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Furniture Shopping with AR

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Abstract: The idea behind this project is to make furniture shopping easier and more enjoyable using Augmented Reality (AR). Often, when people buy furniture, they struggle to visualize how an item will look or fit in their own space. This project aims to solve that problem by allowing shoppers to use their smartphones or AR glasses to see how furniture would appear in their homes before making a purchase.
SBy simply pointing their device at an empty area in the room, customers can view realistic, 3D models of furniture and get a better sense of size, style, and how well it fits with their existing decor. This technology provides a more personalized shopping experience, helping people make better decisions without needing to rely solely on store visits or imagination. Ultimately, the goal is to create a more convenient, engaging, and accurate way for people to shop for furniture in today's digital world.

I. I.INTRODUCTION

This project focuses on developing a mobile application that allows to shop for furniture in an innovative way using Augmented Reality (AR). The idea behind this project is to improve the furniture shopping experience by enabling users to visualize how various furniture items will look in their own homes before making a purchase. Traditional online furniture shopping can be tricky, as it's often difficult to judge how a piece of furniture will fit or look in a specific room.
With AR technology, we can see 3D models of furniture pieces superimposed onto their real-world environment through their smartphone screens. The primary goal of this project is to create an app that simplifies the process of shopping for furniture by offering a more interactive and realistic experience.

II. LITERATURE REVIEW

1) Mobile Application Interfaces
Warankar and Dharmadhikari (2023) developed a mobile app-based control interface, emphasizing the importance of user-friendly interfaces in increasing the accessibility of smart systems. Their Bluetooth-controlled automation project provided real-time control of lights, demonstrating rapid response and ease of use.

2) System Reliability and Performance
Aisha and Ishak (2014) tested their Arduino-Bluetooth lighting system across different room settings. They concluded that while Bluetooth provides effective short-range communication (up to 10 meters), system reliability may reduce with physical obstructions. They suggested placing Bluetooth modules in open, centralized positions to optimize performance.

3) Security and Authentication
Morallo (2017) explored basic security features such as password-based access for controlling light systems. While simple, this method offers a layer of protection against unauthorized access, especially in shared environments like offices or dormitories.

III. KEY FINDINGS

1) AR helps customers see how furniture will look in their home before buying.
2) Customers make better choices, so there are fewer returns.
3) Shopping becomes more interesting and interactive with AR.
4) AR shows if the furniture fits well in the space available.
5) People are more likely to buy when they can see furniture using AR.
6) Customers can change colors, sizes, and styles easily.
7) AR makes online shopping feel like shopping in a real store.

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IV. KEY FEATURES ON ARDUINO LIGHT AUTOMATION SYSTEM

1) Augmented Reality Furniture Placement
- Users can view 3D furniture models in their real-world space using their smartphone cam-era.
- Helps users visualize size, placement, and design before purchasing.

2) User Registration & Login
- Secure user account creation using email and password.
- User login system to personalize shopping experience.

3) Furniture Catalog
- Browse a wide range of furniture items grouped into categories (e.g., sofas, chairs, tables).
- Each item includes images, descriptions, price, and AR preview option.

4) Add to Cart & Place Order
- Users can add items to cart and place orders with multiple products.

5) Real-World Scaling in AR
- 3D models are shown true to size so users get accurate fitting in their room layout.

V. METHODOLOGY

1) Set Up the Development Environment

I used Android Studio as the main IDE.
The app is built using Flutter SDK for cross-platform support and Kotlin for Android-specific functionality.

2) Integrate AR Functionality

I used the AR View plugin to add augmented reality features.
This allows users to view furniture in their real space using their phone's camera.

3) Load and Display 3D Furniture Models

3D models of furniture (like chairs, sofas, tables) are added in the app.
These models are placed in AR space so users can see how they would look and fit in their room.

4) Add User Controls for Interaction

Users can move, rotate, and scale the furniture items using touch gestures.
This helps users adjust the furniture to match their actual room layout.

5) Ensure Realistic Sizing and Placement

The app calculates real-world size so the furniture appears life-size when placed.
This is done using AR plane detection (through the AR plugin).

6) Design a Simple & Clean User Interface

The app's UI is made with Flutter widgets for a smooth and modern look.
Users can browse furniture categories, select items, and launch AR view easily.

7) Optimize Performance

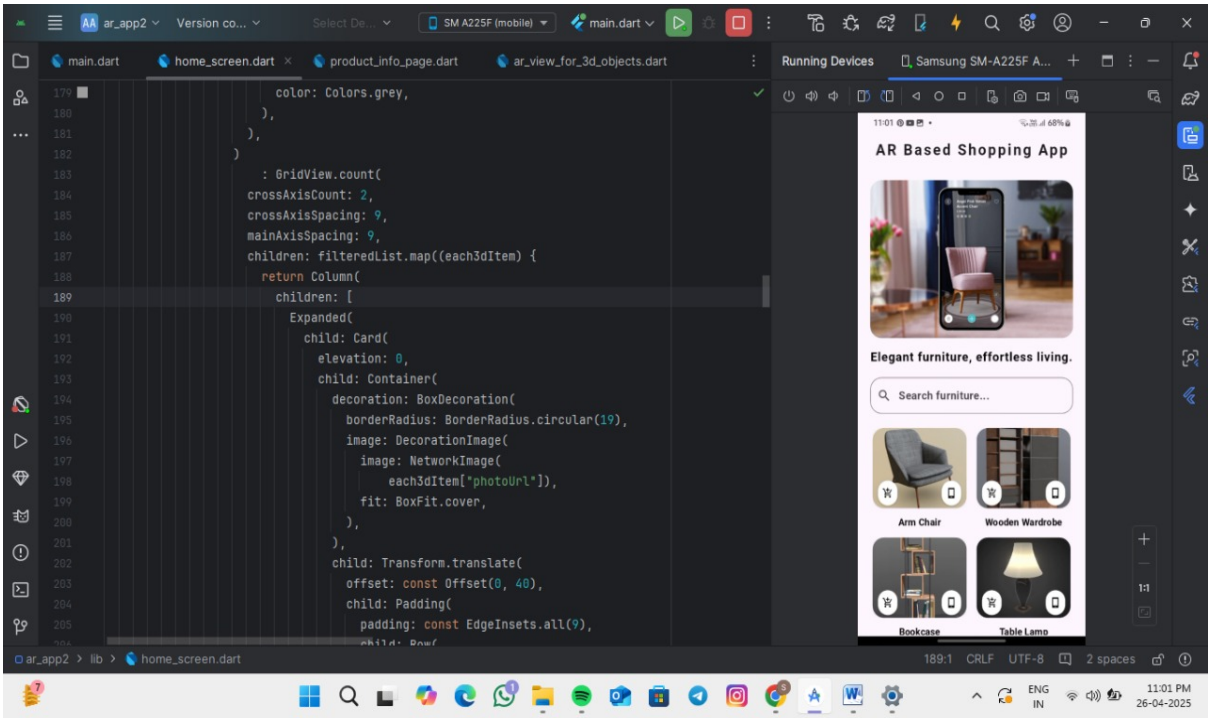
3D models are optimized to load quickly and run smoothly on mobile devices.
Heavy models are compressed, and only needed models are loaded at runtime.

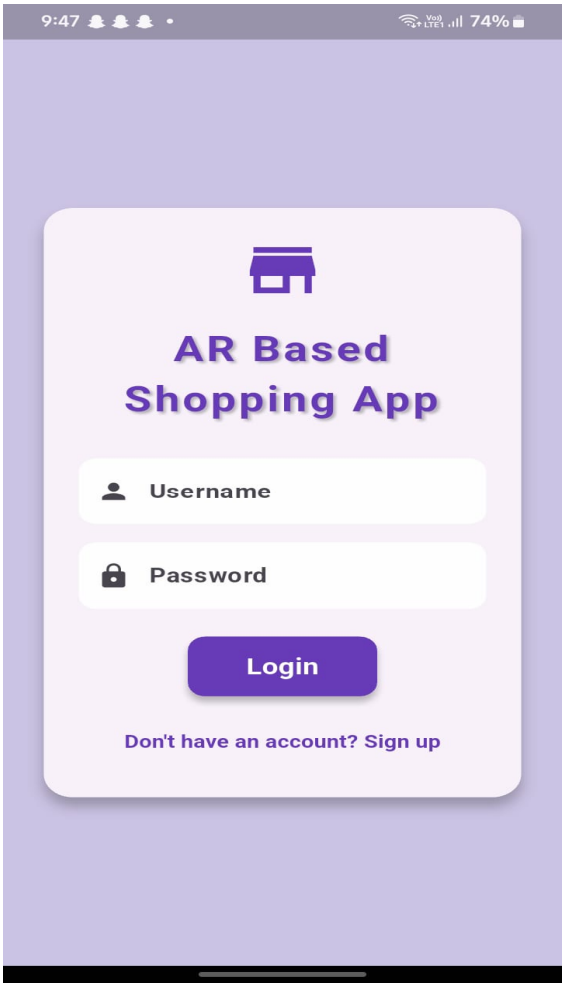
8) Test on Real Devices

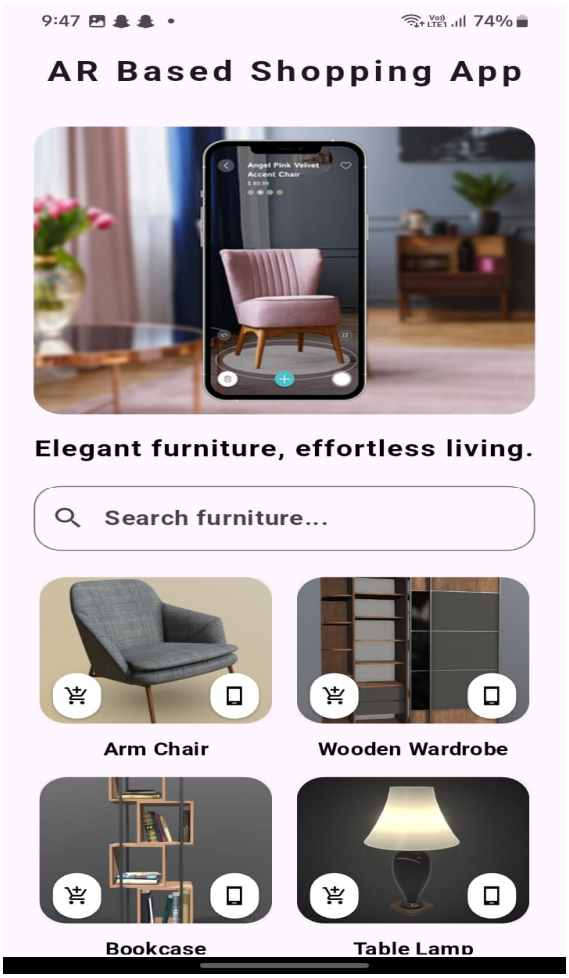
The app is tested on real Android phones to make sure AR works well in different lighting and environments.
I debugged and adjusted placements using Kotlin and Flutter debugging tools.

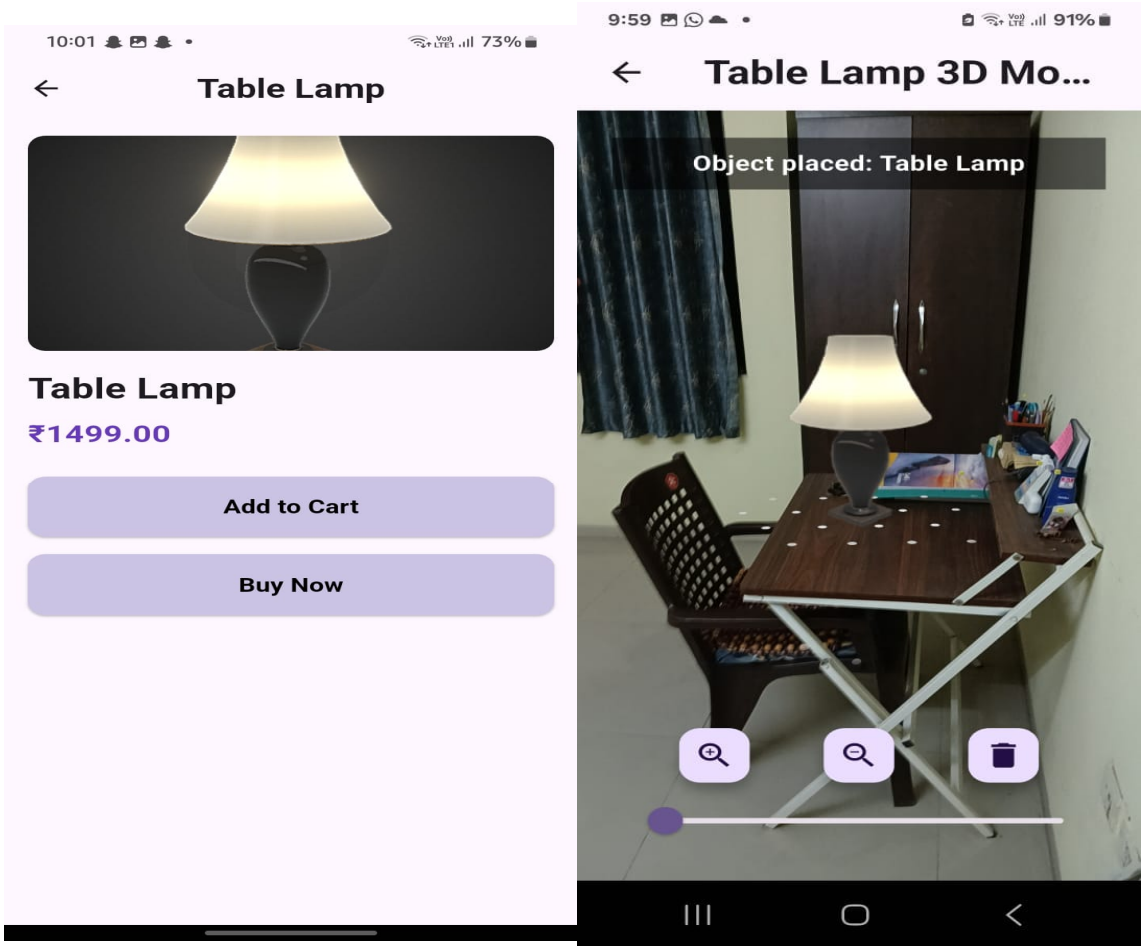
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VI. CONCLUSION:

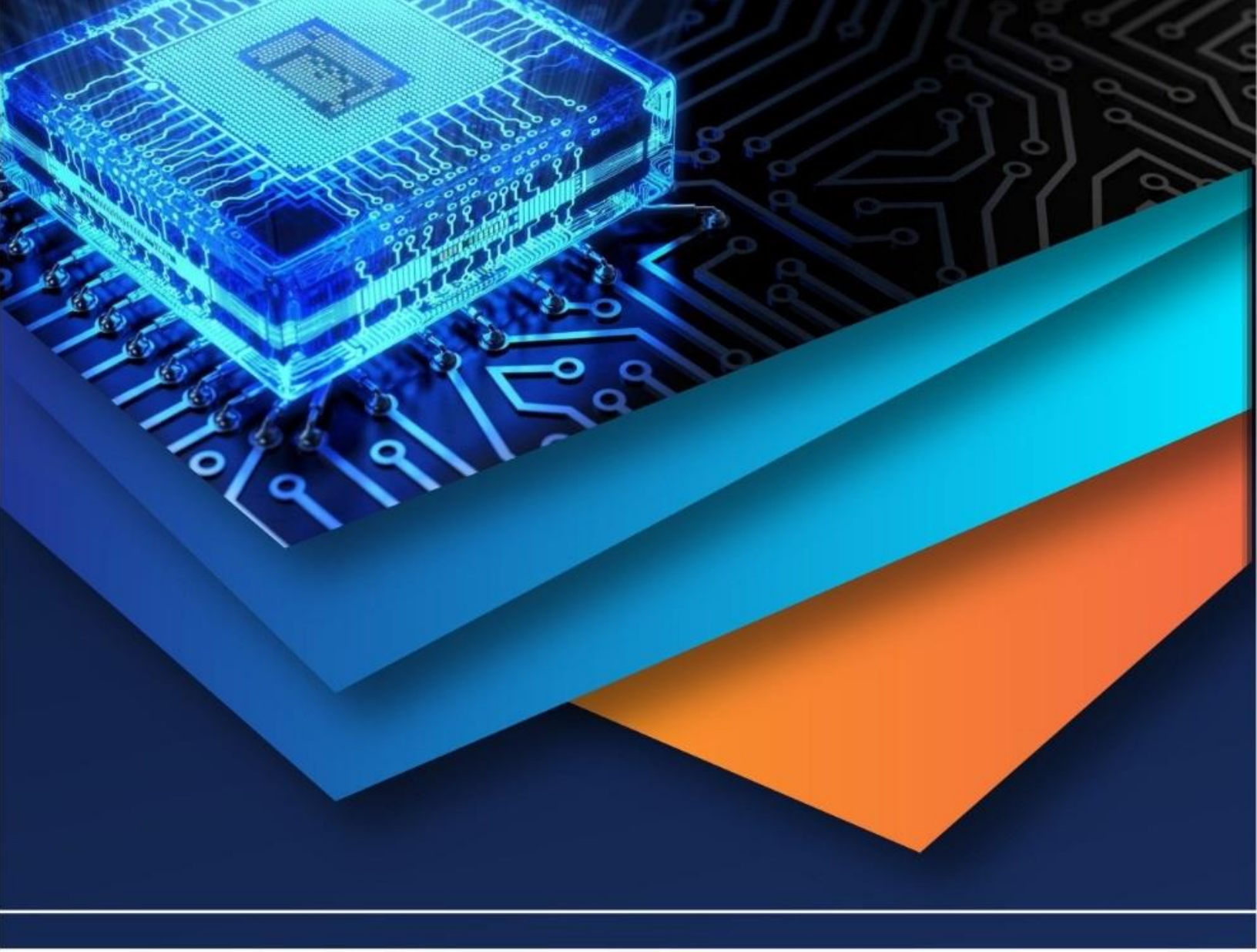
In this project, we made furniture shopping easier and more fun using AR technology. Now, people can see how furniture will look and fit in their home before buying it. This helps them make better decisions and avoid mistakes. It also saves time and makes online shopping feel more real.

it's hard to imagine if something will fit or match your room. With our AR solution, we made it easy and fun! Now, you can see your dream sofa, table, or bed right in your own space before you buy it. No more guessing, no more bad surprises. This project showed us how technology can make shopping smarter, faster, and much more exciting. Overall, AR makes furniture shopping smarter, faster, and more enjoyable for everyone.

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