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Virtual tour with multimedia information of the Chapel of Los Dolores (Icod de los Vinos) for tourist and cultural dissemination

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Abstract

Virtual tours using 360-degree photos offer a quick, simple, and accessible way to share immersive experiences of real places. For this experience, a virtual tour has been created with 360-degree photos of the Chapel of Nuestra Señora de los Dolores, also known as Capilla de la Huerta, located in the municipality of Icod de los Vinos, on the island of Tenerife. It currently belongs to the Bishopric, and although the temple is still open for worship, access is limited to specific days and festivities. It has been designated as an Asset of Cultural Interest in the Monument category since 2013. To create the virtual tour, a 360 camera, model Insta 360 X3, was used. A total of 27 photographs were taken of both the exterior and the visitable interior. In addition, areas that are not ordinarily accessible to the general public due to their poor state of conservation were also photographed. Subsequently, the virtual tour was generated with the CloudPano program. A simple tour was created without multimedia information that can be viewed using virtual reality glasses such as Cardboard, allowing for a completely immersive experience. At the same time, another version was created, enriched with data that can be viewed in a non-immersive way on a computer screen or Smartphoneand enriched with data that can be viewed non-immersively on a computer screen or smartphone. This chapel has been selected for a virtual tour with 360 photos due to its originality and historical-artistic interest, which justifies its dissemination. In addition, we have taken into account its good general state of preservation and the amount of existing documentation, thanks to the studies and interventions carried out. In short, this project aims to enhance the value of the Chapel of Dolores, making known, in addition, rooms and spaces that are not currently accessible to the public.

Keywords: *Virtual tour, Added information, Chapel of Dolores, Tourist interest, Cultural heritage.*

1. Introduction

For this project, a virtual tour enriched with data about the Chapel of Nuestra Señora de los Dolores, also called Capilla de la Huerta, located in the municipality of Icod de los Vinos on the island of Tenerife, has been carried out. This construction is part of the Antiguo Convento Franciscano del Espíritu Santo facilities, an extension of the convent complex catalogued as an Asset of Cultural Interest in the category of Monument since 2013 (BOC, 2013). The chapel's construction at the end of the 18th century was promoted by the Hurtado de Mendoza family, following the wish of Captain Hurtado de Mendoza, who wanted to dedicate it to the Virgen de los Dolores. The chapel was considered finished in 1770, although it underwent modifications until 1774 (Martínez de la Peña, 1998).

Occupying the front of the chapel is the main altarpiece (Figure 1), which belongs to the second half of the 18th century and is catalogued as a Rococo-Chinesque altarpiece (Trujillo Rodríguez, 1977). It can be considered that this altarpiece is registrable, which means that it can be accessed through several accesses that were created at the time for functional reasons, and this has made it possible to identify and analyse its construction system, of the architectural box or sheet metal, which is hidden behind the façade of the altarpiece (Díaz & Tudela, 2021).

The interest aroused by this altarpiece has led to different technical studies and interventions on it (Díaz et al., 2023). The last of these works took place in 2021, within the framework of the Final Degree Project in Conservation and Restoration of Cultural Property, where the study and conservation-restoration of the central niche of the main altarpiece was carried out (Chinea Peña et al., 2021).

Figure 1. Interior of a single nave. In the background, the main altarpiece presiding over the chapel.

This chapel has been selected for a virtual tour with 360º photos, on the one hand, to visualise in a virtual reality headset and, on the other hand, with multimedia information, given its originality and historical-artistic interest. This dissemination is supported by its excellent state of preservation and the abundant documentation available thanks to previous studies and interventions. It also has the possibility of making the tour of the altarpiece registrable. It is exciting to have this virtual tour because the chapel is only open on specific days.

In essence, this project seeks to highlight the value of the Chapel of Dolores, offering access to rooms and spaces that are currently not accessible to the public. The additional information in the tour enriches the visitor's knowledge and promotes the dissemination of books, texts, and information about restoration work carried out in the chapel.

2. Background

A virtual tour is a recreation of an entirely virtual environment where you can move freely and interact using a digital device. Virtual tours can be a copy of a reality or a fictitious space and even a mixture of both (Sanchez Riera et al., 2022), where the user can walk through or examine the place. To create these tours, there are a variety of programs and applications: on the one hand, advanced, expensive technologies that require specialised knowledge to operate, and on the other hand, simple and accessible technology available to anyone who works through a cell phone (Nieva García et al., 2022).

3D modelling technology, facilitated by CAD (computer-aided design) tools, makes it possible to create realistic virtual tours (Janovský et al., 2022). These programs enable modelling, texturing, lighting, and animation of scenes and elements. Video game engines such as Unity or Unreal Engine are used to convert these models into virtual tours (Meier et al., 2021). The creation of virtual tours that are exact replicas of reality can be done by 3D technologies using techniques such as photogrammetry or point cloud creation by 3D scanning (Rüther, 2020). These digital twin tours represent the real environment in great detail in a virtual model (Lucchi, 2023). On the other hand, 360 cameras provide a fast and affordable option for creating realistic virtual tours (Nieva Garcia et al., 2022), although they limit the user's movement to the captured viewpoints.

In all technologies, it is feasible to integrate digital elements that do not physically exist in the real world, thus allowing virtual experiences to be enriched, which considerably expands the application possibilities. In most programs, it is possible to incorporate visual information such as text, images, videos, and audio. In addition, links to external sites can be included, which opens up various options, from linking books or online documents to providing geolocation, contact data, weather forecasts, and even three-dimensional models (Fernández García & Herrera Arenas, 2022).

The way to visualise a virtual tour can vary, from downloadable programs for computers, tablets, or mobiles to online versions. Tours created with CAD programs and video game engines require high processing and are usually limited to computers or consoles. Point clouds generated by scanners also require powerful devices for viewing, usually by download or installation on a computer. In contrast, 360 videos are easily accessible, and virtual tours with 360 photos can be viewed via links. In terms of immersion, virtual tours are classified into three levels: low, semi, and high immersion. Tours on screens controlled by a mouse or touch screen are low immersive while viewing with added information in a full dome or with smart glasses is considered semi-immersive. Finally, virtual reality goggles offer a fully immersive experience (Di Natale et al., 2020).

A 360 camera, specifically the Insta 360 X3 model, was used to capture images for this virtual tour, and the Cloudpano online program was utilised to create the virtual tour from these images. One tour has been designed without added information for viewing in a virtual reality headset, and another has multimedia information to be viewed on other devices.

3. Materials and Methods

A total of 27 spheric photographs were taken with the Insta 360 X3 camera (approximately the price of the camera is 500€). Images were taken of both the exterior, i.e., the entrance door, and the interior, which people can visit with access, as well as parts not generally due to their poor condition and the walkable part of the altarpiece. This process took about two hours. The photographs were then entered into the online program Cloudpano to generate the virtual tour. Organising the images and creating the link points for a simple virtual tour took approximately

three to five hours. The process takes longer to insert the added information, such as data, images, links, 3D models, etc., depending on the amount of material available (Figure 2).

Figure 2. Virtual tour created in Cloudpano with multimedia information buttons

Additional information that has been added to the virtual tour is as follows:

- Informative text;
- Informative text in image format for better visualisation;
- Images of details such as damage or Map of alterations;
- Videos with detailed explanations (Figure 3a);
- Links to other sites;
- Multimedia resources in HTML5 format;
- 3D models embedded in the tour (Figure 3b);
- Access to the documents on the web about the work and restoration carried out in the chapel and the altarpiece.

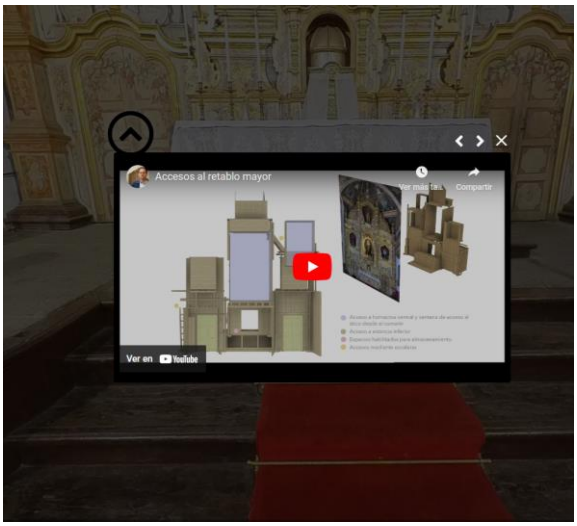

Figure 3a. Example of added information (video)

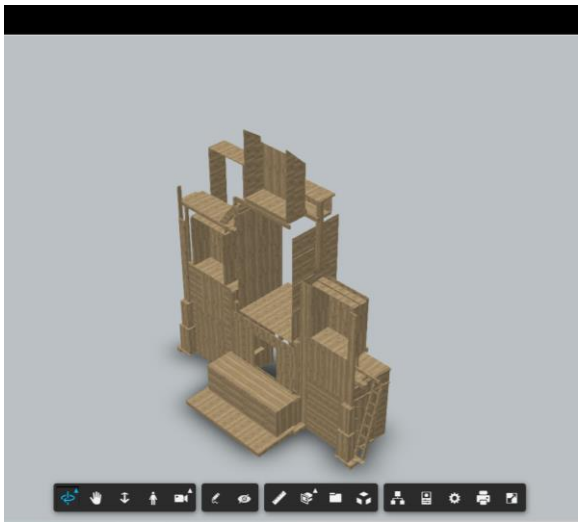

Figure 3b. Example of multimedia information (3D model in interactive viewer)

4. Results

A functional virtual tour has been created (https://capilladoloresvr.cultimerse.com) that can be experienced with virtual reality glasses in an immersive way (Figure 4a). In addition, a new version has been created (https://capilladolores.cultimerse.com) with multimedia information that can be viewed on mobile devices or computers (Figure 4b).

Figure 4a. Virtual tour for immersive devices

Figure 4b. Virtual tour with multimedia information

In the virtual tour enriched with data, most of the possibilities presented by the Cloudpano program have been implemented, including a great variety of multimedia resources (Figure 5). This virtual tour can become a container for all the information of interest associated with the Chapel of Dolores. The information can also be incorporated wherever needed, combining a visual tour with the restored details added live.

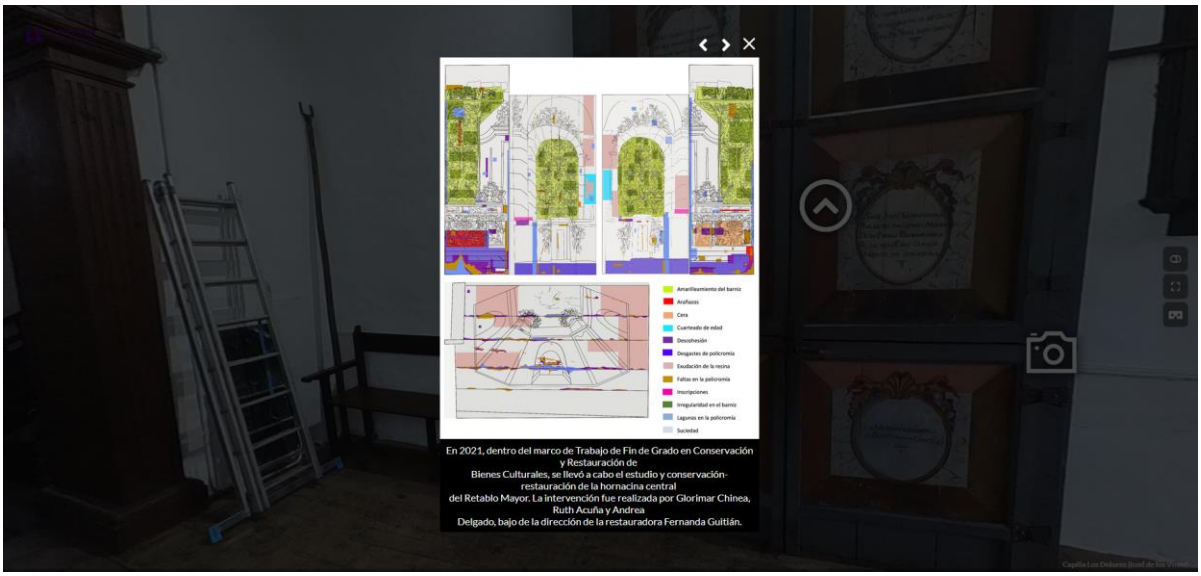

Figure 5. Example of added information (Map of alterations of the central niche). Source: Chinea Peña et al. (2021).

Information has been added in text format (Figure 6) to describe the painted ceiling, the chapel roof, the semicircular arch, and the altarpiece (year, typology, description, etc.). This information is described in more detail in the introduction to this text and can be consulted in Martínez de la Peña (1998).

We have also added details in image format (Figure 7) of the interior of the Altarpiece, the rear view of the tabernacle, a map of alterations (Figure 5), and a timeline elaborated in a previous research work (Chinea et al., 2021).

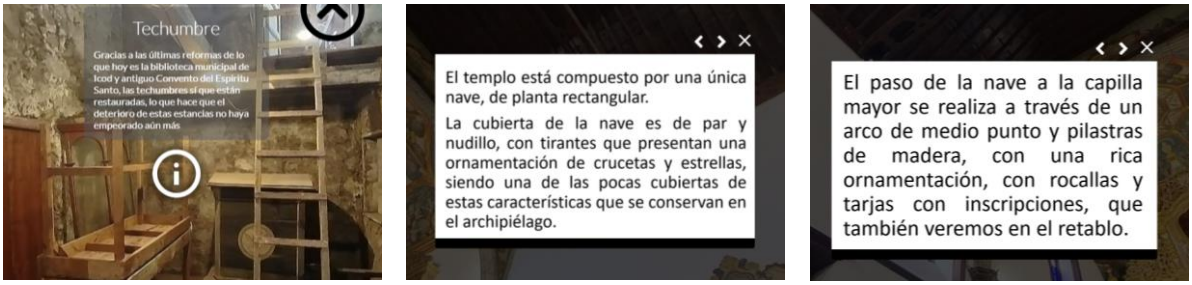

Figure 6. Information in text format with details on the ceiling, the nave and the semicircular arch.

Figure 7. Details in image format of the interior of the altarpiece, the rear view of the tabernacle and a timeline of the construction of the chapel.

Information points have also been inserted to highlight details such as information on the restoration of the ceiling, details of the pulpit, the division of the chapel, the current use of the processional staircases, etc. On the other hand, two videos have been integrated (Figure 8), one with a detailed description of the altarpiece and its components and the other of a procession of the Virgen de los Dolores in the chapel. Both videos can be found on YouTube, but they have been embedded in the virtual tour in HTML5 format to avoid having to leave the virtual tour.

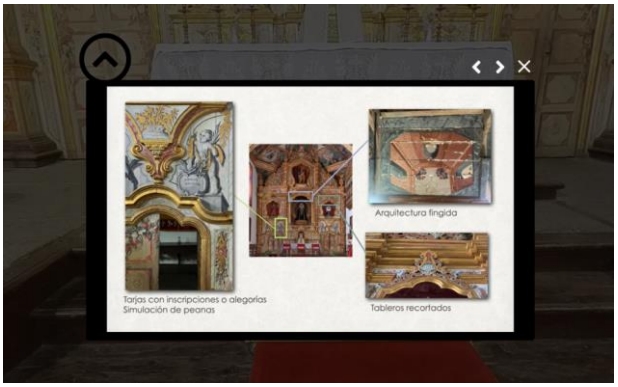

Figure 8a. Video with a detailed description of the altarpiece (Saorín, 2024a).

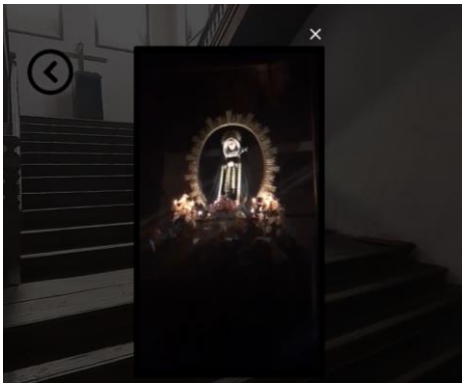

Figure 8b. Video of a procession of the Virgen de los Dolores (Saorín, 2024b).

5. Conclusions

Virtual tours using 360-degree photos offer a quick, easy, and accessible way to share immersive experiences of real places. Compared to the financial investment of a scanner or the time needed to 3D model a chapel, 360 photos are a low-cost, easy-to-create option that does not require advanced knowledge to create a virtual copy of a place.

By being able to incorporate as much information as possible into the tour, it becomes a complete informative material. On the one hand, tourists can obtain more information about the building and visit it virtually when it is not open to the public. On the other hand, it can be a very interesting resource for teachers to work on the Chapel because a direct visit is not always feasible; you can use the virtual tour and work directly on the information associated with the different rooms.

We propose the installation of a plaque with a QR code on the exterior of the Chapel of Dolores to offer direct access with mobile devices to tourists and other people interested in heritage. It is especially interesting to have this virtual tour accessible with a QR code because the chapel is only open on specific days. The additional information included in the tour enriches the visitor's knowledge and promotes the dissemination of books, texts, and restoration work carried out in the chapel.

On the other hand, as future work, it is proposed to measure the user experience of the tour with multimedia information viewed on mobile devices. It is also suggested that the user experience be assessed when navigating the tour in an immersive manner using virtual reality headsets.

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