Virtual Tourism: Towards Better User Experience in Online Virtual Tours[⋆]

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Abstract

The disruption to tourism and travel caused by the COVID-related health crisis highlighted the potential of virtual tourism to provide a universally accessible way to engage in cultural experiences. 360-degree virtual tours, showing a realistic representation of the physical location, enable virtual tourists to experience cultural heritage sites and engage with their collections from the comfort and safety of their home. However, there is no clear standard for the design of such tours and the experience of visitors may vary widely from platform to platform. In our previous research, we conducted a remote usability study to gain deeper insights into the actual experiences and challenges faced by virtual tour users. Our investigation revealed a significant disparity between users' mental models of virtual tours and the actual system behavior. We outlined issues and provided concrete recommendations for the creation of better, user-friendly 360-degree virtual tours. We plan to continue to investigate the design and impact of virtual tours, and investigate user experiences across diverse platforms and devices (e.g. Smartphones, VR Headsets, Tablets), each offering different features . Additionally, we plan to explore different navigation types, including central movement and free movement, as well as varying content and navigation structures specific to each platform. Our emphasis lies on the navigation aspect, which is crucial in shaping users' perceptions of virtual tours. Subsequently, we will examine two key features of virtual tour navigation, as identified in our initial analysis: the degree of freedom of movement (i.e., the number of System Navigation Points) and the transition between movements.

Keywords

360 Virtual Tours, Cultural Heritage, Virtual Tourism

1. Introduction

Virtual Tours (VTs), which showcase 360-degree views of environments, have gained popularity in recent years. They enable users to explore cultural heritage sites like museums and historical locations, as well as other real-world environments such as real estate properties and university campuses, all from the convenience of their personal digital devices. A virtual tour is a realistic presentation of a physical location constructed by multiple 360-degree images or videos, usually shot with a 360-degree camera or stitched from a series of photographs [1]. The users can interactively navigate through the space, alter the viewing angle, and look around as if they were actually there. 360-degree VTs can serve as a way to view a location from afar and even serve as a particular representation of a place at a specific time in the past.

The COVID-19 pandemic along with the lockdowns and restrictions it introduced which limited tourism activities, have made VTs an attractive option for individuals who want to learn about museums and cultural places remotely [2]. In conditions in which it is impossible to physically visit cultural locations and exhibitions, virtual tourism can partially recreate the experience by allowing the users to remotely view and interact with tourist destinations from the comfort and safety of one's home [3]. Furthermore, VTs were found to increase the interest of the users to visit the actual locations of the tour [4] and to improve the learning outcomes and knowledge retention when they physically visit the location [5]. Therefore, 360-degree VTs offer an accessible solution for a wide range of potential users.

This includes individuals who wish to preview a location before their visit, as well as those who may be unable to physically travel to the site due to distance or accessibility challenges.

We focus on 360 virtual tours, as digital twins and 360 virtual tours serve different purposes. The choice between them depends on the specific requirements of a project, with digital twins providing comprehensive capabilities beyond visual representation, as they are suitable for complex structure analysis and operational improvements in sectors like manufacturing and urban planning. Therefore, 360 virtual tours are primarily used for visual exploration of spaces, making them simpler and more cost-effective for industries like tourism and real estate.

Despite the growing popularity and usefulness of VTs, many VT visitors encounter usability issues that affect their user experience [4, 6, 7]. Furthermore, there is currently no standard way for a VT to be constructed, nor a standard way for the design of its components and user interface. Consequently, the attractiveness and experience for users using VTs vary depending on the particular design features and interaction mechanisms implemented in the specific tour. This lack of consistency and unified design knowledge negatively affects user experience and satisfaction [4].

2. Research on 360 Virtual Tours

Described herein are some variations properties and possibilities we aim to explore with current and future virtual tours. Figure 1 illustrates the different elements and considerations involved in virtual tour experiences. The diagram identifies seven key aspects that intersect and interact to create a comprehensive virtual tour environment. I our research, we plan to examine several of these aspects.
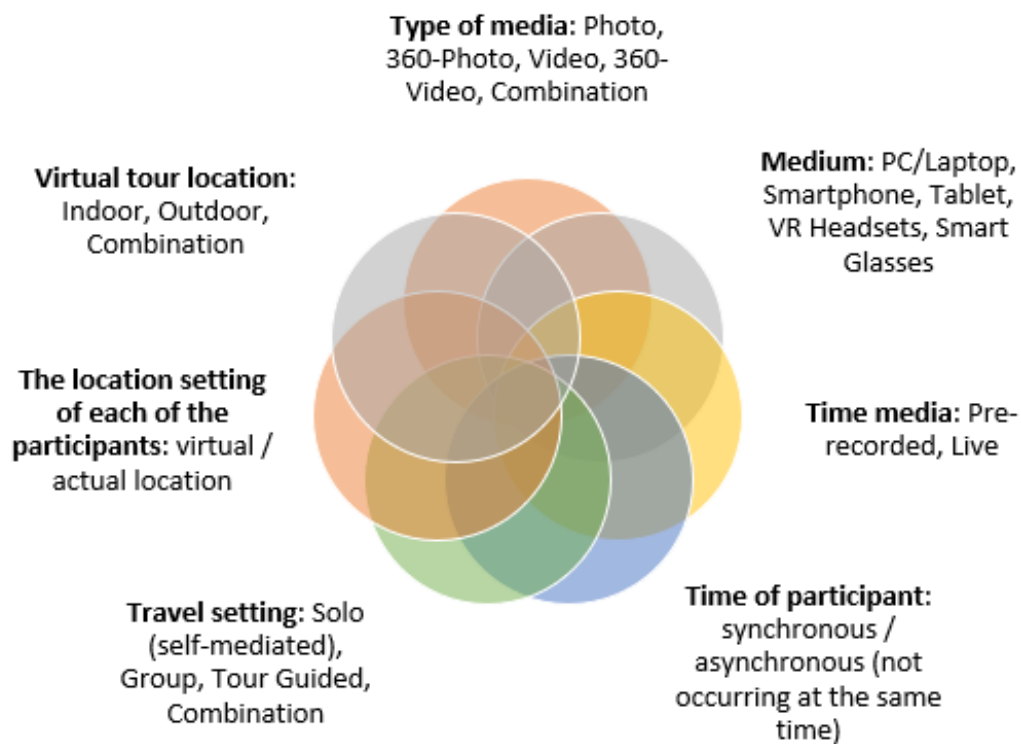

Figure 1: 360 Virtual Tours Research Properties for future Directions and Variations

The virtual tour experience is characterized by several key factors: the type of media utilized, including standard photos, 360-degree photos, conventional videos, or 360-degree videos; the location of the tour, whether indoors, outdoors, or a mix of both; the participants' setting, distinguishing between virtual and physical presence at the location; the travel setting, indicating whether participants are on a self-guided tour, in a group, or led by a guide; the medium used to access the tour, such as PCs,

smartphones, or VR headsets; the timing of the media, differentiating between pre-recorded and live tours; and the timing of participant engagement, considering synchronous or asynchronous experiences.

Our upcoming research endeavors aim to comprehensively investigate the user experience in virtual tours across three main directions. Firstly, we will focus on understanding the pivotal role of navigation structures in enhancing user engagement within virtual tours. Through an in-depth exploration of the relationship between navigational aids and user interaction dynamics, we seek to shed light on how strategic navigation design influences the immersive quality and engagement levels of virtual tourists. Secondly, our research will delve into assessing the impact of enhanced information presentation on user satisfaction and engagement. This entails designing virtual tours with various multimedia elements to examine how different information formats shape user perceptions and learning outcomes.

Lastly, we will investigate the differences in user experience across different devices, ranging from PCs and smartphones to tablets and VR headsets. By uncovering how device-specific factors affect engagement, tour visit outcomes, accessibility, and learning effectiveness, our research aims to provide valuable insights for optimizing virtual tour design and enhancing user satisfaction across diverse platforms.

For this purpose of the research , we will focus on the following research questions:

1. How do navigation structures affect user engagement in virtual tours?
2. What is the impact of multimedia-enhanced information presentation on user satisfaction in virtual tours?
3. How do device-specific factors influence user experience in virtual tours?

3. Research Directions

Investigating the roles of navigation and information presentation in virtual tours intersects HCI principles with cultural heritage research. We focus on user interface design and interaction to enhance user engagement and learning outcomes. By analyzing user preferences and identifying challenges in virtual tours, this research supports the development of user-centered designs that are not only more engaging but also educationally effective.

Navigation and information presentation constitute two pillars upon which the success and user satisfaction of virtual tours rest. Their critical importance underscores why a focused examination of their impact is essential as the first step in researching virtual tours.

Navigation in Virtual Tours: Navigation refers to how users move through and interact with the virtual environment. Effective navigation mechanisms are crucial because they directly influence a user's ability to explore and engage with the content. Poorly designed navigation can lead to frustration, disorientation, and a reduced likelihood of users completing the tour. In contrast, intuitive and seamless navigation enhances the user experience by making exploration effortless and enjoyable, thereby encouraging deeper engagement with the content. Navigation isn't just about moving from point A to point B; it's about doing so in a way that feels natural and enriches the overall experience.

Information Presentation: The manner in which information is presented within a virtual tour—be it through text, images, audio, video, or interactive 3D models—plays a significant role in the educational and entertainment value of the experience. Information presentation must be tailored to the virtual medium to take advantage of its strengths, such as the ability to provide immersive, interactive experiences that are not possible in physical tours. Effective information presentation can captivate users, making complex or detailed content more accessible and engaging. It also caters to various learning styles, ensuring a broader appeal. The challenge lies in balancing the depth and accessibility of information without overwhelming the user.

Virtual Tour use across different mediums A third strand of our research will look into User Experience (UX) of VTs as it varies across different devices—PCs, smartphones, tablets, and VR headsets—and its implications for data collected on virtual tour visits. This investigation is pivotal as it recognizes that the medium through which content is accessed significantly shapes the user's interaction, perception, and overall experience of the virtual tour.

Exploring the user experience (UX) across different devices in virtual tours may reveal varied impacts due to each device's unique capabilities, context of use, and user expectations. The difference in screen size, resolution, and interaction methods between PCs, smartphones, tablets, and VR headsets influences how content is engaged with and perceived, impacting everything from engagement metrics to learning outcomes. Moreover, the accessibility features and immersion levels each device offers can affect inclusivity and the depth of the virtual tour experience. Research in this area aims to uncover how these factors shape user satisfaction, guiding the optimization of virtual tours to meet diverse user needs and expectations.

4. Summary

In conclusion, using 360-degree VTs of museums and cultural heritage sites can be a fascinating way to experience virtual tourism. In a museum VT, visitors are educated and entertained, just like they would be in a real museum. However, it is clear that the user experience of the museum virtual tour is crucial to its success. We plan to examine how virtual visitors experience virtual tours in different settings. In our previous research, we examined current online museum virtual tours [8]. There are, however, different variations of virtual tours that can be developed and studied, which will be the focus of our current research. This is an opportunity to experiment with new types of virtual tourism that have yet to be explored and researched. As these types of virtual tours are likely to be popular and widespread in the future, we need to examine how to design functional and engaging user experiences for them.

5. Acknowledgments

References

[1] N. Bakre, A. Deshmukh, P. Sapaliga, Y. Doulatramani, Campus virtual tour, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) 6 (2017) 5.

[2] T. Yang, I. K. W. Lai, Z. B. Fan, Q. M. Mo, The impact of a 360° virtual tour on the reduction of psychological stress caused by covid-19, Technology in Society 64 (2021) 101514.

[3] A. R. Adriyanto, A. R. Triani, 360 virtual reality panorama of indonesia tourism, Bandung Creative Movement (BCM) Journal 2 (2015).

[4] A. Mohammad, H. Ismail, Development and evaluation of an interactive 360 virtual tour for tourist destinations (2009).

[5] R. Abidin, N. Suryani, et al., Students' perceptions of 360 degree virtual tour-based historical learning about the cultural heritage area of the kapitan and al-munawar villages in palembang city, International Journal of Social Sciences and Management 7 (2020) 105–112.

[6] H.-M. Chiao, Y.-L. Chen, W.-H. Huang, Examining the usability of an online virtual tour-guiding platform for cultural tourism education, Journal of Hospitality, Leisure, Sport & Tourism Education 23 (2018) 29–38.

[7] K. Kabassi, A. Amelio, V. Komianos, K. Oikonomou, Evaluating museum virtual tours: the case study of italy, Information 10 (2019) 351.

[8] R. Shikhri, L. Poretski, J. Lanir, Analyzing behavior and user experience in online museum virtual tours, arXiv preprint arXiv:2310.11176 (2023).