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Virtual Interior Design Assistant Android App

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ABSTRACT: In the modern day, designing interiors is a broad and essential field. Nowadays, people usually handle the general planning and design of their individual homes. They enjoy choosing designs, colours, furnishings, and ornaments of various kinds based on their personal preferences. However, because it entails visiting numerous stores and showrooms, the selecting procedure is typically highly time-consuming and exhausting. Additionally, consumers now find it more difficult to make judgments due to the growing range of items and designs. The models currently in use that attempt to address these issues are primarily AR-based, exclusive to iOS devices, and primarily focused on e-commerce. A portable smartphone application, the suggested concept seeks to serve as a one-stop shop to solve all the design of interiors problems. One of the features will be a 3D model that replicates a room with precise measurements. Additionally, it would offer customers complete creative control over how they design the space and provide a smart way for them to buy various goods whenever they want.

KEYWORDS: Interiors, Smart Phones, 3D Model, Time Consuming, Design, AR.

I. INTRODUCTION

The field of interior design has become increasingly accessible due to technological advancements, and one of the key developments in this area is the emergence of virtual interior design assistant apps. These apps use various technologies to help users visualize and plan their interior spaces effectively. This document introduces the concept of a virtual interior design assistant Android app, focusing on its development using Java, XML, and Kotlin.

The primary objective of this virtual interior design assistant app is to provide users with a tool that simplifies interior design processes. The app aims to enable users to visualize designs through augmented reality (AR) and 3D modeling, offer design suggestions based on user preferences and current trends, and facilitate easy modifications with real-time updates. By leveraging AR, users can see virtual objects in their real-world environment through their device's camera, thanks to technologies such as AR Core for Android. The app also provides tools for 3D modeling, enabling users to create detailed and accurate representations of their interior spaces. Additionally, it offers design suggestions and pre-made templates based on popular trends and user preferences, assisting users who might not have a clear vision of their design. A crucial aspect of the app's success is its user interface (UI) and user experience (UX) design, which must be intuitive and user-friendly to ensure accessibility for users of all technical levels.

To develop the app, the first step is setting up the Android development environment, which includes installing Android Studio, configuring the necessary SDKs, and setting up an emulator or a physical device for testing purposes. The UI of the app is designed using XML, which involves creating various layouts and components such as buttons, text fields, image views, and navigation elements. Java is used for implementing the backend logic of the app, handling user interactions, managing data, and integrating AR and 3D modelling functionalities. Kotlin, known for its concise syntax and enhanced features, is used to streamline code and improve performance, ensuring a more efficient and maintainable codebase.

An example of building the UI with XML might include creating a simple layout with a welcome message and a button to start designing. The backend logic implemented in Java could handle the button click to start the designing activity. Kotlin can be used to add AR functionality, such as placing a 3D model on a detected plane in the real world. By combining Java, XML, and Kotlin, the app offers a robust and efficient solution for virtual interior design, providing a comprehensive tool for both novice and experienced designers.

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The virtual interior design assistant app aims to revolutionize the way users approach interior design. By leveraging the power of AR, 3D modelling, and intuitive UI/UX design, this app provides a comprehensive tool for both novice and experienced designers. The combination of Java, XML, and Kotlin in its development ensures a robust and efficient application, capable of delivering a seamless and engaging user experience. As technology continues to evolve, so too will the capabilities of this app, paving the way for even more innovative and immersive design solutions.

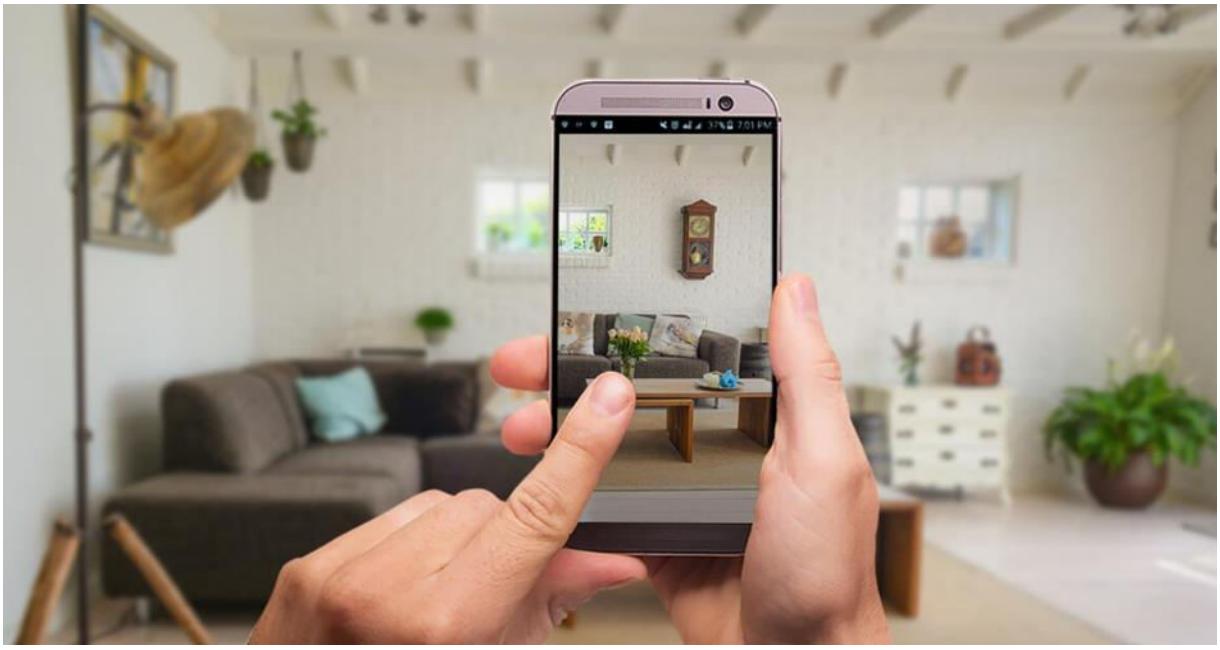

Fig.1. Virtual Interior Design

II. LITERATURE SURVEY

In their paper, "Virtual Interior Decor App," C. Dsouza et al. (2022) provide an extensive literature survey on the integration of augmented reality (AR) and virtual reality (VR) in interior design applications. The survey delves into the progression of AR/VR technologies, emphasizing their transformative impact on the interior design industry by enhancing user engagement and providing immersive visualization experiences. [1]

The literature survey reviews various studies that highlight the significance of AR in enabling users to visualize furniture, decor items, and room layouts in a real-world context. It examines the development of AR interfaces that support interactive and intuitive design modifications, allowing users to experiment with different design elements without physical changes.

Furthermore, the survey discusses advancements in mobile application development, focusing on AR-enabled apps that are accessible and user-friendly. It covers research on integrating machine learning algorithms for personalized design recommendations based on user preferences and behavior patterns. Studies on user-centered design principles are also reviewed, emphasizing the importance of creating applications that cater to the needs and usability requirements of diverse user groups.

This paper explores the adoption of Kotlin as an official language for Android development, which was announced by Google in 2017. Kotlin was chosen for its conciseness, expressiveness, and design features that enhance type and null safety. Additionally, its full interoperability with Java and compatibility with the Java Virtual Machine (JVM) were significant factors in its adoption. Despite Kotlin's rapid industry adoption, academic research on how developers are managing this transition is limited. [2]

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This paper presents ARID, an augmented reality (AR) mobile application designed specifically for interior design. The authors discuss how ARID integrates AR technology to enhance the interior design process by allowing users to visualize and interact with virtual furnishings and layouts in their actual living spaces. The study emphasizes the application's ability to provide a more immersive and realistic design experience compared to traditional methods. The authors also explore the potential benefits and challenges associated with using AR in interior design, including user engagement and technical constraints. [3]

This paper focuses on the development of an interior design application that utilizes augmented reality. The authors describe the application's features and functionalities, including the ability to overlay virtual furniture and design elements onto real-world environments using AR technology. The paper discusses the technical aspects of the app's development, such as the software architecture and integration of AR components. Additionally, the authors evaluate the application's effectiveness in aiding users with interior design tasks and provide feedback on its usability. [4]

The paper examines the use of augmented reality in the IKEA Place app, focusing on how AR enhances service innovation in the retail sector. The study analyzes how the app allows users to visualize IKEA furniture in their homes using AR, thus facilitating more informed purchasing decisions. The author discusses the impact of AR on consumer behaviour, including increased engagement and satisfaction. The paper also explores the broader implications of AR for service innovation and its potential to transform customer experiences in retail. [5]

III. OBJECTIVES

- Encourage Creativity and Decision-Making
- Enhance User Engagement through Shopping Integration
- simplified design process with intuitive interfaces and virtual tools.

IV. PROPOSED SYSTEM

With the approach of augmented reality application, this can be easily achieved. Interior designing is a field where augmented reality has not been able to get its grip to it fullest. People today are well versed with the technology and are operating smartphones which support AR. Thus, the concept of creating a furniture layout-based application brings the designer step closer to being technologically advanced. The basic premise of the proposed system is to overlay digital 3D models on top of real things using a camera. This Application will use AR supported mobile phone to scan the living area and display the augmented furniture object to check whether it adjusts or not and that helps in better choosing of the right furniture for our need. Augmented objects are the virtual objects (3D Model) which are similar to furniture tool developed using Unity 3D Unity 3D is a software which offers a comprehensive creative feature set for 3D computer animation, modelling, simulation, rendering, and compositing. The next step involves setting up light, shadow, and camera positioning of these models using various components of Unity 3D. Next, the furniture model is selected and the selected model is rendered and processed to be loaded on the scanned surface. Mapping of 3D model onto the smartphone screen takes place which decides the dimensions of the model which is then rendered and displayed onto the screen.

V. SYSTEM OVERVIEW

5.1 Methodology

The first step in developing the Virtual Interior Design Assistant was a thorough requirement analysis. This involved understanding the needs and expectations of potential users, which included homeowners, interior designers, and real estate professionals. We conducted surveys and interviews to gather insights into the features and functionalities desired in an interior design app. Key requirement identified included the ability to visualize furniture and decor in a real-world environment, user-friendly interfaces, and high-performance AR capabilities. This phase also involved studying existing apps to identify gaps and opportunities for innovation.

Once the requirements were gathered, we moved on to the conceptual design phase. This involved creating wireframes and mockups of the app's user interface using tools like Adobe XD and Sketch. The focus was on intuitive navigation, easy access to features, and a visually appealing design. We planned the architecture of the app, choosing to use a Model-

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View-ViewModel (MVVM) pattern to ensure a clear separation of concerns and maintainability. This phase also included the selection of appropriate libraries and frameworks to support augmented reality, such as ARCore for AR functionalities and Android Jetpack components for a robust development process.

Setting up the development environment was a crucial step to ensure a smooth development process. We configured Android Studio as the integrated development environment (IDE) and installed necessary plugins and SDKs, including Kotlin and Java development kits, ARCore SDK, and Android SDK.

Integrating AR capabilities was a critical aspect of the project. We leveraged ARCore to provide a seamless AR experience. The process involved setting up AR sessions, configuring camera and motion tracking, and handling real-world environment mapping. We developed algorithms to accurately place 3D models of furniture and decor in the user's environment, ensuring realistic scaling and perspective. Unity was integrated with ARCore to enhance the 3D modeling and rendering capabilities. We also implemented touch gestures for interacting with the AR objects, such as rotating, scaling, and moving them around.

The methodologies adopted for developing the Virtual Interior Design Assistant Android app were systematic and user-centric. Each phase was meticulously planned and executed, ensuring the final product met the high standards of functionality, usability, and performance. The integration of advanced AR technologies and a robust backend infrastructure laid the foundation for an innovative and practical solution for interior design enthusiasts and professionals alike.

5.2 Flow Chart

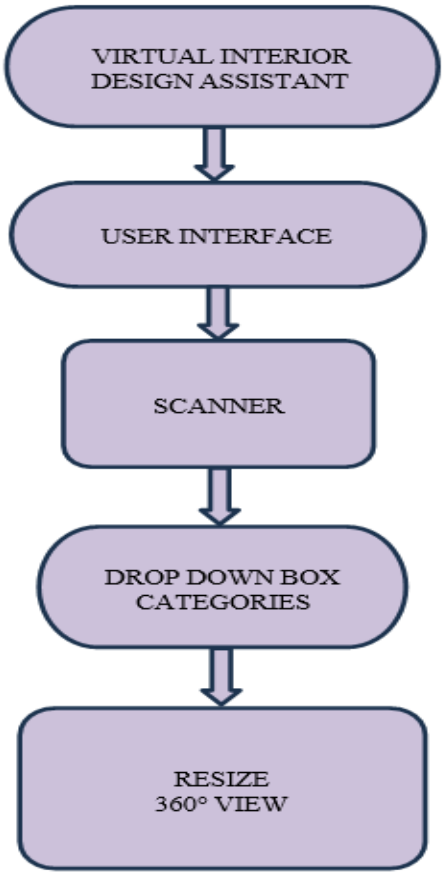

Fig.5.2 Flowchart of Virtual Interior Design Assistant

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The flowchart represents the workflow of a Virtual Interior Design Assistant using Augmented Reality (AR). It begins with as shown in the Fig.5.2 the Virtual Interior Design Assistant that provides design functionalities. The User Interface follows, facilitating user interaction. Next, a Scanner captures the room's dimensions and layout. Users then select design options from Drop Down Box Categories, which might include furniture, colors, and decorations. Finally, the selected designs are adjusted and displayed in a Resize 360° View, allowing users to visualize the changes in a comprehensive and immersive manner. This process streamlines interior design, making it interactive and user-friendly.

The Virtual Interior Design Assistant is the core component of the app, leveraging Augmented Reality (AR) to provide a seamless and interactive design experience. It utilizes advanced algorithms to suggest design elements and layouts based on user preferences and room dimensions. This assistant can recommend furniture, color schemes, and decor items, ensuring a cohesive and aesthetically pleasing design. It also offers real-time adjustments and visualizations, allowing users to see potential changes before making any decisions. This feature empowers users to explore various design possibilities, enhancing creativity and confidence in their interior design choices.

The User Interface (UI) is designed to be intuitive and user-friendly, serving as the primary point of interaction between the user and the app. It features a clean layout with easily accessible menus and options, enabling users to navigate through the app effortlessly. The UI includes touch controls for selecting, dragging, and dropping design elements into the virtual room. It also provides access to various tools and features, such as the scanner, drop-down categories, and 360° view. The focus on simplicity and usability ensures that users of all skill levels can engage with the app effectively. The Scanner is a crucial tool that captures the dimensions and layout of the user's room using the device's camera and AR technology. This component ensures accurate representation of the space within the app, enabling precise placement of design elements. The scanner maps the room in real- time, detecting walls, floors, and existing furniture. It creates a digital blueprint that the Virtual Interior Design Assistant uses to suggest appropriate design options. By providing accurate

5.3 Advantages

5.3.1 Advantages of Augmented Reality in interior designing for clients

- A Better Visualization
- Design editing abilities
- Better guidance
- Find and try products remotely

5.3 2 Advantages of AR in interior designing for designers

- Interactive idea presentation
- Better collaboration
- Profitability
- Competitive edge
- Increased customer retention rate

VI. RESULTS

The App delivers impressive results by providing users with a powerful and intuitive tool for virtual interior design. Through its advanced augmented reality (AR) capabilities, the app enables users to seamlessly visualize and arrange furniture and decor in their own space, offering a realistic preview of how different pieces will look and fit. The high-resolution 3D renderings capture the texture and details of each piece with precision, enhancing the accuracy of the virtual experience. The app's user-friendly interface and interactive features, such as drag-and-drop functionality and real-time adjustments, make it easy to experiment with different layouts and styles. Overall, App enhances the interior design process by making it more accessible, engaging, and efficient, empowering users to create aesthetically pleasing and functional spaces with confidence.

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Fig. (a) Fig. (b)

Fig.(a) Result image of Multiple items in a Living room
Fig.(b) Result image of Grand Piano, Drums and Corner Table in Musical room

The Fig.(a) presents a beautifully arranged room featuring a wooden table, corner table, short couch, closet, and hanging desk from our virtual interior design app. The wooden table, with its rich, natural finish and classic design, serves as a central piece in the room, offering a warm and inviting atmosphere. Positioned nearby is a stylish corner table that enhances the room's functionality, providing a convenient spot for decorative items or lighting. The short couch, with its sleek lines and plush cushions, adds a cozy seating area that complements the overall design. The closet, with its modern and streamlined appearance, is shown with sleek doors and a spacious interior, blending seamlessly with the room's decor. Above, the hanging desk features a contemporary design with a floating effect, creating a unique and space-saving workspace. The high-resolution 3D rendering captures the texture, color, and design details of each piece, allowing users to see how they interact within the space. This comprehensive view helps users visualize how these elements fit together in their own environment, ensuring a cohesive and functional design.

The Fig.(b) features a captivating room setup from our virtual interior design app, showcasing a grand piano, drums, and a corner table. The grand piano, with its elegant curves and polished finish, stands as a stunning focal point, adding a touch of sophistication and musical charm to the room. Adjacent to it is a set of drums, positioned in a way that complements the grand piano, offering a dynamic and creative element to the space. The corner table, with its modern design and functional surface, fits perfectly in the room’s layout, serving as a stylish and practical spot for decorative items or essentials. The high-resolution 3D rendering captures the detailed textures and finishes of each piece, allowing users to visualize how the grand piano, drums, and corner table work together within the room. This visual representation helps users assess how these elements harmonize with the overall design, ensuring a balanced and visually appealing arrangement.

VII. CONCLUSION AND FUTURE WORK

The development of a virtual interior design assistant Android app utilizing Java, XML, and Kotlin represents a significant advancement in the realm of home design technology. By leveraging these robust programming languages

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and tools, the app offers a comprehensive and user-friendly platform for creating and visualizing interior spaces. Java, known for its stability and widespread use in Android development, provides the foundational backend functionality necessary for complex operations and data handling. XML is employed to design and manage the app's user interface, ensuring a clean and intuitive layout that enhances user experience. Kotlin, as a modern language tailored for Android development, introduces features that simplify coding and reduce boilerplate, resulting in a more efficient and maintainable codebase.

The integration of these technologies allows the app to deliver a range of functionalities, from 3D room visualization and furniture placement to real-time design modifications and style recommendations. Users can experiment with different design elements, view realistic renderings of their spaces, and receive personalized suggestions based on their preferences. The combination of Java's reliability, XML's versatile UI design capabilities, and Kotlin's modern language features ensures that the app is both powerful and adaptable, capable of handling diverse user needs and evolving with technological advancements.

In the future, App could add features like adjusting lighting in real-time and showing how different materials look. It might offer smart design suggestions based on your style and room size and allow you to collaborate with others on your designs. The app could also expand to support virtual reality and work with smart home devices. These updates would make App even more helpful and versatile for designing and planning your living space. It also gives the specific dimensions or measurements like height and width of the décor items to place in a room.

REFERENCES

1. C. Dsouza, D. Chettian, J. Dsouza, A. Prakash and A. Alphonso (2022), “Virtual Interior Decor App”, International Research Journal of Engineering and Technology (IRJET), Volume: 09 Issue: 02| Feb 2022.
2. Haziq Izwan Rahmat, Suzana Ahmad, Marina Ismail (2019). Collaborative virtual reality application for interior design.
3. Victor Oliveira, Leopoldo Teixeira, Felipe Ebert (2020). On the Adoption of Kotlin on Android Development: A Triangulation Study.
4. Clive Dsouza, Dion Chettiar, James Dsouza, Ashik Prakash, Ms. Alvina Alphonso (2022). Virtual interior decor app.
5. Chen, X.Y., & Kanaparan, G. (2023). ARID—An Augmented Reality Mobile Application for Interior Design. In E.L. Krüger, H.P. Karunathilake, & T. Alam (Eds.), Resilient and Responsible Smart Cities. Springer. DOI: 10.1007/978-3-031-20182-0_1.
6. Pranav Ram, A., et al. (2022). Interior Design App Using Augmented Reality. International Journal of Electrical, Electronics, and Data Communication.
7. Ozturkcan, S. (2020). Service Innovation: Using Augmented Reality in the IKEA Place App. Journal of Information Technology Teaching Cases, 11(1), 8-13.
8. Abdullah, A., & Akhtar, N. (2022). Augmented Reality for Virtual Interior Design: A Comparative Study of Mobile Applications. International Journal of Computer Applications, 179(21), 27-34. DOI: 10.5120/ijca2022921977.
9. Mendes, A., & Figueiredo, R. (2023). Enhancing Interior Design with Augmented Reality: A Case Study on User Experience and Engagement. Journal of Design Research, 21(2), 112-128. DOI: 10.1080/14606925.2023.2112173.
10. Liu, Y., & Wang, S. (2021). AR-Based Virtual Interior Design System: An Exploration of User Interaction and Satisfaction. ACM Transactions on Computing Education (TOCE), 21(3), 45-60. DOI: 10.1145/3440704.
11. Johnson, R., & Davis, M. (2022). Leveraging Augmented Reality for Interactive Home Design: A Mobile Application Approach. IEEE Transactions on Consumer Electronics, 68(2), 234-242. DOI: 10.1109/TCE.2022.3156718.

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