

CERTIFICATE

This is to certify that the project work entitled “**AR Based Furniture Visualization**” has been successfully carried out in the Graduate Studies and Research in Computer Science by **Anisha Andrade (Reg No: 22BCMGG05)**, student of **III BCA (Metaverse, Gaming, Graphic Design, AR&VR with IBM)**, under the supervision and guidance of **Ms. Sindhu Sandesh**.

Internal Guide: Ms. Sindhu Sandesh

Chairperson: _____

Internal Examiner: _____

External Examiner: _____

PRINCIPAL

Prof (Dr.) Arun A. Bhagawath

The Yenepoya Institute of Arts, Science, Commerce and Management
(Deemed to be University)

Submitted for the viva-voice

Place: Mangalore



DECLARATION

I Anisha Andrade bearing Reg. No.22BCMGG05 hereby declare that this project report entitled “AR-Based Furniture Visualization” had been prepared by me towards the partial fulfilment of the requirement for the award of the Bachelor of Computer Application at Yenepoya (Deemed to be University) under the guidance of Ms. Sindhu Sandesh, Department of Computer Science, The Yenepoya Institute of Arts, Science, Commerce and Management.

I also declare that this field study report is the result of my own effort and that it has not been submitted to any university for the award of any degree or diploma.

**Place: Mangalore
Date:**

**Anisha Andrade
III BCA (MGG,AR&VR)
22BCMGG05**

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to the individuals and the institution that made the successful completion of this project possible.

My deepest appreciation goes to our esteemed Principal and Dean of Science, Prof. (Dr.) Arun Bhagawath, for providing the essential resources and unwavering support throughout this endeavor.

I also extend my sincere thanks to our dedicated Vice Principals, Dr. Shareena P, Dr. Jeevan Raj, and Mr. Narayana Sukumar, for their consistent encouragement and belief in this project. A special acknowledgement is due to Dr. Rathnakara Shetty, Head of the Department of Computer Science, for their invaluable guidance and insightful suggestions that significantly contributed to the project's direction and quality.

Finally, I am particularly grateful to my internal guide, Ms. Sindhu Sandesh, for their exceptional patience, dedicated guidance, and constructive feedback, which were instrumental in navigating the complexities of this project.

**Place: Mangalore
Date:**

**Anisha Andrade
III BCA (MGG,AR&VR)
22BCMGG05**

INDEX

TABLE OF CONTENTS

1. INTRODUCTION	3-4
1.1 OVERVIEW OF THE PROJECT	
1.2 OBJECTIVE OF THE PROJECT	
1.3 PROJECT CATEGORY	
1.4 TOOLS AND PLATFORM TO BE USED	
1.5 OVERVIEW OF THE TECHNOLOGIES USED	
1.5.1 Hardware Requirements	
1.5.2 Software Requirements	
1.5.3 Front End Back End Programming Languages	
1.6 ORGANIZATION PROFILE	
1.7 STRUCTURE OF THE PROGRAM	
1.8 STATEMENT OF THE PROBLEM	
2. SOFTWARE REQUIREMENTS SPECIFICATION	5 - 9
2.1 INTRODUCTION	
2.1.1 Purpose	
2.1.2 Scope of the project	
2.1.3 Intended audience and Reading Suggestions	
2.1.4 Definitions, Acronyms and Abbreviations	
2.1.5 References	
2.1.6 Overview	
2.2 OVERALL DESCRIPTION	
2.2.1 Product Perspective	
2.2.2 Product Features	
2.2.3 User Characteristics	
2.3 OPERATING ENVIRONMENT	
2.3.1 Design and Implementation Constraints	
2.3.2 General Constraints	
2.3.3 Assumptions and Dependencies	
2.4 SPECIFIC REQUIREMENTS	
2.4.1 External Interface Requirements	
2.4.1.1 User Interface	
2.4.1.2 Hardware Interface	
2.4.1.3 Software Interface	
2.4.1.4 Communication Interface	
2.4.2 Functional Requirements	
2.4.3 Performance Requirements	
2.4.4 Design Constraints	
2.4.5 Other Requirements	
3. SYSTEM ANALYSIS AND DESIGN	10 - 14
3.1 INTRODUCTION	
3.2 DATA FLOW DIAGRAM	

3.3	SYSTEM DESIGN IMPLEMENTATION	
3.3.1	Use case	
3.3.2	Class Diagram	
3.3.3	Activity Diagram	
3.3.4	Sequence Diagram	
3.4	USER INTERFACE DESIGN	
4.	TESTING-----	15-17
4.1	INTRODUCTION	
4.2	TESTING OBJECTIVE	
4.3	TEST CASES	
4.3.1	Launch AR Viewer	
4.3.2	Plane Detection (Horizontal)	
4.3.3	Plane Detection (Vertical)	
4.3.4	Furniture Model Placement	
4.3.5	Object Manipulation	
4.3.6	Product Info Display	
4.3.7	Purchase Redirection	
4.3.8	Delete Furniture Object	
5.	SYSTEM SECURITY-----	18
5.1	INTRODUCTION	
5.2	SOFTWARE SECURITY	
6.	CONCLUSION-----	19
7.	FUTURE ENHANCEMENTS-----	20-21
8.	WEEKLY PROGRESS REPORTS-----	22-33
9.	APPENDIX-----	34-35
10.	BIBLIOGRAPHY-----	36

1. INTRODUCTION

1.1 Overview of the Project

This project focuses on the development of a mobile application utilizing Augmented Reality (AR) technology to enhance the furniture shopping experience. The application enables users to visualize 3D models of furniture within their actual physical surroundings through their device's camera. Users can interact with these virtual furniture pieces by placing, moving, rotating, and resizing them in real time. This immersive preview helps users assess both the aesthetic and spatial suitability of the furniture in their environment before making a purchase. The project aims to bridge the gap between imagination and reality, thereby empowering customers to make more informed and confident buying decisions.

1.2 Objective of the Project

This project aims to:

- To offer an immersive AR experience that helps users understand how a furniture item would look and fit in their space.
- To provide hands-on interaction with furniture models through features such as rotation, scaling, and repositioning.
- To enrich user decisions with detailed specifications like dimensions, color variants, and pricing.
- To streamline the shopping process by connecting users directly to product purchase pages via in-app e-commerce integration.
- To design a clean and accessible user interface that ensures ease of use across different user groups.

1.3 Project Category

The project is categorized under immersive technology-based mobile applications, combining Augmented Reality with interactive product visualization and commercial utility.

1.4 Tools and Platforms to be Used

- Unity 3D: Game engine for building the AR application.
- AR Foundation (ARCore/ARKit): AR development toolkit.
- Blender: For creating and editing 3D furniture models.
- C#: Primary scripting language in Unity.

1.5 Overview of the Technologies Used

1.5.1 Hardware Requirements

- Android/iOS smartphones with AR support
- Windows/macOS PC with Unity

1.5.2 Software Requirements

- Unity 3D Engine and Visual Studio
- ARCore via AR Foundation
- Blender

1.5.3 Front-End and Back-End Programming Languages

- Front-End: Unity (C#), UI designed with Unity Canvas
- Back-End: Unity (C#)

1.6 Organization Profile

The project is developed as a part of the academic curriculum for the Bachelor of Computer Applications (BCA) final year project. It is undertaken independently by the student to demonstrate skills in AR mobile app development.

- Mobile development with Unity
- AR Foundation implementation
- 3D object interaction design

1.7 Structure of the Program

The application is structured into the following modules:

- AR Visualization Module: Handles 3D model placement, movement, rotation, and scaling.
- Product Information Part: Provides the website link about product details,
- E-commerce Part: Provides website link to purchase selected furniture.
- User Interface Module: Manages user interaction with buttons, panels, and navigation.

1.8 Statement of the Problem

Furniture shopping is challenging without the ability to visualize products in real-world settings. Customers often face issues with size estimation, color mismatches, and fitting furniture in a room. This project aims to solve these problems by providing an immersive AR experience that bridges the gap between physical and digital shopping.

2. SOFTWARE REQUIREMENTS SPECIFICATION

2.1 INTRODUCTION

2.1.1 Purpose

The purpose of this document is to specify the functional and non-functional requirements of the AR Furniture Visualization App. It defines how the system should behave, interact with users, and integrate with external systems such as e-commerce platforms. Additionally, this document will act as a contract between the client (in this case, academic evaluators) and the development team.

2.1.2 Scope of the Project

The application allows users to place 3D furniture models into their real-world environment using AR. Users can manipulate the furniture, view detailed information, and access purchase links. The app aims to enhance the shopping experience by providing an immersive, interactive, and informative preview of products.

This project is intended for Android devices that support ARCore and will be developed using Unity and AR Foundation. The app supports various furniture models like chairs, sofas, tables, and more.

2.1.3 Intended Audience and Reading Suggestions

This document is intended for students, faculty evaluators, and future developers or maintainers of the project. It is structured into clearly defined sections to facilitate easy understanding of both the technical and non-technical aspects of the system. It is recommended that readers go through Section 1 for context, followed by Sections 2 and 3 for technical insights.

2.1.4 Definitions, Acronyms and Abbreviations

- **AR** – Augmented Reality
- **UI** – User Interface
- **3D** – Three-Dimensional
- **APK** – Android Package
- **SRS** – Software Requirements Specification

- **SDK** – Software Development Kit
- **UX** – User Experience

2.1.5 References

- Unity Documentation
- AR Foundation Documentation
- Android Developer Guides
- YouTube Tutorials
- Stack Overflow Discussions on Unity AR
- Google ARCore Documentation

2.1.6 Overview

This document includes sections detailing the application's design, features, user roles, system requirements, diagrams, and test cases. It acts as a blueprint for understanding and developing the system efficiently.

Sections are arranged to follow the standard IEEE SRS format for clarity and consistency.

2.2 OVERALL DESCRIPTION

2.2.1 Product Perspective

The AR Furniture Visualization App allows users to place and interact with virtual furniture models in their real-world environment using their mobile camera. It bridges the gap between online shopping and real-world spatial understanding.

2.2.2 Product Features

- Real-time AR placement of furniture models
- Object manipulation: move, rotate, and resize
- Product details: description, price, and specifications
- External redirection to purchase the item
- User-friendly UI with smooth controls
- Support for multiple furniture types

2.2.3 User Characteristics

The application is targeted at general users who shop online and wish to visualize how furniture fits into their space. No technical expertise is required. Users should be familiar with basic smartphone operations.

2.3 OPERATING ENVIRONMENT

- Android smartphones supporting ARCore
- Internet access for loading purchase links
- Unity Engine (2019.4.32f1) and AR Foundation

2.3.1 Design and Implementation Constraints

- Requires camera and gyroscope
- Needs well-lit and surface-visible environments
- Limited to Android devices with ARCore

2.3.2 General Constraints

- Dependent on ARCore support and device specs
- E-commerce link functions only with internet access
- AR accuracy may vary based on device hardware

2.3.3 Assumptions and Dependencies

- Users will grant camera permissions
- Devices are AR-compatible and meet minimum system requirements
- Users have basic internet connectivity

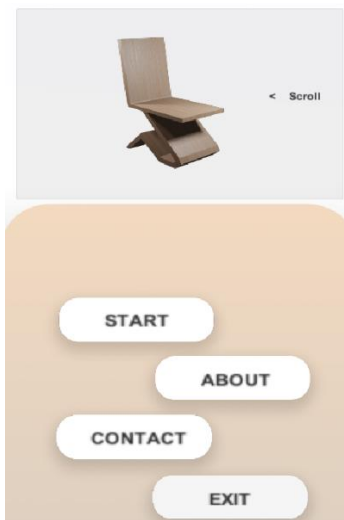
2.4 SPECIFIC REQUIREMENTS

2.4.1 External Interface Requirements

2.4.1.1 User Interface

- Home screen with navigation buttons (AR World, Products, Purchase, About App)
- AR screen with 3D preview and furniture placement features
- Product details screen with images and info
- Navigation and interaction via touch gestures and buttons

Example:



2.4.1.2 Hardware Interface

ARCore-supported device with camera and motion sensors.

2.4.1.3 Software Interface

Unity 3D, AR Foundation, and Android SDK.

2.4.1.4 Communication Interface

- HTTPS for backend communication

2.4.2 Functional Requirements

- Detect flat surface using AR
- Place and manipulate 3D models
- Display product info panel
- Redirect to purchase page on tap
- Exit application safely and reset view

2.4.3 Performance Requirements

- Models should appear within 2 seconds
- Frame rate should be smooth (above 24 fps)
- UI should respond instantly to touch input

2.4.4 Design Constraints

- Platform: Android
- Dependency: ARCore compatibility
- Built using Unity

2.4.5 Other Requirements

- Must not crash when AR fails
- Should exit gracefully on back navigation
- Follow Google Play Store app submission guidelines

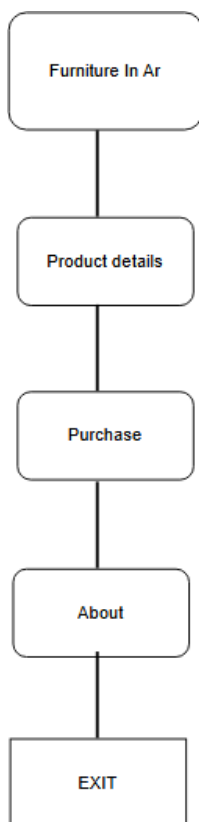
3. SYSTEM ANALYSIS AND DESIGN

3.1 INTRODUCTION

This section outlines the technical structure of the system, including the flow of data and user interactions, using standard design models.

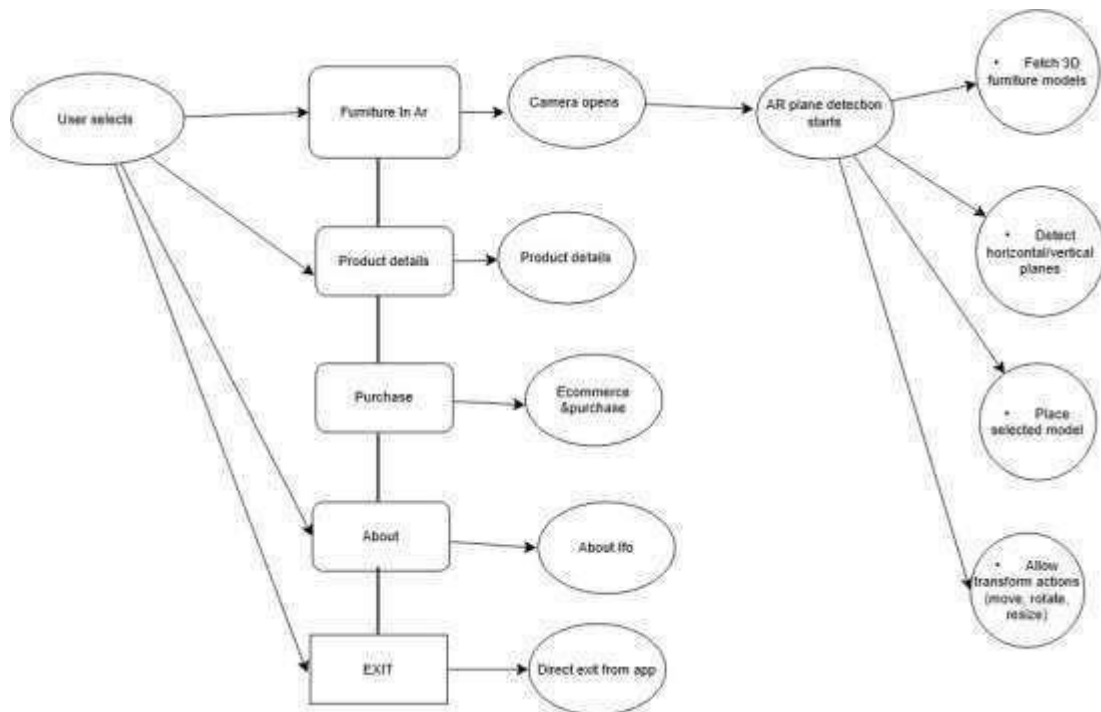
3.2 DATA FLOW DIAGRAM (DFD)

Level 0 DFD (Context Level Diagram)



Level 1 DFD

- Input: User selects AR mode → Camera opens → AR plane detection starts



- Output: Visual preview and interaction with furniture, access to product info and purchase link

3.3 SYSTEM DESIGN IMPLEMENTATION

3.3.1 Use Cases

Actors:

- User

Use:

- Launch AR Viewer
- Detect Surface
- Place Furniture Model
- Rotate/Resize/Delete Model
- View Product Info
- Redirect to Purchase Link

3.3.2 Class Diagram

Classes:

1. Furniture

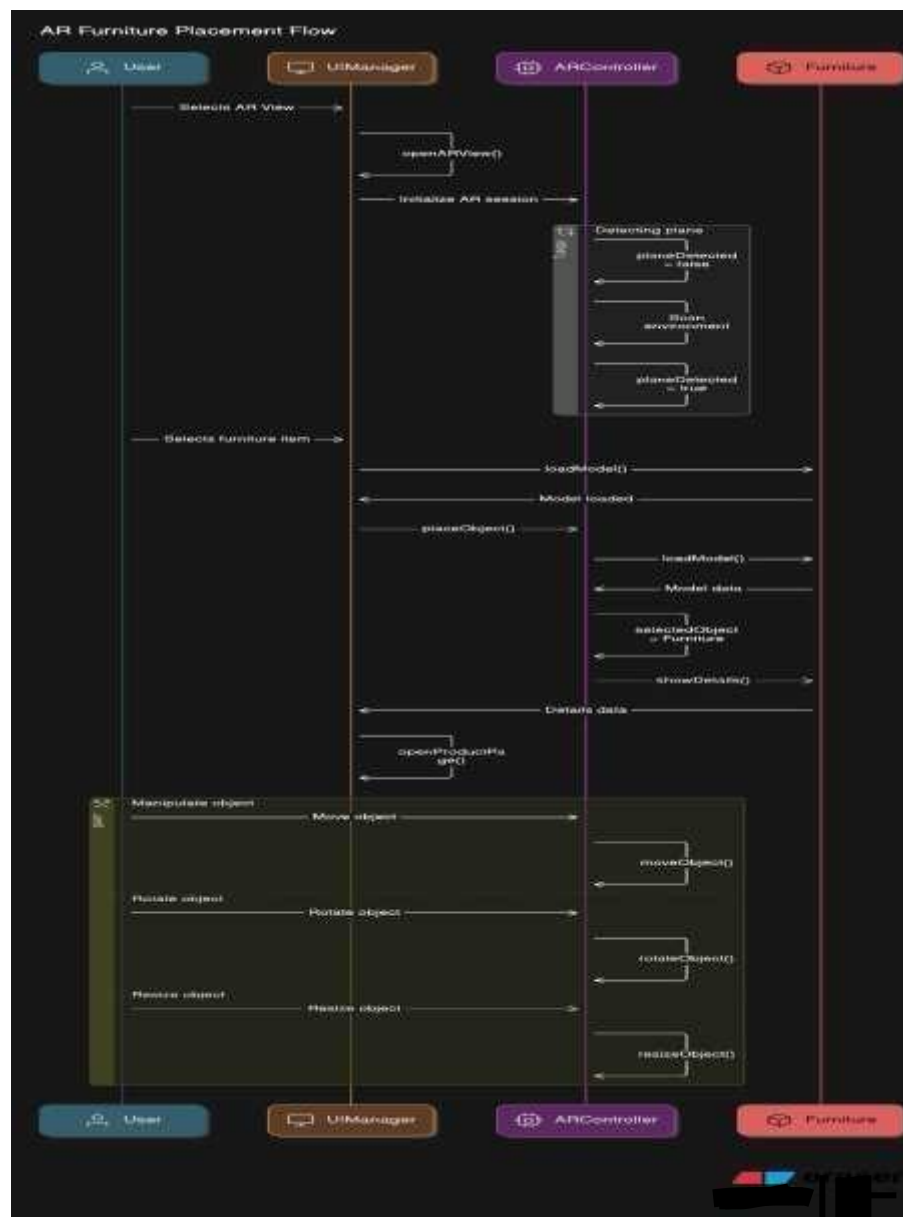
- Methods: loadModel(), showDetails()

2. ARController

- Attributes: selectedObject, planeDetected
- Methods: placeObject(), moveObject(), rotateObject(), resizeObject()

3. UIManager

- Attributes: currentScreen, selectedMenu
- Methods: openARView(), openProductPage(), openPurchaseLink()



**Class Diagram of AR APP

3.3.3 Activity Diagram

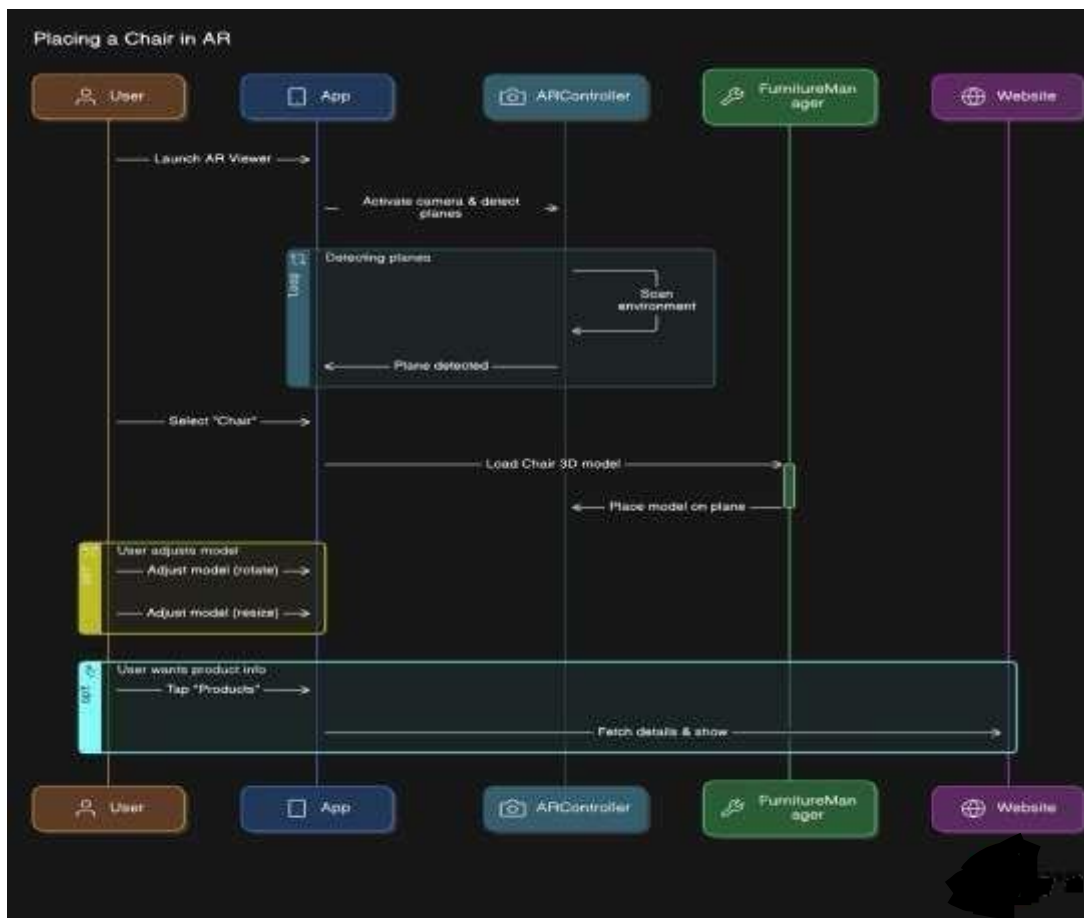
Activity: Placing Furniture in AR

Start → Launch Application → Start AR Session → Detect Plane → Select Furniture Item → Place Model → Move/Rotate/Resize → Confirm Placement → View Product Info → Exit

3.3.4 Sequence Diagram

Sequence:

- User initiates AR session
- System detects surface and places model
- User interacts with model
- Product info is retrieved and displayed
- On tap, user is redirected to purchase

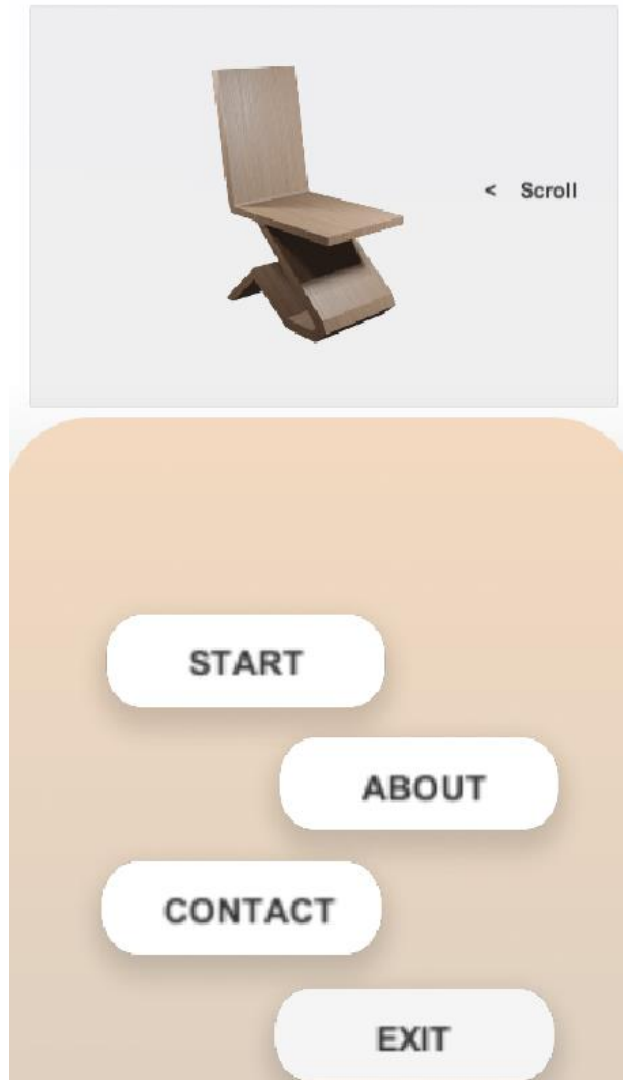


****Sequence Diagram shows the functioning of app.**

3.4 USER INTERFACE DESIGN

Screens:

- Home Screen with Start/Exit options
- AR View with controls to place and interact with furniture
- Product Information Popup
- Purchase Redirection Option



****The Main Menu**

4. TESTING

4.1 INTRODUCTION

Testing is a critical phase in the software development life cycle to ensure that the application performs as expected under various scenarios. This chapter outlines the testing strategies, objectives, and detailed test cases for the AR furniture visualization app.

The purpose of testing is to validate functionality, performance, and user interactions, and to ensure that the AR environment is reliable and provides a seamless experience to the user.

4.2 TESTING OBJECTIVE

The primary objective of testing is to verify the functionality and performance of the AR Furniture Visualization App across different modules. Each test case is designed to ensure that the app meets its intended requirements, responds properly to user inputs, and functions reliably across supported devices.

The testing also ensures that:

- AR session initializes correctly.
- Surface detection and gi object placement operate as expected.
- UI elements respond without lag or error.
- External redirections to product purchase pages are secure and functional.

4.3 TEST CASES

4.3.1 Launch AR Viewer

Test Case ID	TC001
Description	Check if AR viewer launches correctly
Input	Launching application and waiting for AR session initialization
Expected Result	AR camera view launches and begins surface detection
Actual Result	AR view launched successfully and tracking started
Status	Pass

4.3.2 Plane Detection (Horizontal)

Test Case ID	TC002
Description	Surface detection
Input	Point the device at a flat surface
Expected Result	Placement indicator displayed after detection
Actual Result	Plane detected successfully
Status	Pass

4.3.3 Plane Detection (Vertical)

Test Case ID	TC003
Description	Surface detection
Input	Point the device towards a wall or upright surface.
Expected Result	Vertical plane is detected or system ignores safely.
Actual Result	Works as expected
Status	Pass

4.3.4 Furniture Model Placement

Test Case ID	TC004
Description	3D Object Rendering
Input	Select a model and tap once on the screen
Expected Result	Model appears on the plane at tapped position
Actual Result	Works as expected
Status	Pass

4.3.5 Object Manipulation

Test Case ID	TC005
Description	AR Interaction
Input	Tap & drag to move, two fingers to resize/rotate.
Expected Result	Model moves, rotates and resizes correctly
Actual Result	Works as expected
Status	Pass

4.3.6 Product Info Display

Test Case ID	TC006
Description	UI Panel Display
Input	Tap on the product button.
Expected Result	Opens external browser web view to products page
Actual Result	Display is accurate
Status	Pass

4.3.7 Purchase Display

Test Case ID	TC007
Description	External Link Navigation
Input	Tap on the Purchase button.
Expected Result	Opens external browser web view to purchase page
Actual Result	Display is accurate and Re-direct successful
Status	Pass

4.3.8 Delete Furniture Object

Test Case ID	TC008
Description	AR Object Removal
Input	Tap on the "Delete" button.
Expected Result	Last placed object disappears from scene
Actual Result	Works as expected
Status	Pass

5. SYSTEM SECURITY

5.1 INTRODUCTION

System security plays a crucial role in ensuring that the application behaves safely, respects user privacy, and maintains the integrity of the device on which it runs. Since this application uses device hardware features such as the camera and internet, it is important to handle permissions and data interactions securely and responsibly.

The AR Furniture Visualization App does not store or transmit any user data and adheres to Android's permission and security policies.

5.2 SOFTWARE SECURITY

5.2.1 Data Privacy

- No personal data storage: The app doesn't collect or store user information.
- Camera usage limited to AR only: No recordings or location tracking.

5.2.2 API & External Link Security

- HTTPS is used for all external links and API calls.
- Minimal permissions: Only camera access is requested, with runtime permission prompts.

5.2.3 Device Safety

- AR compatibility check: Ensures app runs only on ARCore/ARKit-supported devices.
- Safe exit: App exits gracefully without background tracking or unwanted resource use.

5.2.3 Best Practices

- Secure coding guidelines followed.
- No debug logs in production.
- Regular updates for dependencies and AR libraries.

6. CONCLUSION

The **AR Furniture Visualization Mobile Application** successfully demonstrates how **Augmented Reality (AR)** can be integrated into the shopping experience to assist users in visualizing furniture in their real environment before purchase. This real-time visualization helps users make **more confident and informed decisions**.

The application provides features such as:

- **Placement of 3D furniture models** into real-world surroundings
- **Object manipulation** through move, rotate, and resize functionalities
- **Product information display** including price, description, and dimensions

This project showcases how **immersive technologies** like AR can be applied to **practical and commercial use cases** such as e-commerce and interior design.

The application was developed using **Unity, AR Foundation, and ARCore**, and was tested for **performance, accuracy, and user experience**. It fulfilled all functional requirements and proved to be **stable and responsive** on supported devices.

In conclusion, this project achieves its intended goal of creating a user-friendly, functional AR application and serves as a **foundation for future developments**, including multi-object planning, voice commands, and enhanced customization features.

7.FUTURE ENHANCEMENTS

To further enrich the functionality and user experience of the AR-based furniture visualization mobile application, the following enhancements are proposed for future development:

- **Save Room Layouts:**

Users could be given the ability to save their customized room setups, including furniture arrangements and configurations. This would allow them to revisit and modify their layouts later, enabling long-term planning and design comparisons.

- **Ceiling Placement:**

The current version supports placement on horizontal and vertical surfaces. Future updates could introduce support for ceiling surface detection, allowing users to place items like ceiling lights, fans, or hanging décor, giving a complete interior design experience.

- **AR Measurement Tool:**

Integrating a built-in AR-based measurement tool would help users measure room dimensions directly through their mobile camera. This would provide accurate space assessments before placing furniture, ensuring better fit and usability.

- **Virtual Walkthrough:**

A virtual walkthrough feature would allow users to move around the room while viewing furniture from various angles, just like a real-world inspection. This would greatly enhance spatial awareness and realism during the decision-making process.

- **Voice Commands:**

To improve accessibility and hands-free interaction, voice commands could be implemented for core actions such as placing, moving, rotating, or deleting furniture. This would make the app more user-friendly and inclusive

- **AI Recommendations:**

Using artificial intelligence, the app could analyze user preferences, past interactions, and room layouts to recommend suitable furniture items. Personalized suggestions would help users make quicker and more informed purchase decisions.

- **User Accounts & Wishlist:**

Allowing users to create accounts and maintain wishlists would enable them to save their favorite furniture items for future reference. This feature would also facilitate personalized shopping experiences and targeted offers.

- **Cross-Platform Support:**

Currently available on Android, the application could be expanded to support iOS and web-based platforms. This would increase accessibility and allow users to explore and plan from any device.



8. WEEKLY PROGRESS REPORTS

WEEKLY PROJECT PROGRESS REPORT (WPPR)– 1

For week commencing 3 March 2025

Programme: BCA (METAVERSE,GAMING,GRAPHIC DESIGN,ARVR)IBM

Student Name: ANISHA ANDRADE

Register Number: 22BCMGG05

WPPR: 1

Internal Guide's Name: MS. SINDHU SANDESH

MAJOR PROJECT Title:

AR-Based Furniture Visualization Application

Targets set for the current week:

Finalize project idea and research AR technologies.
Set up Unity with AR Foundation and configure ARCore support.
Begin planning UI and feature list.

Progress/Achievements for the current week:

Chose AR Foundation (ARCore/ARKit) for markerless AR development.
Installed Unity with AR Foundation and configured the AR scene.
Set up test project and validated AR tracking on mobile device.



Future Work Plans (for the upcoming week):

Implement horizontal plane detection.
Begin placing basic furniture prefabs on detected planes.

Implementation shown:

☐

Yes

☐

No

Remarks by the Internal Guide:

Signature of the student

Signature of the Internal Guide



WEEKLY PROJECT PROGRESS REPORT (WPPR)– 2

For week commencing 10 March 2025

Programme: BCA (METAVERSE,GAMING,GRAPHIC DESIGN,ARVR)IBM

Student Name: ANISHA ANDRADE

Register Number: **22BCMGG05**

WPPR: 2

Internal Guide's Name: MS. SINDHU SANDESH

MAJOR PROJECT Title:

AR-Based Furniture Visualization Application

Targets set for the current week:

Integrate plane detection and surface visualization.

Load and place 3D furniture models at touch position.

Set up UI buttons to place and clear objects.

Progress/Achievements for the current week:

Successfully implemented horizontal plane detection using AR Foundation

Enabled real-time surface tracking and visual indicators.

Imported and placed sample furniture models (chair, sofa) in AR space via touch.



Future Work Plans (for the upcoming week):

Add support for object scaling .

Implement object selection and delete functionality.

Implementation shown:

☐

Yes

☐

No

Remarks by the Internal Guide:

Signature of the student

Signature of the Internal Guide



WEEKLY PROJECT PROGRESS REPORT (WPPR)– 3

For week commencing 17 March 2025

Programme: BCA (METAVERSE,GAMING,GRAPHIC DESIGN,ARVR)IBM

Student Name: ANISHA ANDRADE

Register Number: **22BCMGG05**

WPPR: 3

Internal Guide's Name: MS. SINDHU SANDESH

MAJOR PROJECT Title:

AR-Based Furniture Visualization Application

Targets set for the current week:

Add object scaling (pinch-to-scale).

Implement object deletion

Improve UI interaction for selecting placed objects.

Progress/Achievements for the current week:

Successfully Implemented object scaling via touch gestures.

Added UI buttons for deleting the last placed object.



Future Work Plans (for the upcoming week):

Add vertical plane detection (walls).

Implementation shown:

☐

Yes

☐

No

Remarks by the Internal Guide:

Signature of the student

Signature of the Internal Guide



WEEKLY PROJECT PROGRESS REPORT (WPPR)– 4

For week commencing 17 March 2025

Programme: BCA (METAVERSE,GAMING,GRAPHIC DESIGN,ARVR)IBM

Student Name: ANISHA ANDRADE

Register Number: **22BCMGG05**

WPPR: 4

Internal Guide's Name: MS. SINDHU SANDESH

MAJOR PROJECT Title:

AR-Based Furniture Visualization Application

Targets set for the current week:

Implement vertical plane detection for wall placement.

Allow placing of wall-mounted items.

Design UI screens (Welcome, Menu, AR World, Products, About).

Integrate Ecommerce.

Progress/Achievements for the current week:

Integrated vertical surface detection using AR Foundation.

Users can now place objects on walls.

Designed and implemented welcome page and main menu with 4 options.

Successfully added ecommerce purchase feature through an external website.



Future Work Plans (for the upcoming week):

Optimize model loading and app performance.

Implementation shown:

☐

Yes

☐

No

Remarks by the Internal Guide:

Signature of the student

Signature of the Internal Guide



WEEKLY PROJECT PROGRESS REPORT (WPPR)– 5

For week commencing 31 March 2025

Programme: BCA (METAVERSE,GAMING,GRAPHIC DESIGN,ARVR)IBM

Student Name: ANISHA ANDRADE

Register Number: **22BCMGG05**

WPPR: 5

Internal Guide's Name: MS. SINDHU SANDESH

MAJOR PROJECT Title:

AR-Based Furniture Visualization Application

Targets set for the current week:

Optimize performance and reduce 3D model size.

Progress/Achievements for the current week:

Reduced model size and optimized textures for smoother AR performance.



Future Work Plans (for the upcoming week):

Conduct device testing and finalize UI/UX polish.
Prepare project documentation and demo.

Implementation shown:

☐

Yes

☐

No

Remarks by the Internal Guide:

Signature of the student

Signature of the Internal Guide



WEEKLY PROJECT PROGRESS REPORT (WPPR)– 6

For week commencing 7 April 2025

Programme: BCA (METAVERSE,GAMING,GRAPHIC DESIGN,ARVR)IBM

Student Name: ANISHA ANDRADE

Register Number: **22BCMGG05**

WPPR: 6

Internal Guide's Name: MS. SINDHU SANDESH

MAJOR PROJECT Title:

AR-Based Furniture Visualization Application

Targets set for the current week:

Test app on multiple devices.

Fix bugs, polish UI, finalize features.

Complete final project documentation and presentation.

Progress/Achievements for the current week:

Conducted testing on various Android ARCore-supported devices.

Finalized all app features including wall/floor furniture placement, delete, and e-commerce.



Future Work Plans (for the upcoming week):

Submit final build and give project presentation.

Implementation shown:

☐

Yes

☐

No

Remarks by the Internal Guide:

Signature of the student

Signature of the Internal Guide

9. APPENDIX

A. Source Code

- Written in **C#** using **Unity**.
- Integrated with AR Foundation and ARCore for Android AR functionality.
- Scripts for object placement, manipulation, and UI control and interaction.
- Website link integration for displaying product data and linking to external sites

B. Test Cases

1. Object Placement – Ensures models appear correctly on flat surfaces using AR.
2. Object Manipulation – Validates scaling and rotation through touch gestures.
3. E-Commerce Link – Checks redirection to product site.
4. UI Responsiveness – Checks for layout consistency across screen sizes and orientations.

C. System Requirements

Hardware:

- AR-supported Android/iOS device
- 1.8 GHz processor, 3GB RAM, 500MB storage

D. Software:

- Android 7.0+ / iOS 12+
- Unity 2019.4+ with AR Foundation
- Product websites (for item details and links)

E. Screenshots:

- Source codes
- Main UI
- AR Scenes

Code used for the development

```
List<RaycastResult> results = new List<RaycastResult>();
EventSystem.current.RaycastAll(eventData, results);
return results.Count > 0;
}

/// <summary>
/// Calculates and positions the crosshair at the center of the AR view.
/// </summary>
1 reference
void CrosshairCalculation()
{
    if (arCam == null || _raycastManager == null || crosshair == null)
        return; // Prevent NullReferenceException

    Vector3 screenCenter = arCam.ViewportToScreenPoint(new Vector3(0.5f, 0.5f));
    Ray ray = arCam.ScreenPointToRay(screenCenter);

    if (_raycastManager.Raycast(ray, _hits))
    {
        pose = _hits[0].pose;
        crosshair.transform.position = pose.position;
        crosshair.transform.eulerAngles = new Vector3(90, 0, 0);
    }
}

// Scene loader methods
0 references
public void HomeSceneLoader() => SceneManager.LoadScene(0);
0 references
public void Sceneloader() => SceneManager.LoadScene(1);
0 references
public void Scene2loader() => SceneManager.LoadScene(2);

0 references
public void Close_Instructions()
{
    GameObject instructionPanel = GameObject.Find("Instruction_Panel");
    if (instructionPanel != null)
```

About UI

About

AR-404 is an Augmented Reality app to solve the shopping problem of customer, which allows them to try furniture in their home environment before acutally purchasing it.

This app aids the customer by allowing them to place the desired furniture they wish to buy by placing the virtual furniture in real life environment to see how the furniture would look in the actual environment.



Contact page



Contact me!

AR Furniture Visualisation App

Anisha Andrade
Reg No.: 22BCMGG05
Email ID.: 22607@yenepoya.edu.in

YENEPOYA INSTITUTE OF ARTS, SCIENCE,
COMMERCE AND MANAGEMENT
Balmatta
Dept Of Computer Science

10. BIBLIOGRAPHY

- Unity Technologies. *UnityAR Foundation Documentation*.
- Google Developers. *ARCore Documentation*. <https://developers.google.com/ar>
- Bishop, S. (2024). *3D Game Development with Unity*. Packt Publishing.
- Skrzypczyk, P. (2024). *Mastering Augmented Reality with Unity and ARCore*. O'Reilly Media.
- YouTube Channels: Brackeys, Dinesh Punni, Sykoo
- Wang, X., & Huang, M. (2023). Designing User Interfaces for Augmented Reality Applications. *Journal of Interactive Media*, 15(2), 45-60.
- Mitchell, B. (2024). Understanding Augmented Reality for Furniture Shopping. *Furniture Journal*, 20(4), 112-119.
- Project Management Institute. (2025). *A Guide to the Project Management Body*