International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 04 | Apr 2024 www.irjet.net p-ISSN: 2395-0072

DecoAR: An Object Visualization App

Chirag Kumavat[1], Heena Jadhav[2], Shardul Govekar[3], Manasi Kule[4], Prof. Vinod N.Alone[5], Prof. Swarupa Wagh [6]

[1.] *Student, Dept. of COMP Engineering, VPPCOE & VA, Maharashtra, India*
[2.] *Student, Dept. of COMP Engineering, VPPCOE & VA, Maharashtra, India*
[3.] *Student, Dept. of COMP Engineering, VPPCOE & VA, Maharashtra, India*
[4.] *Student, Dept. of COMP Engineering, VPPCOE & VA, Maharashtra, India*
[5.] *Associate Professor, Dept. of COMP Engineering, VPPCOE & VA, Maharashtra, India*
[6.] *Associate Professor, Dept. of COMP Engineering, VPPCOE & VA, Maharashtra, India*

Abstract - *Augmented reality (AR) is a technology that combines a virtual object with the actual world in real time. The travel, retail, and gaming sectors have all profited immensely from the development of augmented reality technologies. Everybody shops online, but before making a purchase, they prefer to see an accurate representation of the item in their setting. But occasionally, people may not enjoy the layout and style of their environment in addition to the goods they want to buy. AR technology can assist in resolving this issue. Through the use of a camera, it can not only display the product to users in real-time, but it can also assist users in determining whether the product will be suitable for their surroundings. With the help of a dynamic and adaptable user interface, a user can interact with 3D virtual furniture data and examine virtual furniture in this study's novel application of augmented reality technology to interior design. The user can immediately judge whether the furniture fits the given area or is appropriate with a fast glance. The project is innovative in that it doesn't call for any kind of pricey device. Tablets and smartphones may be used with ease.*

Keywords Augmented Reality, Room Design, 3D virtual design **-**

Key abbreviations -
AR: Augmented Reality

1. INTRODUCTION

Online tools have brought about a major revolution in how our society works. With the help of AR, we can allow people to get a feel for the products in real life. In our application, we are going to provide the users with multiple themes of interior design and decor, like school or office, where we have provided the facility of AR viewing. The user can decide the proper planning and designing of their surroundings while having a proper 3D view of objects, which will make it even easier to develop a plan. The main aim of developing this application is for users to have a better experience while designing and decorating their surroundings using augmented reality. Traditional methods of design include advising and assisting customers who have relied on a combination of verbal explanations and 2D drawings. However, this medium of approach is restricted to the limit of explanations provided by the customer to the designer for the placement of an appliance; moreover, if a customer changes his mind, the designer might as well have to redo the 2D drawings for the same. To fill in the gap between the purely virtual world and our real-life environment, augmented reality (AR) technology enables us to overlay virtual furniture into a real-life scene. With the approach of augmented reality applications, this can be easily achieved. Interior design is a field where augmented reality has not been able to get its grip to its fullest. People today are well versed in the technology and are operating smartphones that support AR. Thus, the concept of creating an interior design-based application brings the designers one step closer to being technologically advanced.

2. MOTIVATION

Businesses and mobile app development companies may elevate the user experience to a whole new level with AR's assistance. With its impressive capabilities in mobile apps, augmented reality (AR) has the potential to completely transform smartphones and tablets. Apple and Google are already well-established in this industry and are utilizing augmented reality's advantages. With the help of our software, users will be able to virtually arrange furniture items in their living areas to see how they fit, which will make place planning and design easier and more effective.

3. OBJECTIVES

- To create a more engaging and satisfying planning and designing experience.
- To boost client loyalty and increase brand awareness.
- To get the best options for the selected theme.
- To reduce staffing experience for the brand and increase revenue from both online and offline shopping.

● To allow users to add more than one object or furniture in the selected area.

● To help users to see how the furniture will look in real in their house.

● To help drive sales of organizations.

4. METHODOLOGY

The development methodology for "decoAR" was a systematic process. It commenced with project conceptualization and market research to define goals and understand AR's role in interior design. The content was acquired from various 3D model sources. Software tools like Android Studio, ARFoundation Libraries, and Google AR Core were used for development, with Sceneform converting 3D models into AR-compatible formats. User-friendly interfaces were created, integrating AR components for enhanced usability.

The core implementation involved using ARCore features for object placement and visualization. Rigorous testing and debugging ensured application stability. Hardware and software compatibility were addressed for Android devices running version 9 and above. User feedback played a vital role in iterative improvements. The entire process was documented comprehensively in the project report, providing valuable insights into "decoAR's" development.

4.1 SYSTEM DESIGN

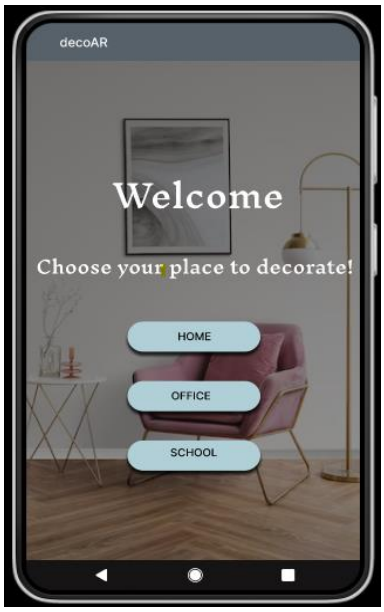

Fig -1:Home Page

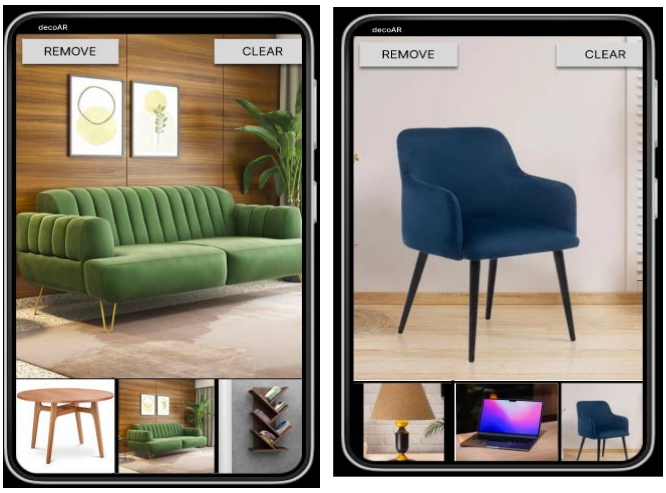

Fig – 2: Actual Representation Using 3D Objects

Created a comprehensive system architecture, outlining how Bootstrap, HTML, CSS, JavaScript, PHP, and MySQL will work together.

Developed wireframes and mockups for the user interface, incorporating Bootstrap's responsive design elements for dynamic scaling across all web-supported platforms.

Defined the data models and database schema for storing grievances, user profiles, and other related data using MySQL.

4.2 DEVELOPMENT

In the development phase, Android Studio served as our primary IDE, tailored for Android devices (version 9 and above). Java played a key role in implementing various AR functionalities, ensuring a seamless user experience. The integration of ARFoundation Libraries and Google AR Core enhanced the application with immersive features, creating a captivating augmented reality (AR) experience. The real-time interaction with the device's camera was crucial, enabling users to seamlessly visualize virtual furniture in their physical surroundings. Adopting an iterative approach, we refined the application based on user feedback, ensuring stability and user-friendliness. The outcome is a Java-powered AR application that offers a feature-rich platform for interior design.

5. LITERATURE SURVEY

In [1], the author has proposed a model of WebAR. It elaborated on the different potential Web AR approaches. It spoke about several technological advances such as the 5G networks which would provide higher bandwidth (0.1 1 Gb/s) and lower network delay (1 10 ms). The paper also discussed various challenges and enabling technologies for when AR meets the web. This model

offers a cross-platform and lightweight approach for Mobile AR but also shows the limiting computing and rendering capabilities of WebAR.

In [2], the article tells us about creating an app that uses Markerless Augmented Reality for interior design. This paper shows how to create models and how augmented reality will work.

In [3], the paper provides a brief introduction to AR using the markerless technique, they have used the - updating the camera pose by doing a 3D reconstruction of the unknown scene method. They used Vuforia AR SDK which uses computer vision technology to identify tracking of the flat surface and project 3D objects over the real environment.

In [4], the DesignAR system is a projection-based, portable, pan-tilt system constructed specifically for interior design prototyping. With DesignAR, it is possible to construct a 3D map by the user inputting spatial information. DesignAR provides an optimal plane through analysis and an interface that can offer various interior designs for its users. Users can perform interior design directly in the projected space via the spatial user interface or even via mobile devices. To verify the usability of the DesignAR system, a total of fourteen usability principal items were established and then the usability evaluation results were obtained through proposed scenarios. It became evident through the usability evaluation results that linking DesignAR to mobile devices enhances the system's usability.

In paper [5], analyzes the use of Augmented Reality technology and Augmented Reality 3D interior models for interior design. It states that the best way to share the concept of an interior design project with customers in the conceptual design stage is to perform it in a vivid 3D prototype.

The paper [6], provides us with the inner depth on how AR can be implemented to facilitate the architects and interior designers. It also discusses the algorithm used to achieve the functionalities. The proposed application exhibits two types of AR, Markerless and marker-based. The novelty of the project is that it can easily be used via any device or OS. This is a cost-effective solution. In this paper, one module is endowed to Architects where over their 2D image a 3D object is rendered to let them consider and assess their idea, and this is not very accurate or satisfying for users.

6. PROPOSED SOLUTION

Marker-less Augmented Reality experiences are replacing image- or QR code-based activations in Augmented Reality thanks to the recent development of better cameras and more precise sensors in soon-to-be-mainstream devices. In our current markerless AR implementations, we employ device sensors to precisely identify real-world features like walls and intersections, enabling users to position virtual objects within their real-world surroundings. Marker-less positional tracking is a more flexible technique of motion tracking because it does not require the use of specific optical markers, unlike marker-based systems. The suggested system's fundamental idea is to use a camera to superimpose digital 3D representations on top of actual objects.

The implementation of the app consists of Two modules.

1. **Finalization of initial rooms and objects and creation of UI layouts.**

• Created 3 Spaces Office, Home, and School, and 6 rooms in each, and selected objects suitable for each room from online platforms like freepik3d.com, vector3d .com, skecthfab.com, and cdtrader.com.

2. **Working on AR module (Placing objects in 3D space)**
   - Getting Augmented Reality Objects.
   - Designing Views for the User Interface.
   - Place the Object on the Surface Area.

Procedure:–
Getting Augmented Reality Objects:
Firstly, we imported the objects from online sources as mentioned in the previous step then we converted .obj files to .sfa and .sfb file formats using Sceneform library as these formats are supported in Android Studio.

Designing Views for the User Interface:
Here we created views for the plane (that is capturing the plane or surroundings through the camera) using ARfragment, ARPlaneListener.

Place the Object on the Surface Area:
Here the object is selected from UI then we finalize the area to be placed which is chosen in the screen by setting the anchor node then we place the selected object by setting a model of the selected object as a Renderable Object and Transformable Object and render it on the anchor node.

7. ARCHITECTURE / FRAMEWORK

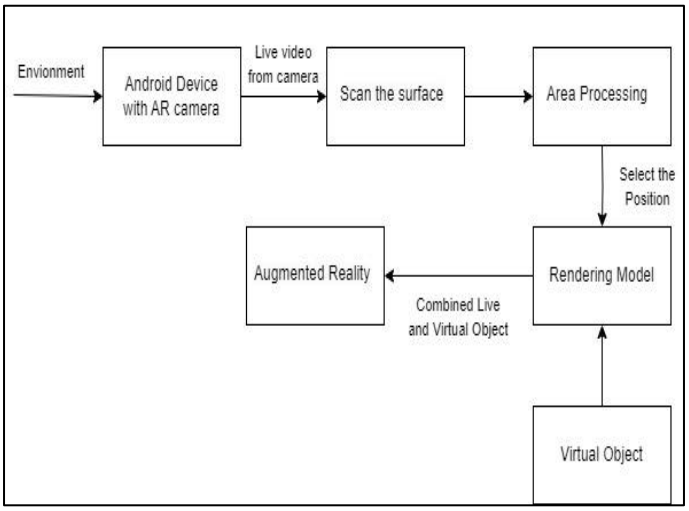

Fig-3: Architecture Of DecoAR

8. CONCLUSION

AR technology has become a topic of interest in the recent field of technology and computer science, online tools have brought a major revolution in how our society works. This paper will provide a brief introduction to augmented reality using markerless techniques. The main aim of developing this application is for users to have a better experience while designing and decorating their surroundings using Augmented Reality. The overall result is positive and shows that our system is helpful, usable, and efficient for designing the environment.

9. ACKNOWLEDGEMENT

We take this opportunity to express our sincere gratitude to **Prof. Vinod N. Alone & Prof. Swarupa Wagh** for their valuable guidance in this PROJECT REPORT without which the PROJECT REPORT would not have been completed. We are very much grateful to her for her untiring assistance in this report and she has been encouraging us in eliminating the errors. The report has been developed as a result of her valuable advice.

We are also grateful for the co-operation, and valuable suggestion rendered by **"Dr.Rais Mulla"**, as the head of the computer department and all other teaching staff of the computer department. We are greatly indebted to the management of our college and express appreciation and thanks to our principal **"Dr. Alam Shaikh"**, for coordinating keen interest and providing the necessary facilities in completing the PROJECT REPORT.

We are thankful to our classmates and friends for their support and being such a good company. We extend our gratitude to researchers and scholars whose papers and theses have been utilized in our seminar report.

10. REFERENCES

[1] X. Qiao, P. Ren, S. Dustdar, L. Liu, H. Ma, and J. Chen," Web AR: A Promising Future for Mobile Augmented Reality–State of the Art, Challenges, and Insights", Proceedings of the IEEE, -16 Feb, 2019.:1-16 doi: 10.1109/JPROC.2019.2895105.

[2] S. Sharma, Y. Kaikini, P. Bhodia, and S. Vaidya, "Markerless Augmented Reality based Interior Designing System," in 2018 International Conference on Smart City and Emerging Technology (ICSCET), Mumbai: IEEE, Jan. 2018, pp. 1–5. doi: 10.1109/ICSCET.2018.8537349.

[3] P. Johri, G. Dhuriya, S. S. Yadav, and S. Chauhan, "Marker-Less Augmented Reality System for Home Interior and Designing," in 2021 10th IEEE International Conference on Communication Systems and Network Technologies (CSNT), Bhopal, India: IEEE, Jun. 2021, pp. 176–181. doi: 10.1109/CSNT51715.2021.9509694.

[4] Y. J. Park, Y. Yang, S. Chae, I. Kim and T. Han," DesignAR: Portable projection-based AR system specialized in interior design",2017 IEEE International Conference on Systems, Man, and Cybernetics (SMC), Banff, AB,pp. 2879-2884, 2017.

[5] J. Hui, "Approach to the Interior Design Using Augmented Reality Technology," in 2015 Sixth International Conference on Intelligent Systems Design and Engineering Applications (ISDEA), Guiyang, Guizhou, China: IEEE, Aug. 2015, pp. 163–166. doi: 10.1109/ISDEA.2015.50.

[6] S. Nasir, M. N. Zahid, T. A. Khan, K. Kadir, and S. Khan, "Augmented Reality Application for Architects and Interior Designers: Interno A cost-effective solution," in 2018 IEEE 5th International Conference on Smart Instrumentation, Measurement, and Application (ICSIMA), Songkla, Thailand: IEEE, Nov. 2018, pp. 1–6. doi: 10.1109/ICSIMA.2018.8688754.