

Report On

Virtual Reality Technology in Home Design

Submitted in partial fulfillment of the requirements of the Course project in
Semester VII of fourth year Artificial Intelligence and Data Science

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CERTIFICATE

This is to certify that the project entitled “Virtual Reality Technology in Home Design” is a bonafide work of “Shlok Gaikwad(Roll No.4), Priyanshu Kamble (Roll No.7), Chetan Sapkal (Roll No. 37)” submitted to the University of Mumbai in partial fulfillment of the requirement for the Course project in Semester VII of fourth year Artificial Intelligence and Data Science engineering.

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Chapter 1: Abstract

This project mainly discusses the application of virtual reality technology in home design. Through virtual reality technology, we can have more realistic experience and switch freely in each space, so that customers can feel the future home personally. Built by importing household design, real 3D model, combined with the virtual reality modelling language (VRML) generated with interactive link the prototype of the object, to quickly build furniture design based on the technology of web 3D virtual reality display system. System combined with rich interactive methods, adjust and contrast design, advance awareness the real effect of household is decorated, improve customer satisfaction; Combination scheme design, the system can also be used for virtual simulation practice. Engineering practice proved that the system development is simple, high efficiency and can greatly accelerate the household decoration engineering design schedule and save time cost, and has high value in engineering practice. This project provides a new Angle of view to parse the virtual reality technology in the application of home design.

Chapter 2: Introduction

2.1 Introduction

In the late 1990s, smart home began to enter our county. Everyone's living environment is also changing with its development. Intelligent technology has gradually penetrated into people's lives. Make everyone realize the convenience brought by science and technology. With the prosperity and development of China's real estate market, people's living standards continue to improve, and there is a higher demand for home design. The interior design combined with virtual reality (VR) technology can make the owners have a more real space experience. For example, by building a virtual simulation system, users can easily roam and feel the design effect of the space through interaction. There are also applications of virtual reality technology in home design and interior design to improve design quality and design effect. In 2018, the ministry of education of China put forward the teaching reform strategy of new engineering. Virtual simulation teaching combined with virtual reality technology has become a hot topic in the reform of higher education. With the rapid development of computer technology, the establishment of virtual reality technology is the need of today's social development. virtual reality technology has also become a new design method and means for designers. Obviously, it has become an important research topic to show the final decoration effect of home design to users quickly and truly by combining virtual reality technology.

With the rapid development of network technology, based on the Web3D network of virtual reality technology is also widely used in various industries, including a representative of the VRML (virtual reality modelling language) is an object-oriented 3D modelling language, data format for describing interactive 3D objects, and become the standard of the Web3D technology. The prototype PROTO statement provided by VRML allows users to define their own model objects. It has the characteristics of classes, can encapsulate data and methods, and has good extensibility.

2.2 Problem Statement:

The use of Virtual Reality (VR) technology in home design presents an exciting opportunity to revolutionize the way individuals and professionals plan, visualize, and create living spaces. However, several challenges need to be addressed to fully leverage the potential of VR in this context.

Accessibility and Cost: The high cost of VR hardware and software can be a barrier for both homeowners and designers. The problem is how to make VR home design accessible and affordable for a broader range of users.

Realism and Visualization: Achieving a high level of realism in VR home design is crucial for making informed decisions. The problem is how to enhance the realism and accuracy of VR representations, including lighting, textures, and material rendering.

Hardware Limitations: The hardware required for a seamless VR experience is still relatively demanding. Not everyone has access to powerful computers and VR headsets, which limits the widespread adoption of VR in home design. The problem is how to develop more accessible and lightweight VR solutions that don't compromise on quality.

Data Privacy and Security: Collecting and sharing personal data and design plans through VR platforms raises concerns about privacy and security. The problem is how to implement robust privacy measures to protect users' sensitive information.

2.3 Objectives

Enhance Design Visualization: The primary objective is to leverage VR technology to improve the visualization of home designs. This includes creating immersive, true-to-life 3D representations of proposed living spaces to help homeowners and professionals make informed decisions.

Improve User Experience: Ensure that VR home design tools are user-friendly, intuitive, and accessible to a broad range of users, regardless of their technical expertise or familiarity with VR technology.

Expand Design Libraries: Develop and maintain extensive content libraries for 3D models, textures, materials, and design elements, catering to various architectural styles and design preferences.

Chapter 3: Proposed System

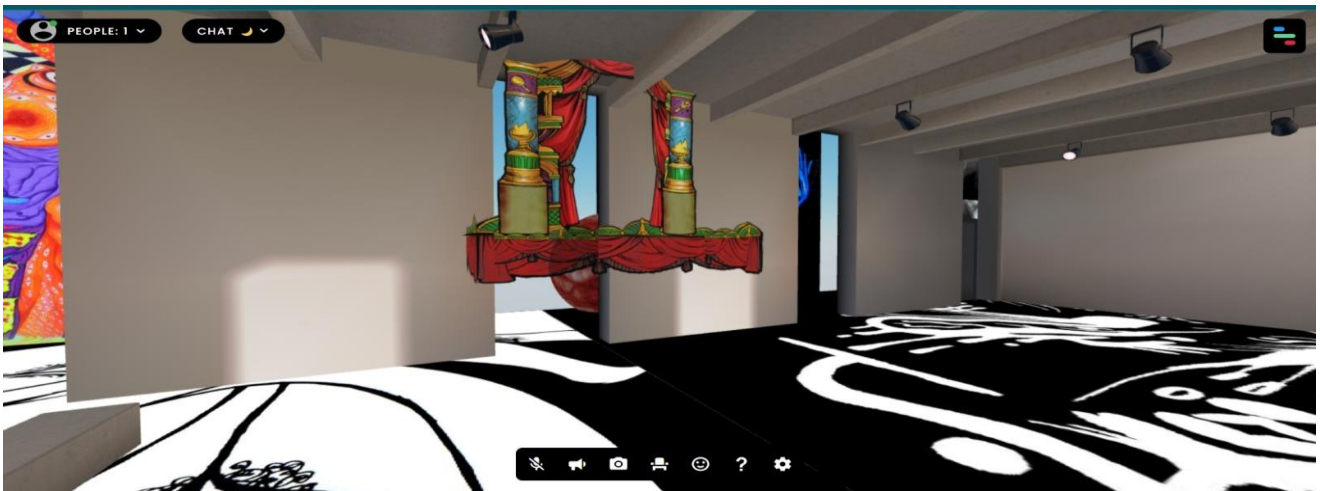
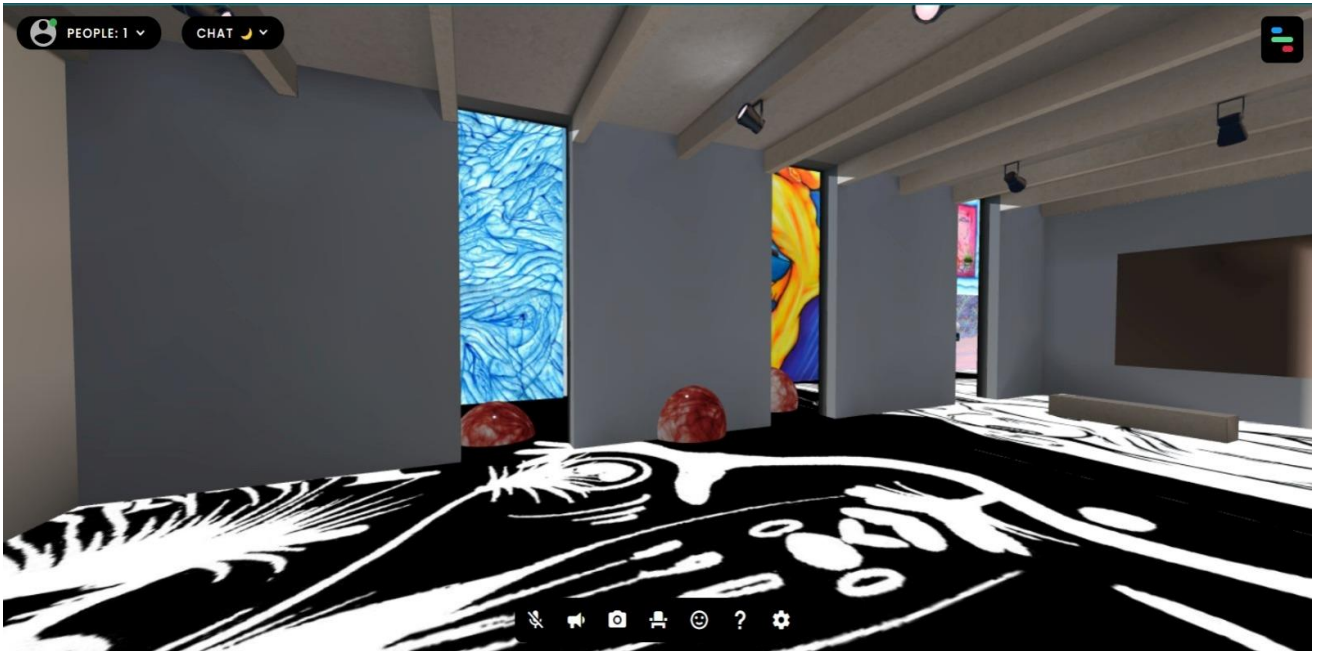
3.1 Introduction

Virtual Reality (VR) is a comprehensive integrated technology, involving artificial intelligence, human-computer interaction, sensing, computer graphics and other technical fields. Virtual reality technology is an artificial simulation environment under the support of computer technology, it uses computers to generate real three-dimensional audio-visual feelings, enabling customers to carry out realistic interactive experience after wearing various devices. As the customer puts on the device and moves, the computer quickly performs complex operations, transmitting accurate 3D images to the device and creating a sense of presence. Virtual reality technology integrates the latest research results of computer graphics (CG) technology, computer simulation technology, artificial intelligence, sensing technology, display technology, network parallel processing and other technologies, and is a high-tech simulation system generated by computer technology. Therefore, customers can use a variety of devices to virtual themselves into the environment and control the scene in the environment for a specific purpose, that is, to control the scene in the whole environment. Virtual reality system contains a lot of perceptual information. Therefore, the successful implementation of the function mainly depends on the system integration technology. The necessary conditions include information synchronization technology, system measurement technology, numerical conversion technology, discrimination and synthesis technology, etc. virtual reality technology is the most effective way to build a photorealistic system in computer. The system can interact with people, get extremely real feedback, and generate induction.

3.2 Details of Hardware and Software

- Unity 3D
- AltspaceVR
- SDKs
- Enscape

3.3 Results:



3.4 Conclusion:

The development of 3D home design virtual reality system adopts VRML with concise code, low development cost and short cycle. It combines the development of prototype objects, navigation maps and other modular functions to achieve good immersive experience. Also can be released directly on the Internet, is conducive to business promotion. According to the design scheme, the system also can be directly used as the virtual simulation teaching project, applied to the interior space design teaching, effective. Combined with Virtual reality technology, system breakthrough in the indoor decoration engineering practice forms, the original home outfit by rich interactive methods, change the direction of the position of the furniture, the replacement of different sizes and different styles of furniture, let the user immersion, the effect after the early perception of household decorates. System can compare different decoration effect, at the same time choose satisfactory decorate plan, Improve user satisfaction. Engineering practice proves that VRML is simple and easy to learn with high code efficiency, and the implementation method can greatly accelerate the design progress of home decoration projects and save time and cost, which has high engineering practice value.

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