



Designing An Immersive Virtual Reality Campus Tour: Technical And User Experience Considerations

(Virtual Tour)

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Abstract: Virtual reality (VR) technology has enormous promise for use in many different industries, but its specialized equipment can be pricey. This research looks at interactive 360-videos as a viable remedy for the problems that surround immersive experiences on mobile devices. It is a practical and inexpensive way to travel because users may explore and engage with the environment's objects and people. Additionally, a virtual tour of a college campus is offered by a suggested software system that makes use of VR technology. The method provides for tourists who would like to tour the facilities but are unable to do so because of their hectic schedules. The programme runs in virtual reality and needs a VR headset.

Index Terms -Virtual Environment, Virtual Reality

I.INTRODUCTION

For VR research, evaluating users' opinions of Virtual Environments (VEs) is essential. Self-assessment questionnaires are typically used for this before and after exposure to VR. The disadvantage of this method is that it measures affective states asynchronously. To get over this restriction, we suggest concurrently evaluating users' affective states using behavioral measurements, specifically head motions when exposed to VR. According to our research, head yaw substantially predicts presence, physical and mental effort, perceived performance, and system usability. [1] Additionally, we show how head yaw can be used to detect faked survey responses and forecast a user's emotional condition. Our findings present a strategy that has promise for gauging users' opinions on VEs.

II. PROBLEM DEFINITION

2.1 Problem Statement

Though online maps have made their own level in today's world, a 2D map can be confusing many times. Integration of AR / VR technology with these maps will make things a lot different.

AR / VR implemented maps of a campus or big complex can make it a lot easier for the visitors to get acquainted with the place.

2.2 Scope

The project will help to analyze user behavior in VR, as well as the other disciplines, [2] such as affective computing and cognitive sciences, which utilize human motion analysis to infer affective states.

2.3 Aim and Objectives

Aim:

To accurately classify the various regions within a given region on the basis of their terrain.

Objectives:

1. Self-assessment on demography.
2. Exposure to a Virtual Reality, where behavioral data is collected.
3. Assess validity of relationship between behavioral data and self-assessed affective states.
4. Real-time system adoption.
5. Train prediction model using self-assessments and behavioral data.
6. Perception : No enhancement in binocular disparity and pictorial cues.

7. Behavior : In most of the systems, input data is taken in the form of values (often in the tabular form).
8. Affectiveness : Low user affective state.

III. EXISTING SYSTEM

There are several existing systems for creating virtual reality in 360-degree virtual tours. Here are some of the most popular ones:

Google Street View: Google Street View is a popular platform that allows users to explore cities and landmarks in 360-degree views. You can also create your own 360-degree virtual tours using Google's Street View app.

Matterport: Matterport is a platform that allows users to create 3D models and virtual tours of real-world spaces. It offers a range of features, including 360-degree views, interactive floor plans, and VR support.

Roundme: Roundme is a platform that allows users to create and share virtual tours with 360-degree views. It offers a range of customization options and supports VR headsets.

These are just a few of the existing systems for virtual reality in 360-degree virtual tours. There are many other platforms and tools available, each with its own unique features and capabilities.

IV. WORKING ON SOFTWARE DEVELOPMENT

The creation of VR software for both consumer and academic use is covered in this paragraph. There are many open platforms used for software development, including Oculus and HTC, both of which have made their SDKs available to the general public. Valve provides APIs with Steam access and the OpenVR SDK, both of which are available on GitHub, while Oculus offers updated SDKs for building prototypes and involving the community in the development process. [3] Cross-device development requires standardization, and OSVR offers a solution by fusing open-source hardware and software. It has been difficult to integrate well-known platforms used by the scientific community, such as VRPN, as only the Razor Hydra input device is now supported. The emphasis is on applications in aerospace and collaborative work.

V. IMPLEMENTATION

5.1 Execution planning and procedure

The definitions of Virtual Reality (VR) and Augmented Reality (AR) and their uses in the AEC (Architecture, Engineering, and Construction) sector are discussed in the text. AR places virtual content over the real world, whereas VR creates an immersive atmosphere using a computer-generated 3D environment. The book provides background information about BIM (Building Information Modelling), a digital model for data management in the AEC industry, as well as information on its various stages, including creation, maintenance, operation, and deconstruction. [4] The text also discusses the process from BIM to VR and BIM to AR, as well as the four different forms of AR. The book concludes by speculating on the potential uses of VR and AR, stating that it might take ten years for VR to become more affordable and portable.

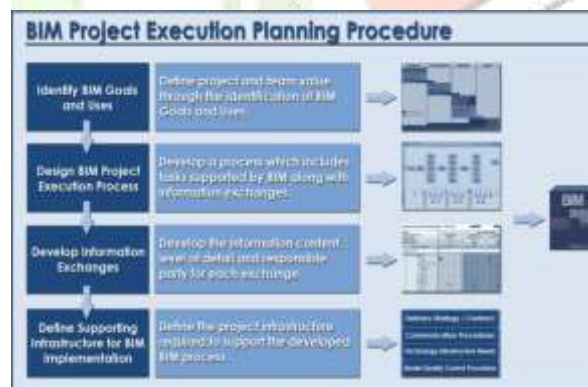


fig. 1. BIM project execution planning procedure

5.2 Applicability (Environmental and Societal Aspects)

According to a Stanford University study, using virtual reality (VR) in the classroom may have a big impact on how well pupils grasp their surroundings. Students can become more environmentally conscious by modeling certain ecosystems that are impacted by climate change, such as coral reefs. By allowing for trial-and-error prior to actual implementation, virtual reality can also help with planning and design for environmental solutions. [5] The toxic materials needed to make and dispose of VR equipment are just one example of potential environmental disadvantages to take into account. A large amount of manufacturing waste might result from VR if it becomes a commonplace item.



fig. 2.augmented reality

5.3 Design

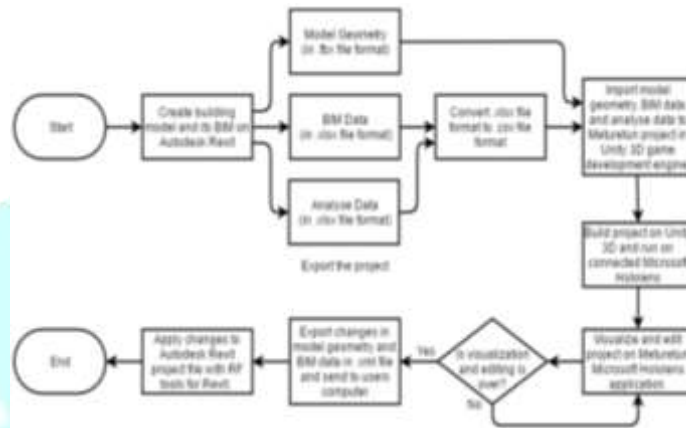


fig. 3. flowchart of implementation

Given above is the flowchart of the implementation process.

5.4 Flowchart detailing the training process

To develop a building model and analyze its BIM data using various software tools, follow the stages in the method given. The first step is to construct a model geometry in the.fbx file format. The next step is to develop a building model in Autodesk Revit together with its BIM data, which is produced in.xlsx file type. Then, this data is transformed into.csv format for additional analysis. The Metureton project imports the model geometry, BIM data, and any modifications made with RF tools for Revit before analyzing them with the Unity 3D game engine. The data is exported in.xlsx file after analysis.

The next step is to export the model geometry and BIM data in the.xml file format and transmit them to the user's computer. [6] The project must be built in Unity 3D and then run on a network-connected Microsoft Hololens as the last stage. The Metureton Microsoft Hololens programme can be used to further improve the project if further visualization and editing are still required.

5.5 Flowchart detailing the extraction process

The procedure described above offers an effective method for developing and examining building models while utilizing a variety of software tools. It places a strong emphasis on the value of accurate data analysis for creating effective BIM and the necessity of visualization for producing successful project results. [7] Following this procedure will help designers and engineers generate and analyze building models more accurately and quickly, which will improve decision-making and result in successful project outcomes.

VI. DETAILS OF HARDWARE AND SOFTWARE

The minimum hardware and software requirements stated are necessary to run 3D modeling, architectural visualization, and virtual reality software programmes properly and efficiently. These specifications are critical to make sure the computer can do the graphically demanding tasks demanded by the software, load big files, and run numerous apps at once. For handling larger data sets and producing high-resolution visuals, the quicker processor and UHD graphics are important, while IPS technology is required for precisely viewing and analyzing 3D models and visualizations. [8] By fulfilling these objectives, software tools like Glitch, WPVR Autodesk, and Neo Foyr will function easily and effectively, enabling the successful completion of projects involving 3D modeling, architectural visualization, and virtual reality.

VII. EXPLANATION OF THE ALGORITHM USED

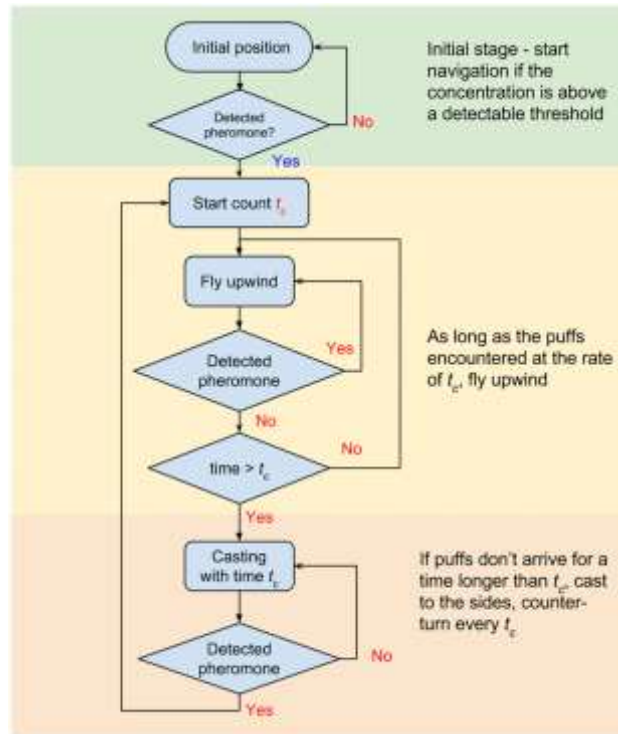


fig. 4. flow-chart-of-the-search-navigation-algorithm.

Depending on the particular application and platform, the algorithms used in a virtual reality campus tour may change. Algorithms for rendering, navigation, audio, collision detection, and optimization are some that are frequently used. [9] While the navigation algorithm provides a user-friendly interface and mobility mechanism, the rendering algorithm creates realistic 3D representations of the campus area. Realistic sound effects are produced by the audio algorithm, while virtual object collisions are controlled by the collision detection system. [10] Last but not least, the optimisation method controls resources like memory, computing power, and network bandwidth to make sure the virtual reality campus tour functions effectively across various devices.

VIII. TESTING AND RESULTS

The potential factors that are evaluated in a virtual reality tour model:

1. User engagement: The level of user engagement with the VR tour is measured by metrics such as time spent on the tour, completion rates, and user feedback.
2. User satisfaction: User satisfaction is measured by gathering feedback through surveys, focus groups, and other methods to determine how satisfied users are with the VR tour experience.
3. Effectiveness: The effectiveness of the VR tour can be measured by metrics such as en-rollment rates, campus visits, and engagement levels before and after implementing the virtual reality tour.
4. Accessibility: The accessibility of the VR tour is evaluated by testing the tour on a variety of devices and platforms to ensure that it is accessible to as many users as possible.
5. Technical performance: [11] The technical performance of the VR tour is evaluated by testing the tour for issues such as lag or glitches, and making necessary adjustments to improve the performance.



fig. 5. 2D model of virtual campus.

Overall, the evaluation of a virtual reality campus tour model would depend on the specific goals and objectives of the tour, and the effectiveness of the implementation methodology in achieving those goals. [12] [13] By gathering feedback and evaluating the effectiveness of the tour, adjustments can be made to improve the user experience and increase the effectiveness of the tour.



fig. 6. 3D model of virtual campus - library



Fig. 7. 3D model of virtual campus - classroom

IX. CONCLUSION

For educational institutions and other organizations to exhibit their facilities and services to potential students, visitors, and stakeholders, virtual reality campus tours are an invaluable marketing tool. [14] These tours provide a hands-on, immersive experience that is unmatched by traditional marketing materials, which raises engagement and interest in the institution. Virtual reality tours can be personalized and customized as technology develops to offer progressively more compelling and specialized experiences. [15] This technology has a bright future in the marketing and outreach initiatives of businesses, enabling them to differentiate themselves from rivals and offer distinctive experiences to their audiences.

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