

Game based technology to enhance the learning of history and cultural heritage

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ABSTRACT

New Game technologies can support the learning process of user within a Cultural Heritage site. The level of realism is ideal to visualize cultural heritage if a strong focus on the environment's atmosphere and immersion is required. Moreover this is not achievable through "static" 3D rendering.

The use of the most appropriate navigation metaphors, according to the different categories of users, can help them highlight and ease their understanding. Similarly navigation metaphors can amplify the role played by the discovery process, which is extremely important in the context of learning. Additionally video games are the perfect means to bring cultural heritage closer to children, pupils, who are traditionally familiar with the concept to walking and navigating into virtual worlds.

This work will present an application, using game engine technology, whereby the virtual environment and its interactions are used to promote the learning history. The work presented is the result of NETConnect, a 36 month project funded by the EC through the Culture2000 Programme. The seven partners of the consortium have worked together, sharing interdisciplinary competences and different cultural experiences, with the following goals:

- To gather common cultural heritage of European significance.
- To use state-of-the-art technology to make European heritage more visible and to improve accessibility to European heritage with major benefits for the general public.
- To improve participation in cultural activities through new technologies.
- To promote cooperation between cultural operators and technology experts, leading to an International Network on new Technologies in Europe for Cultural Heritage.

The project encompasses three archeological sites that share common cultural traits, specifically: Lokroi (Magna Graecia, today South of Italy), Glauberg (Germany), Biskupin (Poland).

The virtual environment developed has been designed to be used by non expert and suitable for use by a wide and heterogeneous public such as families, elderly people, students. The 3D reconstructions followed a graphics style similar to visual language adopted by video games, emphasising environmental effects such as fog, sky, water, particles. When interacting with the environment the user perceives it as if they were playing a

video game. The challenge of finding relevant pieces of information organized through a set of hotspots became the means to learn the history of the site. These relevant Points Of Interest (POI) contain additional multimedia material (e.g. video, images, 3D model, text) becomes accessible to the user.

Moreover we have paid specific attention to the creation of a user-friendly and universal (i.e. suitable for all type of users) interface which can be used during the visit at the museum premises. Since it was requested to make a VR application as immersive and interactive as possible we have decided to introduce the feature to handle new navigation metaphors. Indeed, through scripting, it become possible to configure and use the new Nintendo controller. This functionality, allowing the user to move in the virtual world using the Nunchuck, to look around his/her position using the Wiimote and to interact with the virtual scene using these two controllers.

The game engine chosen for the project is Unity3D (www.unity3d.com) which allows the creation of both web-based (through a free plug-in) and standalone interactive environments which can be available at the premises of a museum or archeological site. This choice was made for several reasons: first, it features a simple authoring interface to create and edit the 3D scene with the possibility to enjoy real time lights and shadows. Secondly it exploits the latest graphical hardware by making extensive use of shaders to deliver high quality graphics.

The system has been already tested by more than a hundred users with very diverse cultural backgrounds and it has received a positive feedback.

Categories and Subject Descriptors

J.5 [Arts and Humanities]: Architecture, Fine Arts

H.5.1 [Multimedia Information Systems]: Artificial, augmented, and virtual realities

H.5.2 [User Interfaces (D.2.2, H.1.2, I.3.6)]: Interaction styles, Input devices and strategies

I.3.7 [Three-Dimensional Graphics and Realism]: Virtual reality

General Terms

Documentation, Design, Experimentation, Human Factors.

Keywords

Virtual Reality, Cultural Heritage, 3D Reconstruction, Interactive Navigation, Multimedia Contents, Game Engine, Entertainment.

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