Application of VR Technology in Modeling the Space of the One Column Temple

ICTU Student 195
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
student195@ictu.edu.vn

***Abstract*—This thesis explores the application of virtual reality (VR) technology in modeling the space of the One Column Temple, a historical and cultural site in Vietnam. The research focuses on the development of a VR system to visualize and simulate the temple's environment, using 3D modeling techniques and real-time rendering. The study employs scene graph and impostor techniques to optimize the display of the temple's environment, providing an immersive and cost-effective way to experience the historical site. The implementation involves the use of 3D modeling software such as 3Dmax, Blender, and MultiGen Creator to create detailed 3D models of the temple. The research also highlights the potential of VR technology in preserving and presenting historical sites, suggesting further research into the detailed history and cultural context of the One Column Temple and other historical sites to develop additional simulation models. The limitations of the study include the lack of extensive user testing and evaluation, which could provide more insights into the effectiveness of the VR system in enhancing user experience.**

***Index Terms*—Virtual Reality, Scene Graph, Impostor, 3D Modeling, Historical Site, One Column Temple**

I. Introduction

The introduction provides an overview of virtual reality technology, its historical development, and its components. It discusses the main applications of VR, including architectural design, entertainment, education, and healthcare. The thesis specifically focuses on the application of VR in modeling the One Column Temple, a historical and cultural site in Vietnam. The research aims to explore how VR technology can be used to preserve and present historical sites in an immersive and cost-effective manner. The introduction also highlights the significance of the One Column Temple in Vietnamese history and culture, emphasizing the need for innovative methods to document and share its heritage [1].

II. Methods

The methods section details the use of 3D modeling software such as 3Dmax, Blender, and MultiGen Creator to create the 3D models of the temple. Scene graph and impostor techniques are applied to optimize the real-time rendering of the temple's environment. The research also involves the use of VR technology and other software applications to develop a simulation model of the temple's space. The implementation process includes the creation of detailed 3D models of the temple's architecture, including its intricate design elements and historical features. The scene graph technique is used to manage the hierarchical structure of the 3D models, while impostor techniques are employed to enhance the visual quality and performance of the VR environment. The study also explores the use of various VR tools and software to ensure the accurate representation of the temple's historical context and cultural significance [1].

Supervisor: ICTU Teacher 131, Thai Nguyen University of Information and Communication Technology.

III. Results

The research successfully implemented a VR system to visualize the One Column Temple using scene graph and impostor techniques. The system allows for the efficient display of the temple's environment in real-time, providing an immersive experience for users. The results demonstrate the effectiveness of using VR technology to preserve and present historical sites. The VR model accurately represents the temple's architectural features and historical context, offering a detailed and interactive experience. The implementation of scene graph and impostor techniques significantly improves the performance and visual quality of the VR environment, making it a viable tool for cultural heritage preservation and education. However, the study does not provide extensive user testing or evaluation, which could provide more insights into the effectiveness of the VR system in enhancing user experience [1].

IV. Discussion

The discussion highlights the potential of VR technology in preserving and presenting historical sites. It suggests further research into the detailed history and cultural context of the One Column Temple and other historical sites to develop additional simulation models. The use of VR can provide a cost-effective and non-invasive way to experience historical sites, reducing the need for physical restoration. The study also emphasizes the importance of accurate and detailed 3D modeling in creating realistic VR environments. The limitations of the current implementation include the lack of user feedback and evaluation, which could help refine the VR system and improve its effectiveness. Future research could focus on incorporating user feedback to enhance the interactivity and educational value of the VR models [1].

V. Conclusion

The thesis concludes that VR technology can be effectively used to model and simulate the space of historical sites like the One Column Temple. The research provides a foundation for further development of VR applications in cultural heritage preservation and education. The implementation of scene graph and impostor techniques demonstrates the potential of VR technology in creating immersive and cost-effective experiences for historical sites. The study highlights the need for continued research and development to improve the accuracy and interactivity of VR models, ensuring they effectively serve as tools for cultural heritage documentation and education [1].

References

[1] ICTU Student 195, ”Application of VR Technology in Modeling the Space of the One Column Temple,” internal undergraduate thesis (original in Vietnamese), Thai Nguyen University of Information and Communication Technology, 2010.

[2] Martin Kada, Stefan Roettger, Karsten Weiss, Thomas Ertl, Dieter Fritsch. Real-Time Visualisation of Urban Landscapes Using Open-Source Software.ifp/VIS Group, University of Stuttgart, Germany martin.kada @ifp.uni-stuttgart.de roettger@cs.fau.de

[3] Paul Martz, OpenSceneGraph Quick Start Guide, Skew Matrix Software LLC, Năm 2007. 3. Danh mục các địa chi website