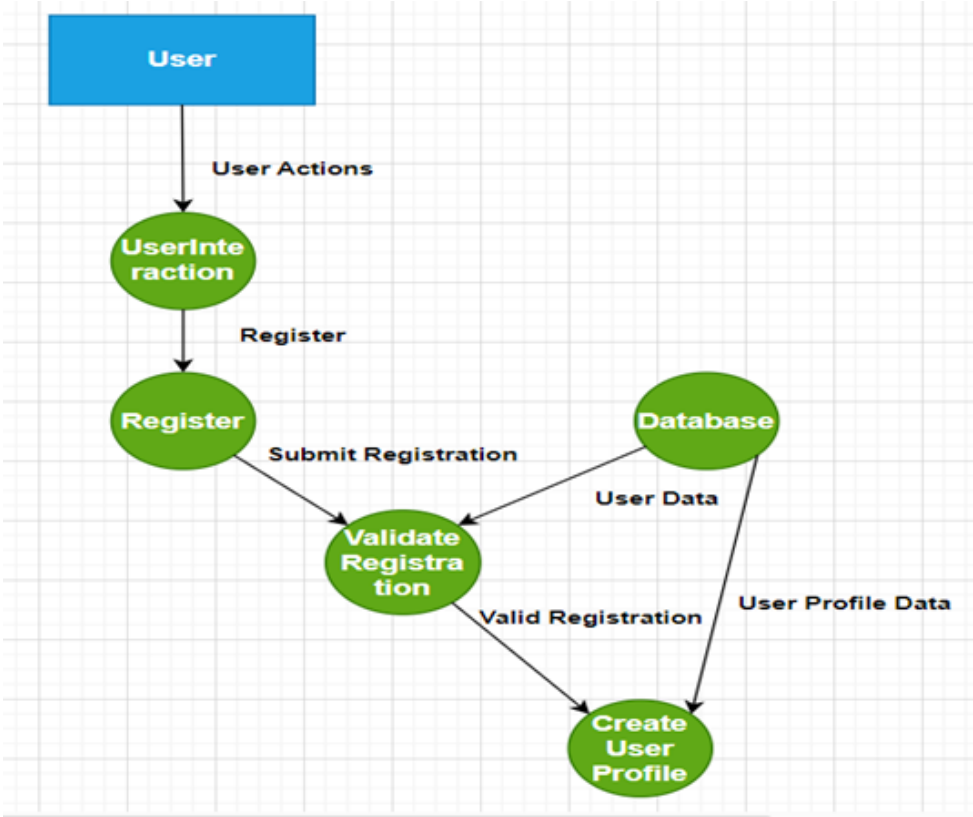


FIGURE 4.8: DFD level 2 Registration User

4.5.5 Level 2 DFD Admin Management

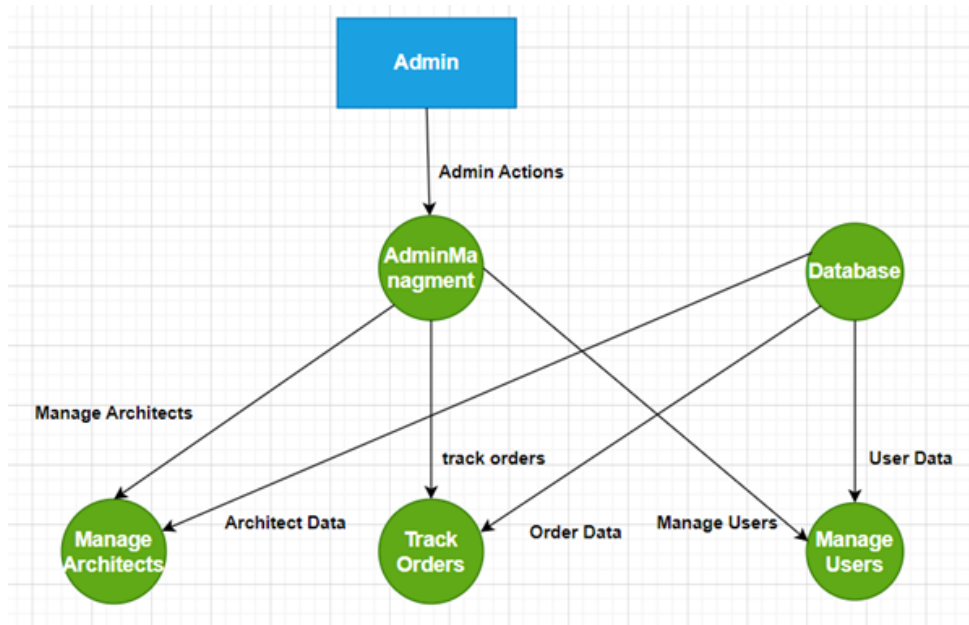


FIGURE 4.9: level 2 DFD Admin Management

4.5.6 Level 1 DFD For Architect Interaction

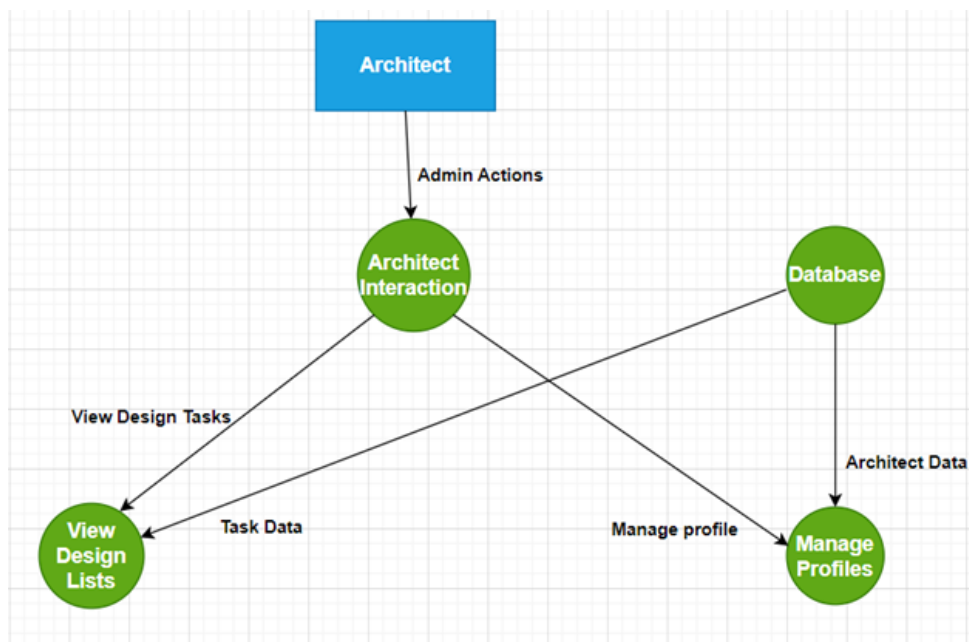


FIGURE 4.10: Level 1 DFD For Architect Interaction

4.6 User Flow

A 3D house building application using augmented reality can allow users to visualize their house designs in a realistic way before they are built. The user can select a 3D house model from the library, and the application will track their position and orientation in the real world, and then overlay the 3D house model onto the real world environment. The user can then walk around the 3D house model and interact with it in a natural way, such as changing the materials, colors, and textures. To use the application, the user will need to create an account and log in with their credentials. This will allow the application to save their house designs and preferences, so that they can access them from any device. The login UX design should be easy to use and understand, and it should be secure to protect user data. Here are some specific considerations for the login UX design of a 3D house building application using augmented reality:

- The login screen will be clear and concise, with easy-to-read text and buttons.
- The user will be able to create an account quickly and easily.
- The user will be able to log in with their credentials using a variety of methods, such as email, social media, or a password.
- The application will use strong security measures to protect user data.

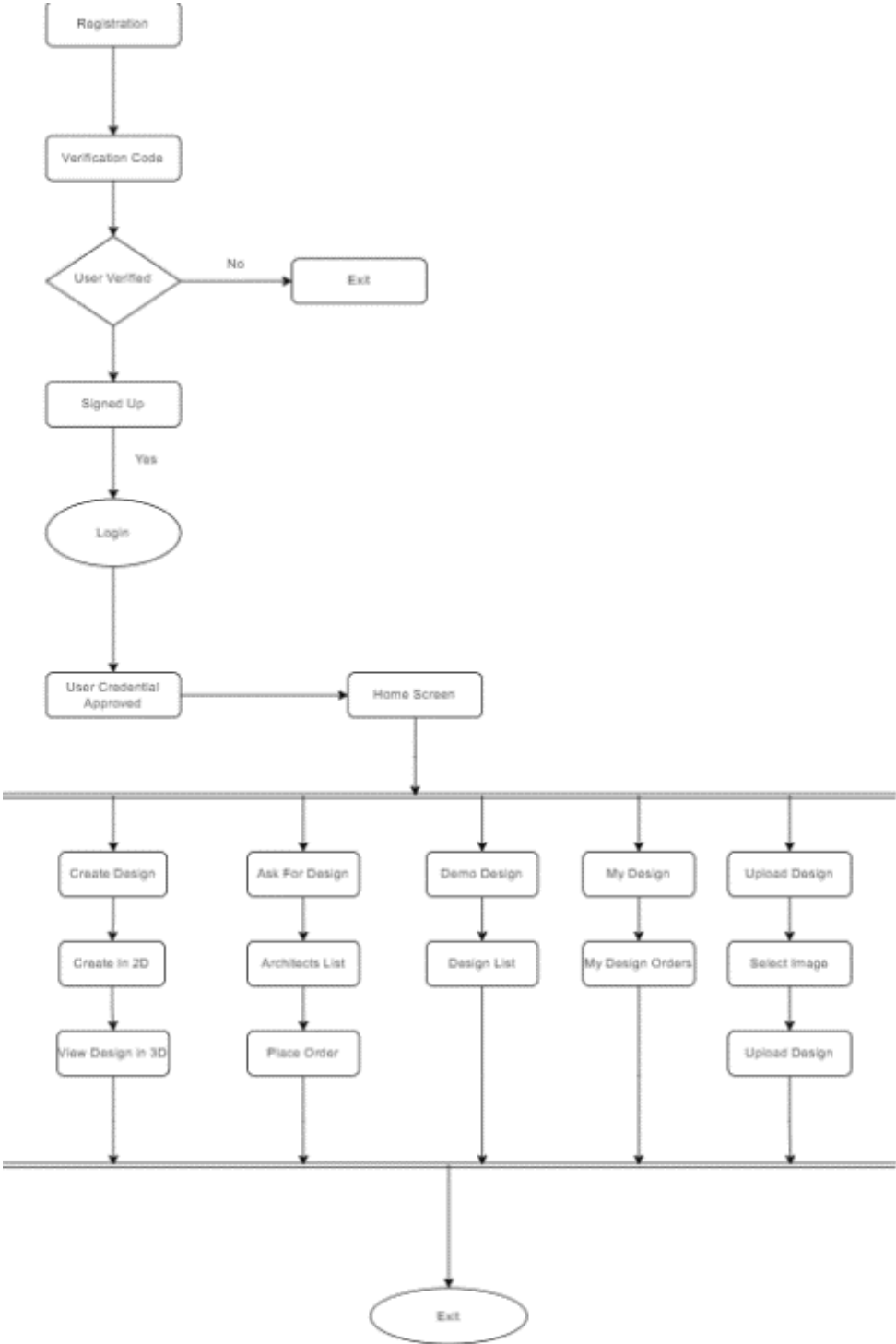


FIGURE 4.11: User Flow Diagram

4.7 Future enhancement

4.7.1 VR(future)

Some more advanced VR modules to be added in future and in future we will be giving our users the 3d modeler camera option that will work like the real 3d glasses and the users will be not having any Outsource device (like oculus). [11]

4.7.2 Deployment

As of now the application is hosted locally on the apache server. The development of this project is just for proof of Concept. When the project is fully operational we will host this web- site.

4.8 Appendix A

4.8.1 sectionUser Manual

User Manual shows guidance of system to its users. It provides bird's eye view of the complete system, and also how system will react upon specific actions. User guide of the intended application is given below:

4.8.2 Home page/login/signup

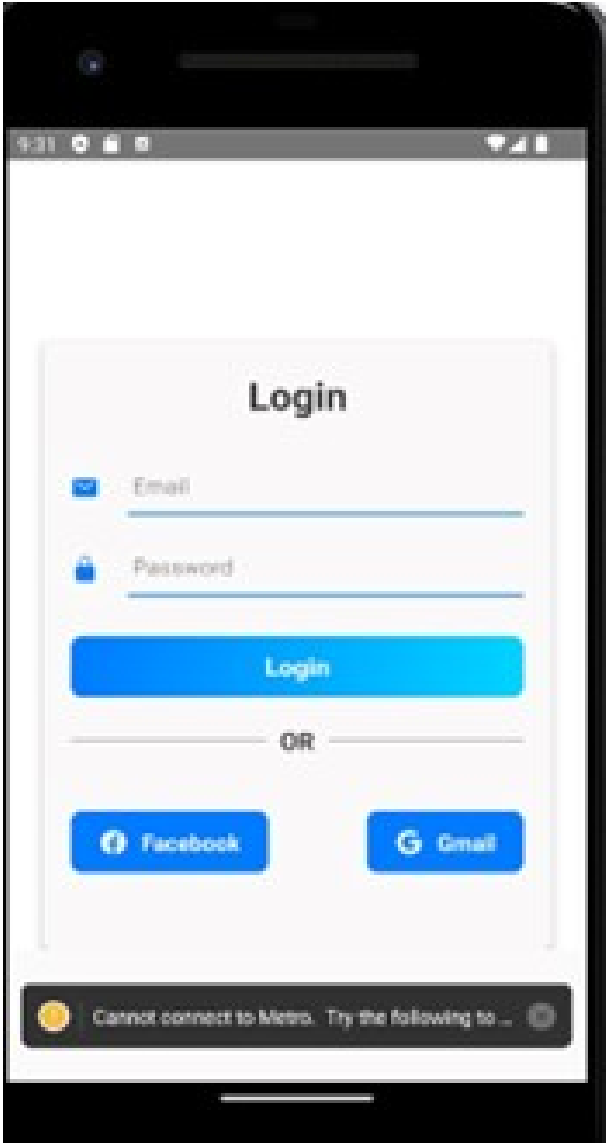


FIGURE 4.12: login page

4.8.3 Welcome Dashboard

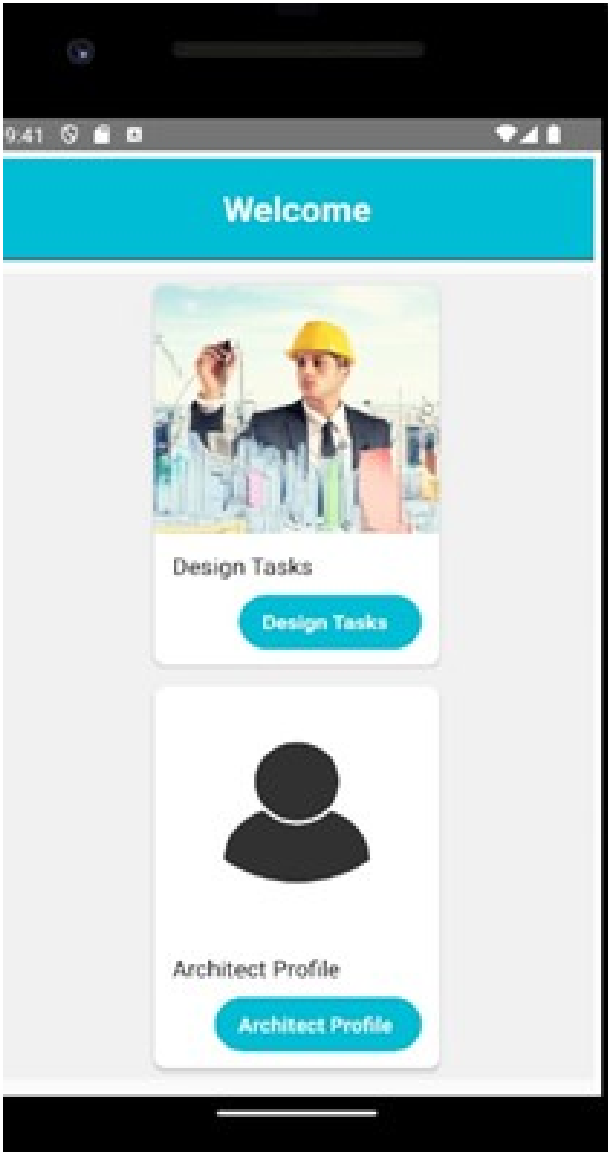


FIGURE 4.13: Welcome Dashboard



FIGURE 4.14: Welcome Screen 2

4.8.4 Designs



FIGURE 4.15: Designs



FIGURE 4.16: More Designs

4.8.5 Demo Designs

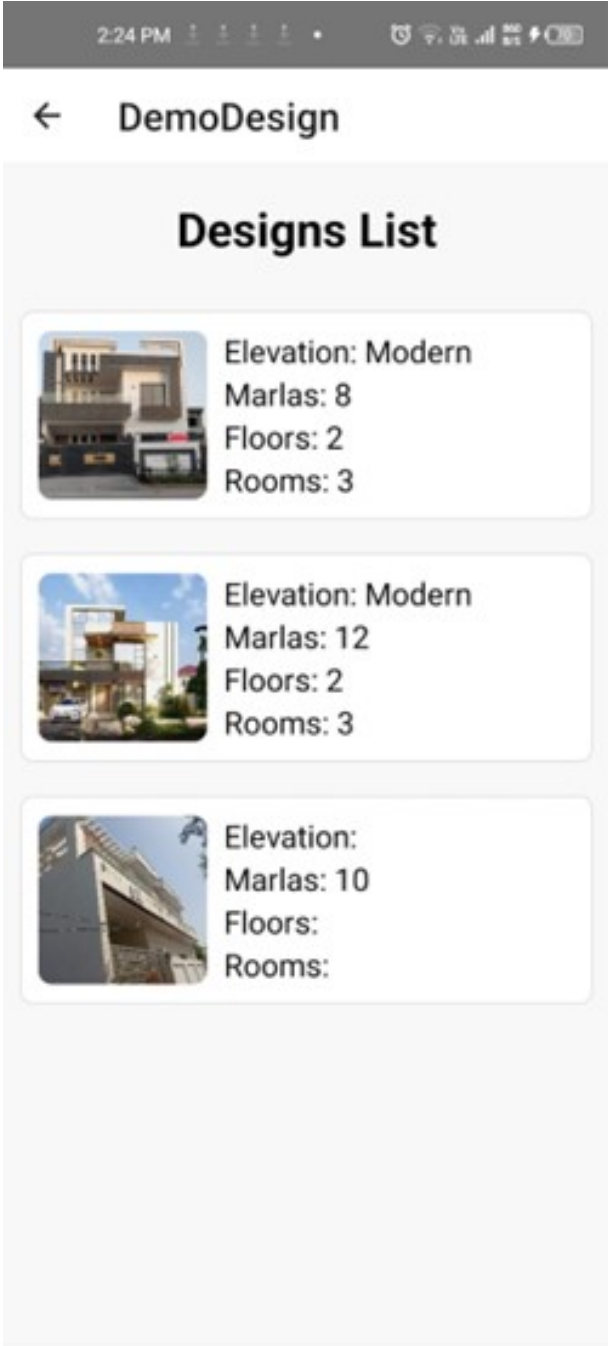


FIGURE 4.17: Demo Design List

4.8.6 Upload Design

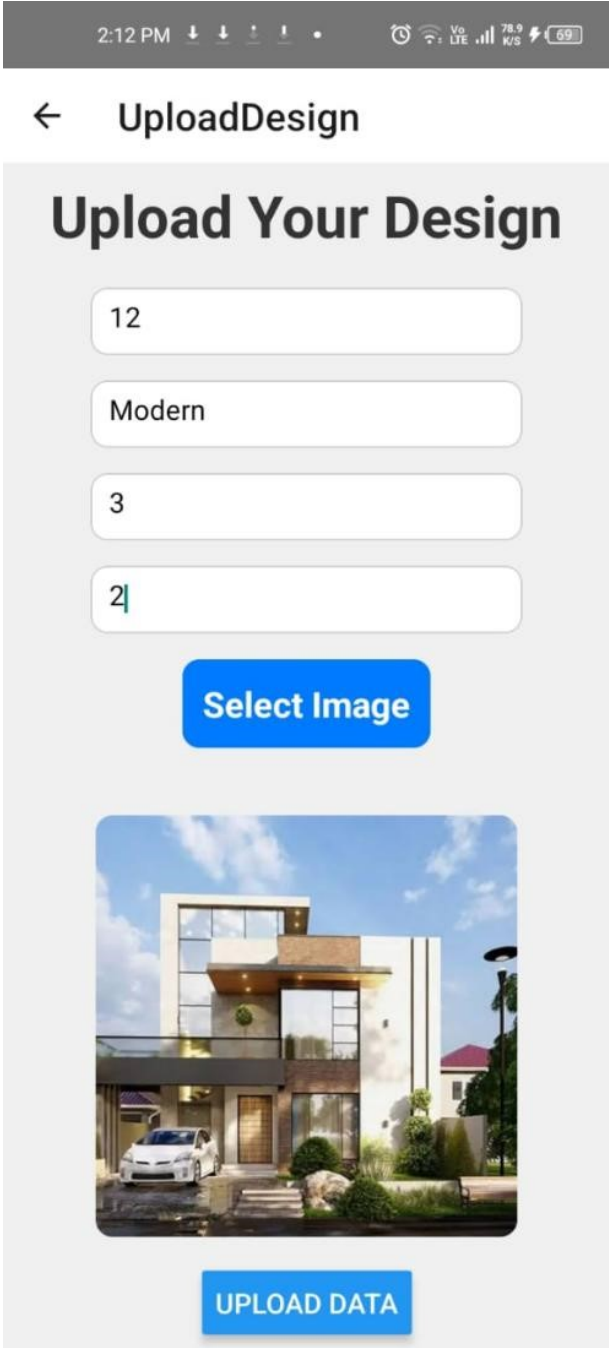


FIGURE 4.18: Upload Design

4.8.7 Successful upload

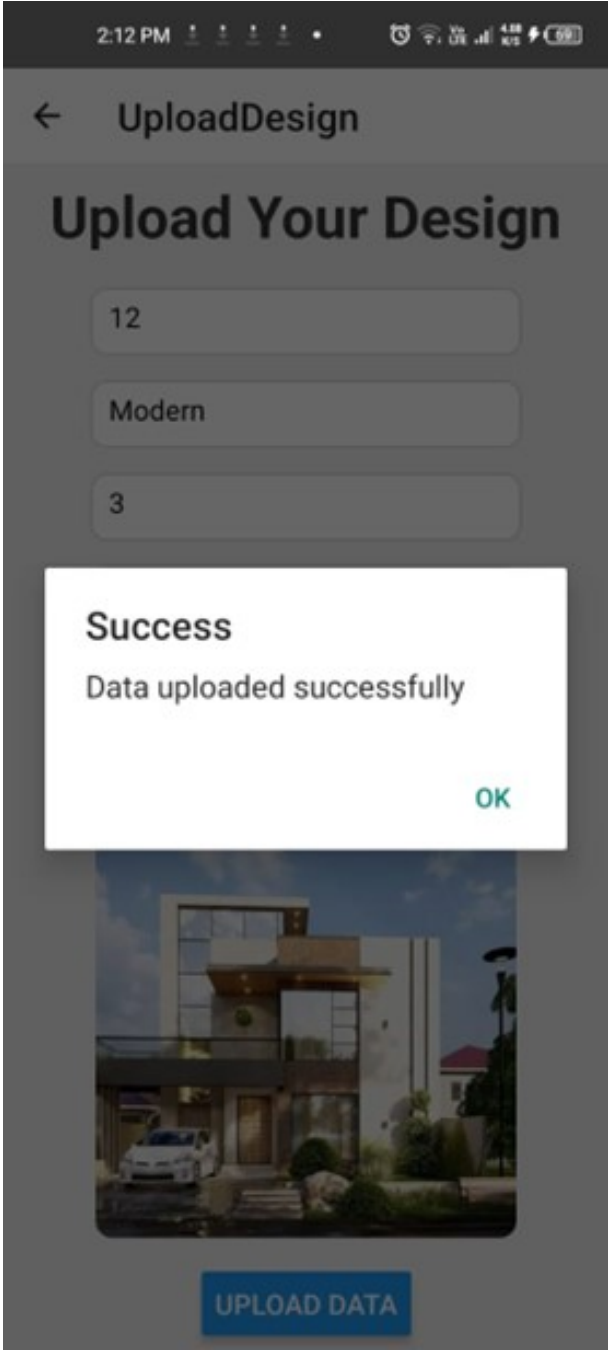


FIGURE 4.19: Successful Upload

4.8.8 Database Design

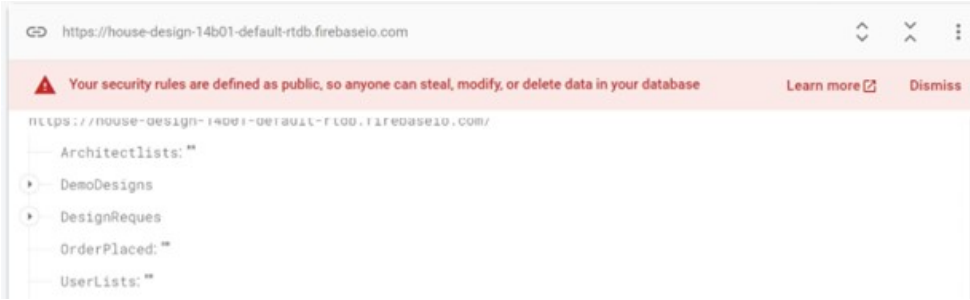


FIGURE 4.20: Database



FIGURE 4.21: Data Stored in Database

Chapter 5

Implementation

In this chapter we have discussed in detail the implementation of the system works we will define the tools and technologies, language, and its libraries along datasets that are used to make our fake job detection application. We have discussed the front-end implementation in chapter 4 individually. We started here with the Back end Where the crux of our model

Modules of 3D Buildings application are:

- User
- Architecture
- Admin

Database:

- Firebase Database
- React Native

- React JS React
- Hooks React

5.1 Project Modules

5.1.1 Front end

Node JS

Although Stream lit primarily operates with Python, JavaScript can be used to complement front end Functionalities further. In this project, JavaScript can be used for dynamic content and interactivity if needed.

React

Authentication and Registration: Components for user login/sign up.

Design Creation

viewer, gallery with ready-made designs, and editor for creating 3D models.

Working together

Communicate with architects to explore and create custom designs.

Order Placement Tracking

Managing VR visualization orders and monitoring building advancement.

Data management includes API integration for outside tools and database interaction components.

User assistance

A tutorial component that walks users through the features of the software.

5.1.2 Backend**Unity**

Unity is a flexible cross-platform game engine that can be used for video games, apps, and 2D/3D apps. [12] Crucial points

Cross-Platform

Compatible with multiple OSs and devices.

Graphics

Provides excellent physics-based 2D and 3D rendering.

Scripting

Bolt visual scripting and C are used.

Asset Store

Pre-made asset marketplace.

Community

Both official documentation and an active community.

Work together

Cloud-based platform for group training.

Networking

Facilitates server administration and multiplayer games.

Licensing

Both paid and free versions are offered.

React Native

React Native is ideal for 2D mobile applications because of its cross-platform development capabilities. [12] However, if you want to make 3D mobile apps, you should check into specialized programmers like Unreal Engine, Unity, or Three.js, which are designed to create stunning graphics and immersive 3D experiences on mobile devices. Based on the specific requirements of your project, make a choice.

Typescript

Typescript, [12] a statically-typed superset of JavaScript. Important characteristics:

- Static typing to identify errors early.
- Complies with JavaScript standards.
- Uses type inference and annotations to improve the quality of the code.
- ES6/ESNext features are supported.
- Gives structured code generics and interfaces.
- Provides strong editor support and tooling.
- Extensively utilized in web development, especially for substantial applications.

5.1.3 Database

Firestore

We are using this for real time database because many other applications are using this as database because of its Reliability and user friendly and they are giving real time data that a user got the correct output. [14]Firestore is a cloud-hosted platform, you don't need to install or manage any servers yourself. This facilitates A simple launch and rapid and easy scaling of your application.

Firestore provides numerous features, such as:

Real time database

A firestore database that enables real-time data syncing and storing across devices.

Authentication

A quick, safe method of verifying a user's identity within your application.

Storage

A scalable and safe solution to keep your app's files.

Hosting

A quick and dependable method of storing both static and dynamic content for your app.

Cloud Functions

A platform for server less computing that lets you run code without setting up or maintaining servers.

Cloud Messaging

A dependable and effective method of sending push alerts to users of your app.

Analytics

An effective platform for tracking user behavior that gives your insight into how users are using your app.

Remote Config

A method of dynamically altering your application's configuration without requiring an update.

Chapter 6

System Testing

Testing is the process of putting a system through its paces to find bugs and weaknesses. Software testing is the process of assessing and confirming that the proposed system performs as intended. Testing is an essential step in the software development life cycle that must be taken to eliminate all types of errors before it is fully released. Testing makes the system more usable and less prone to errors. On the other hand, bug and error rectification is one of the most important steps in the project development process.

6.1 Software Testing and Methodologies

Various software testing methodologies will be used on the proposed system as shown in the so that the system does not contain errors before ending in the user's hand. In the following sections, we'll go through the various testing methodologies and test cases. These topics will be discussed in this chapter:

- **Functional Testing**
- **Non-Functional Testing**

6.2 Functional Testing

This part makes sure that all the functional requirements of the proposed system are being fulfilled.

6.2.1 Unit Testing

In Unit testing, all the modules of the system are tested individually. Each module is referred to as a unit. All the units were tested separately so that it could be made sure that all of them are working correctly. The different modules of our application that are tested are User authentication, Prediction of the model, and front-end. All these modules were tested separately to make sure that all are working fine as a unit.

6.2.2 Integration Testing

In Integration testing, all the modules are combined so that they can be tested as a single system. It is checked whether or not the units combined function properly then they are integrated. First tested the units through unit testing then the units are tested when integrated to check its working correctly or not. Our proposed system was integrated after the units were cleared, the integration of modules that are User authentication, Prediction of the model and front-end was done and integration testing was done to make sure that they are working properly.

6.2.3 System Testing

First tested the units through unit testing then the system is tested as a whole to check its working correctly or not. After integration testing is done the system should be tested

to see whether it works correctly as a system or not. Our proposed system was tested as a single system after the integration was done. All the modules were combined and run as a single system to perform the task.

6.2.4 Black Box Testing

By providing random input, the proposed system validated the output result in relation to the functional requirements. It was put to the test by presenting random resumes, and observing the reaction. The system responded as it was expected and passed the Black Box Testing.

6.2.5 White Box Testing

To make sure everything is running well, we internally tested how well our application performed for resume analysis. The proposed system was presented to many individuals to see how it performs. The individuals interacted with the application and the results were satisfying.

6.3 Functional Testing

This section ensures that all of the non-functional requirements of the proposed system are met.

6.3.1 Performance Testing

We evaluated the system's total response time. like how long it takes for our application to analyze the resume's' legitimacy. The response time has been kept as short as possible. Performance testing led us to the conclusion that our system is responsive all around.

6.3.2 Acceptance Testing

We verified that the system's major requirements are met. We verified whether or not all of the functional requirements from the objective section had been met.

6.4 Usability Testing

Users with limited or no technological knowledge were put to the test to see if they could understand and use the application on their own. Usability testing was done using a sample of the intended audience for the web application. Usability testing was conducted to see how actual users interacted with the app and determine whether they were able to carry out the functions for which it was intended. The following guidelines were used when doing the usability testing:

- The proposed system should be easy to understand and use. The navigation should be made as easy as possible for the user to understand. The program should be simple for the user to register, log in, and explore.
- The application should make using it enjoyable for users. The colors should be chosen using their psychological effect on the human mind. Everything will be readable if the colors chosen have an appealing appearance and feel. The colors should be easy on the eyes.

6.4.1 Steps for Usability Testing

- Arrange the meeting
- Getting people to take part
- Planning the work
- Conducting the meeting
- Examining the facts

6.5 Used Test Cases

The test case can be defined as a scenario in which functionality is approximated across a variety of activities or conditions to confirm the desired result. Test cases are different types of tests that are used to have every kind of scenario possible for the proposed system. They can be used on any kind of system whether the system is automated or manual. In this phase, we verified the system's functioning and accuracy. The system and its parts are put to the test with various inputs, and the system's output is compared to the intended output.

6.5.1 Registration Test Case

In test case ID 1, the objective is to validate the registration process for a new user. The initial status confirms that the application is open. The test inputs involve providing the new user's email, name, and password. The expected result is the successful registration of the user, accompanied by the receipt of a confirmation message. The actual result aligns with expectations, as the user is successfully registered, and the confirmation message is

displayed. The overall status of the test case is marked as "pass," indicating that the registration functionality is functioning as intended in the tested scenario.

Test Case ID	1
Description	Registering a new user
Initial status	Application is open
Input	New users Email, name, password
Expected result	User is successfully registered and receives a confirmation message
Actual result	User successfully registered and confirmation message displayed
Status	pass

TABLE 6.1: Test Case 1

In Test Case ID 2, the scenario involves attempting to register a new user with existing credentials (email, name, password) while the application is open. The expected result is a failed registration, accompanied by an error message signaling that the provided email is already registered. The actual outcome aligns with expectations, as user registration fails, and the error message correctly indicates the preexistence of the email, resulting in a 'Fail' status for the test case.

Test Case ID	2
Description	Registering a new user
Initial status	Application is open
Input	Existing user's email, name, password
Expected result	User should not be registered, and an error message should be displayed
Actual result	User registration fails, and an error message indicates.
Status	Fail

TABLE 6.2: Test Case 2

6.5.2 Login Test Case

In Test Case ID 3, the objective is to verify the successful sign-in process using existing user credentials. The initial status involves opening the application. The input is the existing user's email and password. The expected result is that the user should log in successfully, leading to the dashboard display. The actual result confirms this expectation, indicating that the user successfully logged in, and the dashboard was appropriately displayed, resulting in a passed status for the test case.

Test Case ID 3

Test Case ID	3
Description	Signing in with existing user credentials
Initial status	Signing in with existing user credentials
input	Application is opened
Expected result	Existing user's email and password
Actual result	User successfully loginn to dashboard User logged in and dashboard displayed
status	pass

TABLE 6.3: Test case 3

Test Case ID 4

Test case ID 4 verifies the sign-in process with existing user credentials using incorrect email or password. The expected outcome is a failed login with an error message. The actual result aligns with expectations, as the user login fails, and an error message explicitly indicates that the provided credentials are incorrect. Therefore, the status for this test case is marked as "Fail" since the observed behavior aligns with the expected failure scenario.

Test Case ID	4
Description	Signing in with existing user credentials
Initial status	Signing in with existing user credentials
input	Incorrect email or password
Expected result	User login should fail, and an error message should be displayed
Actual result	User login fails, and an error message indicates incorrect credentials
status	Fail

TABLE 6.4: Test Case 04

6.5.3 Sign Up Existing User's Email Test Case

Test Case ID 5

In Test Case ID 5 Tests the user registration process by attempting to sign up with an existing user's email. The initial status is when the application is opened, and the input consists of an existing user's email, name, and password. The expected result is that the user is informed that the email is already registered. The actual result aligns with expectations, as the user receives an error message indicating that the email is already registered. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

Test Case ID	5
Description	Attempting to sign up with an existing user's email
Initial status	Application is opened
input	Existing user's email, name, password
Expected result	User is informed that the email is already registered
Actual result	User receives an error message indicating that the email is already registered
status	Pass

TABLE 6.5: Test case 05

6.5.4 Creating a 2D design Test Case

Test Case ID 6

Test Case ID	6
Description	Creating a 2D design
Initial status	User is logged in
input	User drags and drops elements to create a 2D design
Expected result	2D design is successfully created and visualized in 3D
Actual result	2D design is successfully created and visualized in 3D
status	Pass

TABLE 6.6: Test case 06

Test Case ID 7

Test Case ID	7
Description	Creating a 2D design
Initial status	User is logged in
input	User encounters an error while attempting to create a 2D design
Expected result	2D design is successfully created and visualized in 3D
Actual result	User faces an error during the design creation process
status	Fail

TABLE 6.7: Test case 07

Tests the user's ability to create a 2D design by dragging and dropping elements. The initial status is when the user is logged in, and the input involves the user dragging and dropping elements to create a 2D design. The expected result is that the 2D design is successfully created and visualized in 3D. The actual result aligns with expectations, as the 2D design is successfully created and visualized in 3D. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

6.5.5 Placing an order for a design Test Case

Test Case ID 8

Test Case ID	8
Description	Placing an order for a design
Initial status	User has a created or selected design
input	User provides order details and submits the order
Expected result	Order details are successfully submitted, and architects can review it
Actual result	Order details are successfully submitted, but architects cannot review it
status	Pass

TABLE 6.8: Test Case 08

Test Case ID	9
Description	Placing an order for a design
Initial status	User has a created or selected design
input	User provides order details and submits the order
Expected result	Order details are successfully submitted, and architects can review it
Actual result	Order details are successfully submitted, but architects cannot review it
status	Fail

TABLE 6.9: Test case 09

Tests the user's ability to place an order for a design. The initial status is when the user has a created or selected design, and the input involves the user providing order details and submitting the order. The expected result is that order details are successfully submitted, and architects can review it. However, the actual result indicates that although order details are successfully submitted, architects cannot review it. Therefore, the status for this test case is marked as "Pass."

6.5.6 Managing user-uploaded designs Test Case

Test Case ID 10

Test Case ID	10
Description	Managing user-uploaded designs
Initial status	User is logged in
input	User accesses the "My Design" section and interacts with user-uploaded designs
Expected result	User can view and manage their uploaded designs
Actual result	User Successfully view and manage their uploaded designs
status	Pass

TABLE 6.10: Test Case 10

Test Case ID 11

Test Case ID	11
Description	Managing user-uploaded designs
Initial status	User is logged in
input	User accesses the "My Design" section and interacts with user-uploaded designs
Expected result	User can view and manage their uploaded designs
Actual result	User encounters an error while managing designs
status	Fail

TABLE 6.11: Test case 11

Tests the functionality of managing user-uploaded designs. The initial status is when the user is logged in, and the input involves accessing the "My Design" section and interacting with user-uploaded designs. The expected result is that the user can view and manage their uploaded designs. The actual result aligns with expectations, as the user

successfully views and manages their uploaded designs. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

6.5.7 Viewing design tasks as an architect Test Case

Test Case ID 12

Test Case ID	12
Description	Viewing design tasks as an architect
Initial status	Architect is logged in
input	Architect accesses the "Design Tasks" section
Expected result	Architect can view a list of assigned design tasks
Actual result	Architect Successfully view the list of assigned Design Tasks
status	Pass

TABLE 6.12: Test Case 12

This test case examines the functionality of viewing design tasks as an architect. The initial status is when the architect is logged in, and the input involves accessing the "Design Tasks" section. The expected result is that the architect can view a list of assigned design tasks. The actual result aligns with expectations, as the architect successfully views the list of assigned design tasks. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

6.5.8 Updating architect profile Test Cases

Test Case ID	13
Description	Updating architect profile
Initial status	Architect is logged in
input	Provides updated professional information in the "Architect Profile" section
Expected result	Architect profile is successfully updated
Actual result	Architect profile updated Successfully
status	Pass

TABLE 6.13: Test case 13

This test case evaluates the process of updating an architect's profile. The initial status is when the architect is logged in, and the input involves the architect providing updated professional information in the "Architect Profile" section. The expected result is that the architect's profile is successfully updated. The actual result aligns with expectations, as the architect's profile is updated successfully. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

6.5.9 Admin tracking design orders Test Cases

Test Case ID 14

Test Case ID	14
Description	Admin tracking design orders
Initial status	Admin is logged in
input	Admin accesses the "Track Orders" section to monitor design order status
Expected result	Admin successfully tracks design order status
Actual result	Admin Successes while tracking orders
status	Pass

TABLE 6.14: Test case 14

This test case assesses the admin's ability to track design orders. The initial status is when the admin is logged in, and the input involves the admin accessing the "Track Orders" section to monitor the status of design orders. The expected result is that the admin successfully tracks the design order status. The actual result aligns with expectations, as the admin successfully tracks orders. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

6.5.10 Admin managing architects Test Cases

Test Case ID	15
Description	Admin managing architects
Initial status	Admin is logged in
input	Admin accesses the "Manage Architects" section to view and manage architect data
Expected result	Admin successfully manages architect data
Actual result	Admin successfully manages architect data
status	Pass

TABLE 6.15: Test case 15

This test case evaluates the admin's capability to manage architects. The initial status is when the admin is logged in, and the input involves the admin accessing the "Manage Architects" section to view and manage architect data. The expected result is that the admin successfully manages architect data. The actual result aligns with expectations, as the admin successfully manages architect data. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

6.5.11 Admin managing users Use Case

Test Case ID	16
Description	Admin managing users
Initial status	Admin is logged in
input	Admin accesses the "Manage Users" section to view and manage user data
Expected result	Admin successfully manages user data
Actual result	Admin successfully manages user data
status	Pass

TABLE 6.16: Test case 16

This test case assesses the admin's ability to manage users. The initial status is when the admin is logged in, and the input involves the admin accessing the "Manage Users" section to view and manage user data. The expected result is that the admin successfully manages user data. The actual result aligns with expectations, as the admin successfully manages user data. Therefore, the status for this test case is marked as "Pass" since the observed behavior matches the expected outcome.

Chapter 7

Conclusions

The **3D Building Application** project effectively launched an interactive application that enhances user engagement through immersive experiences and facilitates the study of 3D buildings. By utilizing cutting-edge 3D and 2D modelling tools, a unique platform that goes beyond conventional modelling techniques was developed. [9]

Important conclusions and ideas from this project include:

Enhanced User Engagement:

Through intuitive exploration and immersive design, users were able to gain a deeper grasp of architectural designs and spatial relationships, which led to increased Engagement and interaction.

Technological breakthroughs:

By pushing the limits of 2D and 3D modelling tools, there was a need for cutting-edge hardware and software, which paved the way for additional modelling technology breakthroughs.

Flexible Real-World Applications:

The programmer proved useful outside of its original purview in a number of fields, including educational resources, urban planning, and architectural design. Its capacity to provide virtual tours of historical places and buildings now under construction has important implications for both professional and educational settings.

Overcoming Obstacles:

Ensuring user-friendly interactions and optimizing graphics for flawless performance proved to be challenging aspects of the project. These difficulties were successfully overcome by constant iteration, optimization, and thorough testing.

Prospects for Further Development:

The "3D Building Application" project has a great deal of room to grow in the future. Some of these improvements might include augmented reality (AR) integration, mobile platform growth, and collaborative tools designed with engineers and architects in mind.

Personal and Professional Development:

This project gave the team members a chance to learn new techniques for developing 2D and 3D models, managing projects, and addressing problems. The project has been an invaluable educational opportunity that has prepared team members for future contributions in the ever-evolving field of modelling technology.

Gratitude and Acknowledgments:

The team is incredibly appreciative of the steadfast support and priceless contributions from mentors, project advisers, and other team members. Their direction was crucial to this project's successful conclusion.

To sum up, the "3D Building Application" project achieved more than expected and represents a critical turning point in the development of modelling technology in the domains of architecture and allied arts.

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