X3D for Geo-referenced Information

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Abstract — X3D open standard allows the delivery of interactive 3D geo-environments through the Internet at any time. This short paper introduces and presents a live case of Virtual Reality geographical use based on X3D Web3D technology at Lusófona University, Portugal. Some interesting features of this solution are highlighted, as well.

Index Terms — Flux Studio, Geo-information, Virtual Reality, X3D.

1 Introduction

The discover of the Internet is already overdue. The glory days of static Web pages follows the same trend. The conception of dynamic pages with PHP, ASP.Net and Javascript has been, at present, the major concern of programmers. The near future will concern about the creation of virtual reality worlds and 3D Web pages. This short paper is closely related with these last issues.

The use of 3D graphics allows for more realistic and detailed representations of themes, offering more viewpoints and additional inspection possibilities compared to 2D representations [1]. Still, major virtual worlds available on the Web have so far been relatively limited in terms of scalability and adaptability [2].

Corvaglia [3] mentions the use of Virtual Reality (VR) in major fields like medicine, military and industrial applications. NASA, for instance, employs this technique where space missions can be tested and astronauts can learn Shuttle functionality.

In this short paper, we present a live case of the use of X3D Web technique within the site of Lusofona University, Portugal, where the fade 2D campus was replaced by a 3D view with great improvement in geo-location of departments, parking lots and other facilities by common 'internauts', in general, and fresh students, in particular.

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2 X3D

By definition, X3D could be the integration of a 3D Application Program Interface (API) in a Web environment using XML concepts.

Independent of the operating system, Web servers and browsers, its main goal is to allow the creation of Web virtual worlds with interactivity. VRML 97 was its predecessor. It was developed by the WebW3 consortium for integration of 3D graphics and multimedia contents (a major deeper reference is http://www.web3d.org/x3d). Broadly, lower bandwidth, navigation and exploration are some features of this API. Specifically, X3D supports the inclusion of graphics (polygonal geometry, lighting, materials, textures, hierarchical transformations), animations (timers, interpolators to drive continuous simulations), audio and video, user interactions (mouse picking and dragging, keyboard input), navigation (cameras, collisions, visibility detection), scripting for programming (Scene Access Interface) and the ability to compose a single X3D scene with other assets located in the World Wide Web.

Fig. 1. Imagine this group scene divided into two building rectangle shapes where each one owns its textures. As expected, each corner of the rectangles holds distinct (x,y,z) coordinates.

According to Ranon [4], an X3D file defines a scene graph, i.e., a direct acyclic graph describing the 3D world being created (see fig. 1). Each node in the graph is an instance of one of the available node types. E.g. a Shape node defines a contour, a Transform

orients and scales its children nodes while the DirectionalLight defines a light source in the world.

3 GEO-REFERENCED INFORMATION

The proposed work, accomplished last February, relies on Flux Studio (authoring tool) and Flux Player (browser plug-in) software from www.mediamachines.com. The main aim was to add a Web link to the home page of Lusofona University (http://www.ulusofona.pt) regarding the building internal geo-location in its main campus (Lisbon, Portugal). Since ever, many candidates and fresh students present a major difficulty to locate each department because this campus involves an area of two Km square (see fig. 2). Since this institution is a private educational one, it would be agreeable to add this feature because of its social image in terms of an appealing marketing.

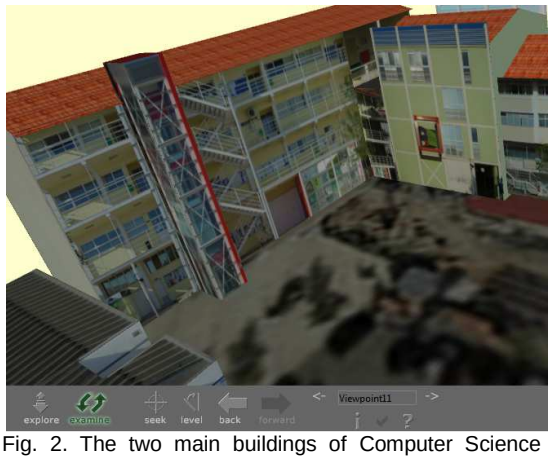

Fig. 2. The two main buildings of Computer Science department at Lusofona University.

As well, this project was included as an optional work of Computer Graphics, an optional discipline of the Computer Science degree. Digital photos were taken to all edifices to setup their textures on the virtual world. 3DS Max was used to cut, to stretch and to fit those images to the main shapes framework. The geo-location of each building within campus was achieved with an AutoCAD .DWG file of the Architecture department. The overall HTML file set in the .WRL (standard extension of X3D) file through the following instruction: <embed src="CAMPUS_LUSOFONA.wrl" width="943" height="567" hspace="1" vspace="1" align="middle" border="2"></embed>.

Fig. 3. View of the administration building and other offices.

The environment of this virtual map is similar to that of most popular virtual reality map where the common user might navigate through it by using the Explore, Examine, Seek and Level buttons of the browser plug-in (see fig. 3 and 4). For inexperienced players, it was created thirteen viewpoints (cameras) that allow the user to travel in a smooth and continuous way throughout the campus. Our survey shows that users are quite pleased with this solution.

Fig. 4. Partial view of the psychology department.

4 GENERAL CONCLUSIONS

Geo-referenced information may benefit from X3D concepts which can increase the users' engagement and motivation to acquire spatial information. A second issue concerns the hard work that was needed to create the buildings textures: 70% of the project time. The capability to convert .DWG files into X3D is also a remarkable quality of AutoCAD. A final topic is closely related to the marketing image impact to student candidates, an intangible asset difficult to measure.

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