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UniDeck: An AR-Based Interior Design Application

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Abstract: This paper presents the development of UniDeck, an innovative Augmented Reality (AR)-based interior design application utilizing Blender, Visual Studio Code (VSCode), Unity, and C#. The application streamlines the interior design process by providing an intuitive platform for creating, visualizing, and modifying interior spaces in real time. Blender is used to create high-quality 3D models, ensuring realistic interior elements. Unity enables interactive visualization and simulation, while VSCode with C# facilitates coding, asset management, and scene manipulation.
UniDeck offers drag-and-drop object placement, material customization, lighting adjustments, and real-time AR visualization. Users can scan spaces, place virtual furniture, customize attributes (e.g., colors, textures, sizes), and purchase items directly. This paper discusses architectural design, implementation challenges, performance optimization, and how UniDeck enhances the interior design workflow. Future iterations aim to improve customization, performance, and support for virtual tours and multi-room designs.
Keywords: Augmented Reality, Interior Design Applications, 3D Modeling, Unity, Real-Time Visualization.

I. INTRODUCTION

With the rapid advancement of Augmented Reality (AR) and smartphone technology, AR is revolutionizing various industries, including interior design. Traditional methods of designing spaces often involve manual sketching, 2D layouts, and expensive physical models, leading to inefficiencies and design limitations. AR offers a transformative solution by allowing users to visualize and interact with virtual furniture and décor within real-world environments.

II. LITERATURE SURVEY

A. Introduction

The advent of Augmented Reality (AR) technology has revolutionized various fields, including interior design. AR applications enable designers and clients to visualize spaces and make informed decisions in real-time. This literature survey examines four recent studies that explore the integration of AR in interior design, highlighting their methodologies, findings, and implications for the field.

This survey reviews four peer-reviewed articles published between 2021 and 2024. The selected studies were identified through academic databases using keywords such as "Augmented Reality," "interior design," and "design applications." The focus is on understanding how AR enhances the design process, user experience, and automation in interior design.

B. Thematic Organization

Evaluation of AR Applications in Interior Design

Nandakumar et al. (2023) provide a comprehensive evaluation of various AR-based applications for interior design and decoration. Their study emphasizes the practical implications of AR tools, showcasing how they enhance user experience by allowing real-time visualization of design elements in actual spaces. The authors discuss the effectiveness of different AR applications in facilitating design decisions and improving client engagement (Nandakumar et al., 2023).

C. Automated Interior Design Processes

Kán et al. (2021) focus on the automation of interior design through AR, proposing a hierarchical tree of procedural rules to guide the design process. This innovative approach aims to streamline design decisions, reducing the time and effort required for interior design tasks. The authors demonstrate that their method not only enhances creativity but also ensures adherence to established design principles, making it a valuable tool for both designers and clients (Kán et al., 2021).

D. User -Centric Approaches in AR Design

The study by P et al. (2024) emphasizes the importance of user-centric design in AR applications for interior design. The authors explore how AR can be tailored to meet individual user preferences, thereby improving user satisfaction and engagement. Their findings indicate that personalized AR experiences significantly impact the decision-making process, allowing users to visualize and interact with design elements in a way that aligns with their personal tastes (P et al., 2024).

III. RESEARCH METHODOLOGY

For conducting the study, a convenient random sampling technique was applied. The primary data was gathered from users through personal interviews and questionnaires. Secondary data was collected from various websites, journals, and publications.

IV. OBJECTIVES

1) To understand user perspectives about interior design AR applications.
2) To analyze the impact of AR-based interior designing on users.
3) To evaluate the effectiveness of UniDeck in improving design efficiency.
4) To assess user preferences in customization and real-time visualization.
5) To determine whether UniDeck is preferred over traditional 2D layout planning.

V. SYSTEM ARCHITECTURE AND DESIGN

A. Technology Stack

- Blender: For creating realistic 3D models of furniture and interior elements.
- Unity: Serves as the primary engine for real-time visualization and AR integration.
- C# with VSCode: Implements interactive functionality, object manipulation, and scene rendering.

B. Features and Functionalities

- Real-Time Object Placement: Drag-and-drop virtual furniture into real-world spaces.
- Customization Options: Modify color, texture, lighting, and object scaling.
- Scene Navigation & Interaction: Smooth virtual space navigation for an immersive experience.
- E-Commerce Integration: Purchase furniture directly within the app.
- Save & Reload Designs: Store and revisit designs.

VI. RESULTS AND DISCUSSION

User Preference for AR Interior Design

Preference	Percentage
Always Use	50%
Often Use	20%
Sometimes Use	24%
Rarely Use	6%

Effectiveness of AR-based Design Tools

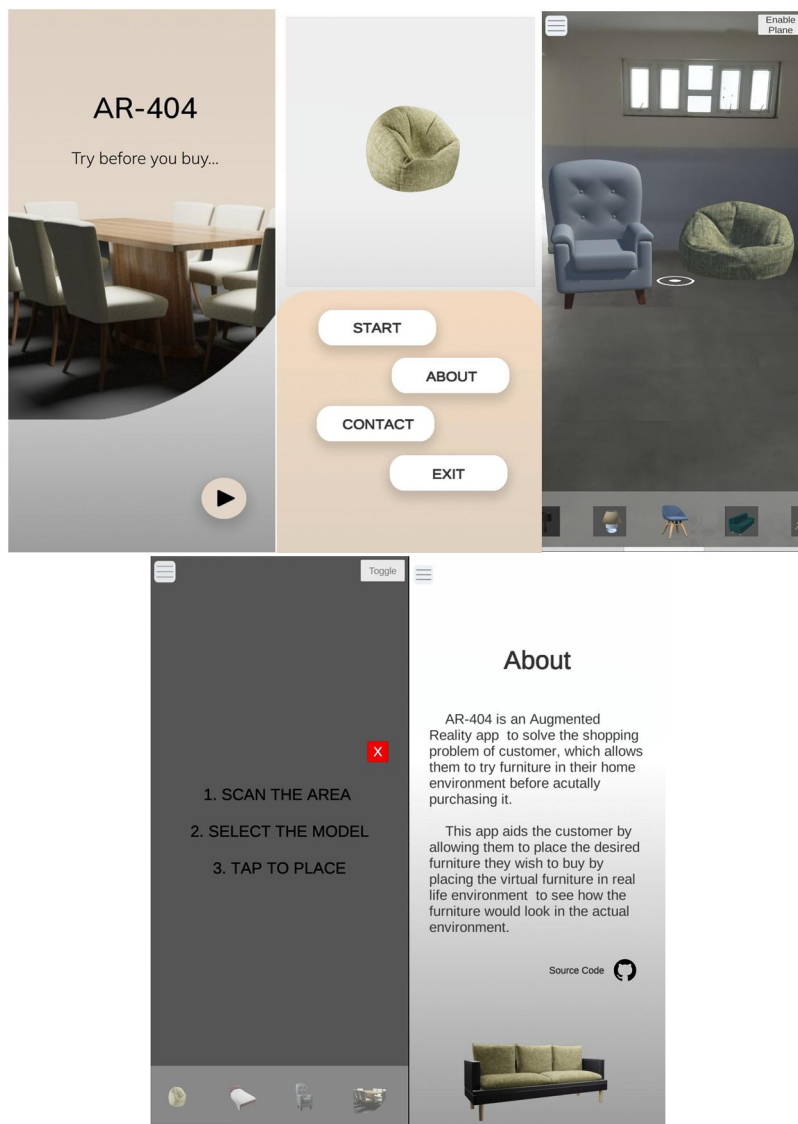| Effectiveness Level	Percentage
Very Effective	46%
Effective	34%
Neutral	16%
Slightly Effective	4%

VII. CONCLUSION AND FUTURE WORK

The UniDeck 3D Model Interior Designing project successfully delivers an immersive, AR-powered solution for interior designers and consumers. By integrating real-time object placement, customization, and e-commerce, it enhances efficiency and decision-making in interior design.

Future improvements will focus on:

- Advanced customization features, such as real-time material physics.
- Virtual tours and multi-room design support.
- AI-based recommendations for furniture arrangements.
- Cross-platform compatibility for a broader user base.

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