



EDETA 360°: VIRTUAL TOUR FOR VISITING THE HERITAGE OF LLÍRIA (SPAIN)

EDETA 360°: TOUR VIRTUAL PARA VISITAR EL PATRIMONIO DE LLÍRIA (ESPAÑA)

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Abstract:

Virtual enhancement of cultural heritage by using 360° panorama photography technologies have become well established as a mean of digitally recording heritage sites for conservation, education and tourism purposes. This paper describes the work undertaken to create an interactive virtual tour based on panorama photos of the town of Lliria and its surroundings, called "Edeta 360°". This application aims to allow the general public to learn about the heritage of Lliria and to appreciate, disseminate and share it, while at the same time engaging users in a real experience of the town. Methodologically, this work has been addressed following an easy procedure with off-the-shelf equipment and using both freely available software (Hugin 2014.0.0) and Easypano Tourweaver 7.90®, while ensuring the quality of the final product.

Key words: ICT and cultural heritage, virtual tour, panoramic images

Resumen:

Potenciar el patrimonio cultural mediante el uso de la tecnología fotográfica panorámica en 360° es un medio ampliamente utilizado por los sitios patrimoniales para propuestas de conservación, educación y turismo. Este documento describe el trabajo de creación de un tour virtual interactivo basado en fotos panorámicas de 360° del municipio de Lliria, llamado Edeta 360°. La aplicación permite dar acceso general a los ciudadanos y fomentar de este modo el aprendizaje y el aprecio del patrimonio de Lliria. A la vez, sirve para difundir y compartir el amplio y rico patrimonio del municipio, ofreciendo a los usuarios una experiencia única de la ciudad de Lliria. Metodológicamente, este trabajo ha seguido un procedimiento sencillo, utilizando equipamiento propio y software libre (Hugin 2014.0.0), como Easypano Tourweaver 7.90®, consiguiendo con pocos medios un producto final de calidad.

Palabras clave: TICs y patrimonio cultural, tour virtual, imágenes panorámicas

1. Introducción and objective

In the last few decades, numerous studies have researched into how to apply Information and Communication Technologies (ICT) to cultural heritage (Monod and Klein 2005; Styliaras *et al.* 2010; Hermon and Kalisperis 2011; Ott and Pozzi 2011; Rogerio-Candelera 2014), with special attention given to architectural heritage and urban spaces.

More recently, with the development of spatial simulation and visualisation tools for spaces that cannot be accessed easily, several applications have focused on studying immersive and realistic forms of communication which provide public access to the contents of cultural heritage. According to Niccolucci (2002), virtual heritage productions may be ideal in responding to a need for a fashionable synergy between scientific enquiry,

technology, art, and everyday life, and, consequently, influence more serious cultural demand.

Among these applications, virtual environments have been widely used in the field of cultural heritage. They allow the general public to appreciate remote (in space and time) cultural assets with an immersive experience. Virtual tours (VT) are one of the most popular virtual productions (Bastanlar *et al.* 2008; Wessels *et al.* 2014). A virtual tour consists of a panoramic photography application that provides views of a wide variety of spatial data (realistic vision of building and surroundings) in a single environment, and to do so in a very attractive, interactive and meaningful way, thereby facilitating site cognition and learning.

The objective of this paper is to describe the work undertaken to create an interactive virtual tour, called

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“Edeta 360°”, based on panoramic photos for the town of Llíria and its surroundings.

This work, at all times, followed the London Charter for the Computer-Based Visualisation of Cultural Heritage (2009), which establishes internationally-recognised principles for the use of computer-based visualisation by researchers, educators and cultural heritage organisations.

2. The town of Llíria and its surroundings

Llíria, the county town of the Camp de Túria, is located 25 km away from Valencia between the Mediterranean coastal strip and the Iberian mountains. The municipal district covers an area of 228 km², being one of the largest in the province. This strategic location has favoured the settlement of several historical civilisations going back to pre-Roman times (at least the second millennium B.C.). Archaeological remains of all of these civilisations (Iberians, Romans, Visigoths, Byzantines, Muslims and Christians) are scattered throughout the entire municipal district and many of them are also concentrated in the historical town itself.

Edeta 360° (www.edeta360.com) focuses, in this first approach, on the virtualization process of the historical buildings located in the historical centre of Llíria.

The decision for ICTs was justified because the existent unbalance between the high amount of heritage assets to be managed and the limited staffing resources. Additionally, accessibility reasons are raised in relation to urban orographic difficulties, and also because the private ownership of some historical buildings does not allow visitors on their properties. On the other side, many old buildings present also accessing difficulties to certain rooms as the bell towers, upper floors, etc.

3. Methodology

This work employs the easiest procedure in order to use off-the-shelf equipment and mostly freely available software, while still ensuring the quality of the final product. The simulation environment is based on the same concept as that used by Google Street View; namely, it consists of a set of spherical images that capture the whole environment around the data collection point where they are performed.

The selection of the different heritage assets and/or environments was the first step in the elaboration of the virtual tour. The criteria applied to select these heritage elements were primarily: significance, singularity, representativeness and uniqueness, but also physical accessibility. Thus, eighteen visitable Llírian cultural assets were included in the virtual tour.

Secondly, all information related to these assets was recorded from documentary and bibliographic sources (digital, graphical and written materials), so that they could be enhanced virtually. This material includes aerial images of the town, old pictures, historical texts, artistic drawings, etc.

The steps to develop the virtual tour were:

1) *Taking photos*. The purpose of this task is to create the panoramic view by applying 360° photography techniques in order to capture the entire surroundings of

a location. To this end, at each cultural asset a central shooting position was established to guarantee the same focal length and taking into account the radius on which it will swing so as to ensure there was enough image overlap (at least 25 - 30%) to allow the photos to be stitched together, as suggested by Fangi (2006). A total of 6,000 photos of Llíria were captured during 12 field campaigns between January and June 2015.

2) *Rendering the spherical images onto flat 2d surfaces*. First of all, some photo edits or corrections were performed; then, luminosity and colour-level adjustments were made in order to obtain homogeneous images, and optical lens distortions were also corrected. The most commonly available rendering options for virtual tours, according to Ippoliti *et al.* (2014), are spherical geometric projections (also called equirectangular projection).

3) *Stitching photos to create 360° panorama images*. This was performed by using the open source panorama stitcher Hugin 2014.0.0 which imports the photos and generates a single panoramic image of the deployed sphere that can be mapped onto planar surfaces.

4) *Converting a 360° panorama into a virtual tour with Easypano Tourweaver 7.90® software application* to produce the visitable and interactive urban virtual tour. To further explore the site, the visitor can move on to investigate other structures and the landscape (from one scene to another) by way of clickable invisible polygonal hot spots, which will be triggered when a pointing device (usually a mouse) is moved over another heritage element if visual contact exists between them. The images to be connected can be both exteriors and interiors. In order to contemplate the building from different angles, the spheres needed to be able to walk around were constructed. Afterwards, the interior of the building can be visited. The spheres are connected consistently, and the inside of the building can only be accessed through a sphere that includes a door.

5) *Adding extras to the virtual visit*. Navigation instruction texts, heritage information documents (different plans showing the evolution of the building over time, documentary texts, etc.), audio files, images (old pictures, etc.) are included in the application as pop-up windows.

Edeta 360° opens when you right-click the virtual tour; it then shows a contextual menu. The second screen displayed consists of an introductory text with instructions on how to navigate and which also invites the user to enter.

Navigation starts with an urban aerial photo of the historical town of Llíria and related zooming images of the different virtually enhanced heritage sites and surroundings. The visitor can select one of them by clicking on the area and, afterwards, a historical building can be chosen by clicking on it; then, a first image of the main access door of the building appears.

4. Concluding remarks

Concluding remarks from this work point out that, beyond the well-established methods that have traditionally been employed in the field of cultural heritage to date, ICTs, and particularly virtual tours, have become increasingly more popular tools to achieve heritage enhancement, tourism experience development

and dissemination. This is because virtual tours have the ability to arouse fascination far beyond a tourist brochure or any printed material. For this reason, it is a widely used application in cultural events and tourism fairs.

On the other hand, an online virtual tour can effectively contribute to the recreational experience in the sense that Viñals *et al.* (2014) noted. Hence, besides the onsite phase of visitation, the virtual tour has a high potential to generate motivation and expectations in the phase prior to the visit. A virtual online tour can also consolidate feelings of appreciation after the visit.

Other specific advantages have been identified such as its contribution to address accessibility issues (private

ownership of the heritage, physical difficulties to visit some places, etc.) and the overall vision from an urbanistic perspective rather than a vision of single elements.

On the other hand, it is noteworthy that the current approach with simple off-the-shelf equipment is an important strength of the project. It thus gives an idea of the broad potential of its extrapolation to other similar heritage assets.

However, it must be recognised that it is necessary to look deeper into how to strengthen the emotional dimension of these presentations. Some authors, like Roussou (2008), have already opened up this debate.

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