

An Augmented and Virtual Reality based Application for Enhanced Campus Exploration

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Abstract:- Introducing a ground breaking Augmented Reality (AR)-Virtual Reality (VR) campus tourexperience developed on the Unity3D platform and optimized for deployment on Oculus Meta Quest headsets. This immersive application revolutionizes the traditional campus visit, allowing users to explore campus buildings and amenities from their smartphones. Through high-quality 360-degree films, interactive 3D models, and engaging components, prospective students, parents, and visitors gain an in- depth understanding of the campus environment. By learning to develop and utilize this technology, individuals open doors to diverse career opportunitiesin fields such as virtual reality development, augmented reality design, and immersive experience creation. Moreover, the application enhances decision-making for prospective students and strengthens their connection to the institution, setting a new standard for campus exploration experiences while also fostering innovation and creativity in educational technology.

Keywords:- AR-VR Campus Tour, Unity 3D Platform, Oculus Meta Quest Headsets, Immersive Experience.

I. INTRODUCTION

In today's rapidly evolving digital landscape, institutions are continually seeking innovative ways to engage with prospective students and provide them with unparalleled experiences that truly showcase the essence of their campus environments. Redefined traditional campus visit experience can be achieved by adapting AR-VR campus tour with the help of revolutionary fusion of AR-VR. Imagine being able to explore every nook and cranny of a university campus without setting foot outside your home. The AR-VR campus tour makes this possible by offering an immersive and interactive journey through campus buildings and amenities, all accessible from the convenience of your smartphone or compatible device. Prospective students, parents, and visitors are invited to embark on this cutting- edge experience, where they can seamlessly navigate through virtual representations of classrooms, libraries, and recreational spaces. Gone are the days of static brochures and two-dimensional campus maps; instead, users are treated to high-quality 360-degree films, detailed 3D models, and interactive components that bring the campus to life in stunning detail.

By harnessing the power of AR and VR technologies, institutions can provide users with a comprehensive understanding of their campus environment. This not only facilitates better decision-making for prospective students but also fosters a deeper connection with the institution. Whether it's admiring the architecture of a historic building, exploring state-of-the-art facilities, or envisioning campus life, the AR-VR campus tour offers an unparalleled opportunity to engage with the heart and soul of an educational institution. In an era where virtual experiences are becoming increasingly prevalent, the AR-VR campus tour stands at the forefront of innovation, transforming the way individuals explore and connect with universities.

It represents more than just a glimpse into the future of campus visits; it embodies a shift towards immersive, personalized, and impactful interactions that leave a lasting impression on all who embark on this digital journey. Welcome to the next generation of campus exploration.

II. EXISTING SYSTEM

Traditional campus tours, devoid of VR technology, encompass guided or self-guided tours supplemented by interactive maps and virtual tours on university websites. These tours serve as invaluable tools for prospective students, offering insights into campus amenities, academic offerings, and student life. Additionally, universities host open house events and admissions sessions to enhance engagement. These events provide opportunities for direct interaction with faculty, staff, and current students, allowing prospective students to gain first hand insights into academic programs, extracurricular activities, and campus resources. Overall, these engagement efforts aim to facilitate informed decision-making and successful recruitment endeavors by creating welcoming environments where prospective students can envision themselves as part of the campus community.

III. PROPOSED SYSTEM

The project aims to create a cutting-edge Unity-3D application tailored for virtual campus tours, enabling users to immerse themselves in a three-dimensional exploration of the campus through VR headsets. This innovative program not only provides users with essential information about key campus structures but also integrates a feedback mechanism to gather continuous user input. By leveraging user

experiences and preferences, the AR/VR campus tour undergoes iterative improvements, ensuring that it remains

dynamic and responsive to the evolving needs and expectations of its user.

IV. RELATED WORK

The below Table 1 provides the description of various works carried out by different researchers with respect to AR-VR campus tours.

Table 1: Literature Survey

Literature Survey		
Sl. No	Title	Description
1	Virtual reality interactive media for universities Sumatera Utara – a campus introduction and simulation. [1]	The study suggests boosting information distribution about institutional buildings at Universitas Sumatera Utara (USU) through the use of Virtual Reality (VR) and 3D modelling. The program aims to create a more engaging learning environment at USU by making campus structures easier to explore and navigate through immersive 3D models.
2	Virtual Reality Based Virtual Tour of College Using Unity 3D. [2]	This system provides a remote virtual view of the campus without requiring location services by allowing path-searching based on schedules within the college infrastructure. In addition to predetermined path-finding features, it offers a static virtual depiction of the college.
3	Virtual campus tour (student perception of university virtual Environment). [3]	The program provides a whole campus tour including navigation, narration, and department information by fusing a website with virtual reality. It has hotspots for exploration. To enhance the user experience, usability tests are carried out, and plans to expand campus amenities and provide navigational guidance are being made.
4	Virtual Campus Tour Application through Marker less Augmented Reality Approach. [4]	Designed with affordances and consistency for user navigation in mind, interface and inter action buttons are saved as PNG files. With the help of Wikitude Augmented Reality Software, marker less AR capability is achieved, allowing 3D building models to be displayed in AR sessions without requiring special device specifications.
5	Virtual Tour for College Visitors. [5]	Designed with affordances and consistency for user navigation in mind, interface and inter action buttons are saved as PNG files. With the help of Wikitude Augmented Reality Software, marker less AR capability is achieved, allowing 3D building models to be displayed in AR sessions without requiring special device specifications.
6	Interactive Navigation by Virtual Reality Tour of Electronics Department. [6]	A 3D human programmed with navigation may move freely with controls. With just one click, navigation algorithms direct you to your destination. Mannequin navigation and exploration within the department model are made possible using joystick control
7	Augmented Reality Mobile Application to Assist Campus Visits and Tours Inside the UP Diliman Campus. [7]	A mobile augmented reality application uses a hybrid method to find points of interest on the campus of UP Diliman. In order to identify certain buildings and points of interest on campus, users can use image-based markers or geolocation for campus-wide POIs. A mobile augmented reality application uses a hybrid method to find points of interest on the campus of UP Diliman. In order to identify certain buildings and points of interest on campus, users can use image-based markers or geolocation for campus-wide POIs.
8	A Playable 3D Virtual Tour for an Interactive Campus Visit Experience: Showcasing School Facilities to Attract Potential Enrollees. [8]	With the use of gaming technology, MILES Virtual Tour offers a more engaging experience. Rank-Order Spearman Narrow value ranges restrict the application of the correlation coefficient, which is used to quantify correlation strength and direction. An animated campus and 3D avatars mimic the feel of a real university.
9	Designing An Immersive Virtual Reality Campus Tour: Technical and User Experience Considerations. [9]	Realistic 3D representations are produced by rendering, audio enhances immersion, and navigation improves user movement. Virtual inter actions are managed via integration issues and collision detection, while resource management is handled by optimization for cross-device capability.
10	Virtual Tour with Voice Assistant using Extended Reality. [10]	An Internet of Things voice assistant is featured in a virtual tour of a college's grounds. Voice service detects entry and plays recorded sounds when a user puts on a VR headset in certain places. Sound ends when the person exits the room

V. METHODOLOGY

A. Collecting Information

The process involves comprehensive gathering of pertinent information regarding the college campus, encompassing detailed data on building locations, notable landmarks, and distinctive features as mentioned in Fig 1. This meticulous approach often necessitates on-site visits to physically explore the campus, allowing for the capture of accurate and high-quality videos of the actual locations. Through meticulous documentation and videography, the project ensures a thorough understanding and representation of the campus environment, laying the foundation for the development of an immersive and authentic virtual experience for users.

B. Collecting Videos

The project involves the creation of high-quality 360-degree videos capturing various significant spaces across the campus, including departments, laboratories, and libraries as mentioned in Figure 1. These videos are meticulously crafted to showcase the essence and functionality of each space, highlighting key features and amenities to provide users with an immersive experience. Moreover, the videos undergo enhancement and editing processes to ensure seamless transitions between different viewpoints, enhancing the overall fluidity and realism of the virtual tour. Through careful attention to detail and advanced editing techniques, the project aims to deliver a captivating and dynamic visual representation of the campus environment, enabling users to explore and engage with the spaces with unparalleled clarity and depth.

C. Unity Development

The Unity game engine serves as the foundational tool for developing the VR application, facilitating the integration of essential elements such as user interaction, navigation, and environment rendering. Leveraging Unity's versatile capabilities, developers employ C# programming language to write code and scripts that drive the functionality and behavior of the VR app. This involves implementing interactive features that enable users to engage with the virtual environment, including navigating through different spaces, interacting with objects, and accessing relevant information. Furthermore, Unity's robust rendering engine empowers developers to create immersive and visually stunning environments, leveraging advanced graphics techniques to ensure a captivating and realistic VR experience. Through the seamless integration of Unity's features and the utilization of C# scripting, the project aims to deliver a polished and immersive VR application that effectively showcases the college campus and enhances user engagement.

D. Integration of Video Content

The integration process involves seamlessly incorporating the gathered 360-degree videos into Unity's virtual reality environment, ensuring precise alignment and optimization for optimal performance. This intricate task encompasses meticulous attention to detail to ensure that each video seamlessly fits within the virtual space, maintaining consistency and coherence throughout the experience. Additionally, optimization techniques are applied to enhance

performance, including minimizing load times, optimizing video resolution and compression, and implementing efficient rendering processes. By meticulously aligning and optimizing the 360-degree videos within Unity, the project aims to deliver a seamless and immersive virtual reality experience that captivates users and facilitates seamless exploration of the campus environment.

E. Testing and Iteration

Iterative testing is conducted throughout the development process of the VR application, involving deploying the application to testers to identify and address bugs and usability issues. Feedback from testers guides refinements to improve the user experience, ensuring a seamless and engaging interaction with the virtual campus environment.

F. Oculus Quest Deployment

The APK is prepared for deployment on the Oculus Quest platform through compilation in a format compatible with Oculus Quest. This involves ensuring that the APK is compiled specifically for the Oculus Quest platform and meets all necessary requirements as mentioned in Figure 1. Additionally, thorough installation instructions are provided to guide users through the setup process, ensuring seamless deployment and optimal functionality on the Oculus Quest headset.

G. Evaluation

Gathering user feedback is a crucial step in assessing the performance and usability of the application. This involves soliciting input from users who interact with the VR experience on the Oculus Quest platform, specifically formatted to ensure compatibility. By collecting feedback, developers gain valuable insights into user experiences, identifying areas for improvement and addressing any issues encountered during interaction. Additionally, providing clear installation instructions ensures smooth deployment of the application, enhancing user accessibility and facilitating a seamless VR experience on the Oculus Quest headset.

VI. RESULTS

The project accomplishes its goals by developing an immersive and interactive campus tour using Unity-3D and VR headsets. This innovative experience allows users to virtually navigate the campus, accessing crucial building details and offering feedback for continuous improvement.

By bridging the divide between physical and virtual campus visits, this approach enriches engagement and recruitment endeavors, offering prospective students and visitors an unparalleled glimpse into the institution's offerings and atmosphere.

VII. CONCLUSION

Augmented Reality and Virtual Reality offers enhanced user experiences, fostering immersive and interactive environments that drive heightened engagement and satisfaction among users. Particularly in educational and

training contexts, AR and VR technologies have demonstrated their efficacy in improving learning outcomes and skill development through realistic simulations. Additionally, they facilitate improved data visualization, aiding in the comprehension and analysis of complex.

FUTURE SCOPE

Future developments for the virtual reality-based campus tour designed in Unity3D and deployed on Oculus Meta Quest headset encompass a range of exciting features. These include implementing avatars for personalized interactions, advanced locomotion options for smoother navigation, real-time chatbot conversations for instant information access, and multiplayer support for collaborative exploration. These enhancements promise to enrich the user experience, making the virtual campus tour more immersive and socially engaging.

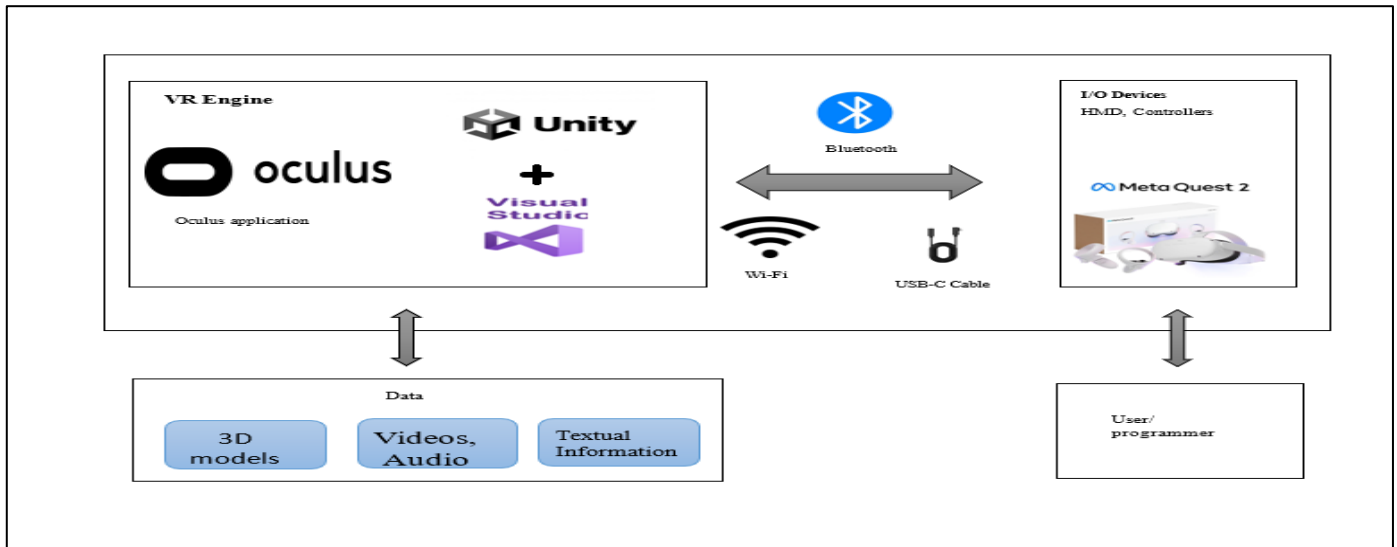


Fig 1: System Architecture

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