

Virtual Reality Tour of APCOER

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I. Abstract

This project will explore the design and development of a Virtual Reality (VR) tour for Anantrao Pawar College of Engineering and Research (APCOER), which will revolutionize the traditional methods of campus exploration. Using advanced VR tools such as Unity and Unreal Engine, along with high-resolution 360° photography and detailed 3D modeling, the project delivers an immersive and interactive experience of the college. The VR tour covers critical locations at the campus, such as classrooms, laboratories, recreational buildings, administrative offices and landscaped areas, enabling users to view the college environment at their comfort. Clickable points of interest, navigable campus maps and interactive hotspots allow users access to massive details about the infrastructure and academic resources. This project addresses the limitations of conventional campus tours, such as physical, geographical and time constraints, by offering a fully virtual alternative accessible via VR headsets, PCs and smartphones. The processes involved in development involve data collection, accurate 3D modeling to include the integration of interactive elements into a cohesive VR application. All these will be tested and perfected through user testing before mass distribution in enhancing navigation and visual appeal as well as cross-platform compatibility. The campus visibility improvement between APCOER and prospective students will enhance engagement and better-informed decision making. This project demonstrates the potential of VR technology in the educational domain, reflecting its application for improving institutional outreach and enhancing student recruitment. The VR tour highlights APCOER's interest in incorporating cutting-edge technologies to create an engaging, informative and entertaining experience.

Keywords—Virtual Reality, College Tours, Student Recruitment, User Experience, 360° photography, Immersive Technology.

II. INTRODUCTION

Recruitment of prospective students is undoubtedly fundamental for the success of higher education institutions. Age-old methods of printed brochures, websites and physically visiting the campus have always remained the best ways of connecting with students. However, these methods also have their drawbacks. The printed materials do not have the characteristics - liveliness, involvement, etc. – that are needed to capture the campus environment. Although so much information is available on the websites, they still do not provide ‘the real feel’ of the campus. Although campus visits may be the best way for prospective students to have firsthand experience of the university environment, they are often affected by distance, cost and time constraints. Such limitations may specifically disadvantage students from the low-income groups, rural population, or even the disabled and so such talented students may never seek higher education opportunities.

III. LITERATURE SURVEY

[1] O. Augereau, G. Brocheton and P. P. Do Prado Neto, "An Open Platform for Research about Cognitive Load in Virtual Reality," (2022) IEEE. This paper presents an open platform designed to facilitate research on cognitive load in virtual reality (VR) environments. The platform allows for the exploration of various factors that influence cognitive load, such as interactive systems, user interfaces and three-dimensional displays.

[2] A. Bayro, Y. Ghasemi and H. Jeong, "Subjective and Objective Analyses of Collaboration and Co-Presence in a Virtual Reality Remote Environment," (2022) IEEE. Subjective and Objective Analyses of Collaboration in a Virtual Reality Remote Environment. This paper examines both subjective and objective aspects of collaboration in VR remote environments. The authors explore how VR facilitates remote collaboration by analyzing factors such as

social computing, three dimensional displays and head-mounted displays.

[3] S. Crawford et al., "Dental Verse: Interactive Multiusers VR Implementation to train preclinical dental student psychomotor skill," (2022) IEEE. Dental Verse: This study presents Denta Verse, a VR platform designed to train preclinical dental students in psychomotor skills through interactive and immersive learning experiences. The multiuser VR environment facilitates computer-aided instruction and distance learning, enabling students to practice and enhance their skills in a simulated dental setting.

[4] S. Saranya, B. Channarayapriya, U. Harshavardhini, A. S. Nandhini, J. Revathi and R. Venkatesan, "Development of Virtual Reality Platform through Human Computer Interaction using Artificial Intelligence," (2024) 3rd International Conference. This paper focuses on the development of a virtual reality (VR) platform that integrates human-computer interaction (HCI) with artificial intelligence (AI) techniques. The authors employ deep learning and heuristic algorithms, including genetic algorithms, to create an intelligent and user-friendly virtual environment.

[5] Z. Jun-Zhu and Z. Yu-Gao, "Display Design Based on Virtual Reality Technology VR-Platform Platform," (2022) 7th IEEE International Conference. This paper discusses the design of display systems utilizing virtual reality (VR) technology on the VR-Platform. The authors explore how VR can be employed to enhance visual displays, focusing on both the technical and practical aspects of integrating VR into display design.

IV. PROPOSED SYSTEM

1. System Overview

The VR tour application enables users to explore the college campus interactively and immersively. As a fully immersive VR experience, it allows users to virtually "walk" through different parts of the campus, replicating the look and feel of the college environment. The tour provides an interactive 360-degree view of the campus, allowing prospective students, visitors and faculty to explore significant areas in detail.

2. Key Features

a) Virtual Environment

The virtual environment includes high-quality 360° panoramic images of key campus locations. Users can experience a virtual tour of the college entrance with a full front view, academic and administrative buildings and various educational facilities, such as classrooms and labs.

b) Interactive Elements

Interactive elements enhance user engagement by providing detailed information about various campus locations. Information hotspots are embedded throughout the tour to provide textual or audio descriptions of each location, giving users deeper insights into each area's function and significance.

c) User Interface

The user interface is designed to be intuitive and adaptable across multiple platforms. In VR mode, users can navigate using gesture controls, making it easy to interact within the virtual space. For desktop users, mouse and keyboard controls allow for smooth navigation, while mobile and tablet users can operate the system using touchpads.

3. Technical Specifications

The VR tour system requires specific hardware to ensure smooth functionality and an immersive experience. Compatible devices include VR headsets, mobile phones and desktops or laptops. Essential software components include VR development platforms like Metareal, 360° photo capturing tools for stitching immersive images and 3D modeling software for creating virtual elements.

4. Implementation Benefits

This VR tour system offers significant benefits, including 24/7 virtual access to the campus, which improves outreach to prospective students who may not be able to visit in person. The virtual format reduces the cost and management required for in-person campus tours while reaching a highly targeted audience.

V. SCOPE

I. Project Boundaries

The VR tour offers an immersive, interactive exploration of the college, showcasing key areas like the main entrance, academic buildings, recreational centers, dining halls, and administrative offices. It is a non-live, pre-designed VR experience, with interactions limited to pre-set information points. Excludes live-streaming, real-time student interactions, and dynamic features like academic schedules or personalized pathways. Focuses on functional representations rather than detailed architectural reconstructions.

II. Target Audience

The VR tour's primary audience comprises prospective students and their families, who can benefit greatly from exploring the campus remotely before making enrollment decisions. This tool is also valuable for alumni, enabling them to stay connected with the college and see recent

campus changes. Additional stakeholders include college administrators, faculty and staff who can use the VR tour for promotional purposes.

III. Application Areas

This VR tour system has broad applications within educational institutions, with primary use cases in college recruitment and admissions, providing prospective students and parents with an engaging, immersive tour experience. The tour can be embedded on the college's admissions website, included in outreach materials, or used during virtual recruitment events to enhance engagement. In addition to recruitment, the VR tour can serve as a resource in alumni relations by showcasing campus developments and fostering connection. Beyond higher education, this project could serve as a model for other organizations, such as corporate training campuses or high schools, that wish to offer remote tours of facilities.

IV. Limitations

- The VR tour lacks **live, real-time interactions**, limiting dynamic engagement and personalized guidance.
- Requires **high-quality VR headsets or compatible devices** for the best immersive experience, potentially excluding users without such hardware.
- Does not fully capture **intricate architectural details** or **live-action scenes**, reducing the richness of the experience.

V. Constraints

The VR tour project operates within specific constraints that impact its development and deployment. Budget limitations restrict the level of graphic quality, animation and interactive features that can be integrated into the VR environment. Additionally, the need to support multiple devices including VR headsets, desktop computers and mobile platforms places technical constraints on development, requiring optimizations to ensure smooth performance across hardware with different capabilities. Another constraint is the need for ongoing updates and maintenance, as campus changes will necessitate new VR content, placing a sustained demand on resources.

VI. ARCHITECTURE

The architecture of the Virtual Reality (VR) tour for APCOER integrates hardware, software and interactive

elements to create an immersive experience. The system is structured into the following components:

A. System Components

Input Layer: 360° Photography and Videography: It captures high-resolution visuals of key campus locations using specialized cameras.

Processing Layer: VR Development Platform: Metareal is at the core that assembles the 3D models, 360° media and interactive elements.

Output Layer: User Interface: Engaging menus through clickable hotspots and intuitive navigation are incorporated into the application.

B. Workflow

Content Creation: Shoot 360° images and videos of campus locations. Create 3D models of physical spaces, making sure to scale and texture correctly.

Integration and Development: Combine media and models in a VR development platform. Add interactive elements, such as clickable points of interest, navigation controls and pop-up descriptions.

Testing and Deployment: Test with users to ensure easy navigation and interaction. Optimize for multiple platforms and devices before final deployment.



VII. RESEARCH METHODOLOGY

This section explains the systematic approach followed in developing and evaluating the Virtual Reality (VR) tour for Anantrao Pawar College of Engineering and Research (APCOER). The methodology consists of a hybrid combination of qualitative and quantitative techniques for robust and user-centric design.

A. Research Design

Exploratory Phase: Literature review was conducted to understand the current advancements in VR applications, focusing on usability, engagement and accessibility in educational environments.

Development Phase: Used 3D models, 360° visuals and interactive features to develop a seamless virtual environment.

B. Data Collection Methods

Primary Data: Took high-resolution 360° images and videos of campus locations with specialized equipment.

Secondary Data: Analysed similar implementations of VR tour for inspiration and benchmarking purposes.

C. System Development Process

3D Modeling and Asset Creation: Detailed 3D models of the campus locations are designed using Blender and Maya and scaled and textured accurately.

Testing and Optimization: Used feedback to tweak the navigation controls, visual quality and the system's overall performance.

D. Analytical Framework

Quantitative Analysis: Surveys were used to establish levels of satisfaction, ease of use and realism. System performance metrics such as frame rates, loading times and device compatibility were evaluated.

VIII. ADVANTAGES & DISADVANTAGES

A. Advantages

- **Enhanced Accessibility:**
The VR tour allows prospective students and their families to explore the campus from any location, overcoming geographical and time constraints.
Compatible with multiple devices, including VR headsets, PCs and smartphones, ensuring broad accessibility.
- **Showcases Unique Features:**
Highlights key facilities, infrastructure and student amenities, enhancing APCOER's visibility and appeal.
Offers an innovative platform to promote the college's strengths in a competitive education market.

B. Disadvantages:

- **Technical Limitations:**
Achieving high-quality visuals while maintaining system performance across devices can be challenging.
Limited by the hardware capabilities of users, especially for those with outdated devices.
- **Development Costs:**
Initial investment in VR equipment, 3D modeling and development tools can be high.

IX. FUTURE SCOPE

The Virtual Reality (VR) tour for Anantrao Pawar College of Engineering and Research (APCOER) lays the foundation for innovative applications of immersive technology in education. Several enhancements and expansions can significantly improve the system's effectiveness, usability and impact.

A. Dynamic Updates:

The VR tour can be integrated with real-time data to display ongoing campus events, lectures, workshops and other activities, ensuring the content remains current and engaging.

B. Scalability and Future Technologies

Integration with AR:

Augmented reality features can also be explored. Mixed-reality solutions can thereby be offered.

X. CONCLUSION

The Virtual Reality (VR) tour for Anantrao Pawar College of Engineering and Research (APCOER) marks a major milestone in the adoption of immersive technology to make campuses more accessible and engaging. The VR tour provides an interactive and user-friendly experience, which enables prospective students, parents and other stakeholders to explore the key campus locations, including classrooms, laboratories and recreational spaces, with realistic visual and functional fidelity. It includes features like clickable hotspots, navigable maps and detailed descriptions that really make the system stand out as it highlights the unique infrastructure and academic offerings of APCOER.

XI. REFERENCES

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