

Bildung eines virtuellen Wiederaufbaus mit dem Umgebungskontext

Creating Virtual Reconstructions with the Environmental Context

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Kurzfassung:

Virtuelle Darstellungen von architektonischen Artefakten zeigen räumliche Eigenschaften bestimmter Objekte. Die Unterstützung der visuellen Genauigkeit des Modells ist ohne einen breiteren Kontext nicht ausreichend. Hintergründe, Szenarios und Kommentierungen sind notwendig, um den Betrachter in die virtuellen Reaktionen der Artefakte hineinzubringen. Das Konzept der Immersion ist von den Wissenschaftlern in VR erforscht worden. Nah an dem Konzept der Immersion liegt das Konzept des erkennbaren Ortes. Die vermischten Realitätssysteme, die echte Objekte einschließen, sowie synthetisierte Bilder ergeben den meist überzeugenden, sensorischen Input für den Betrachter. Dieser Beitrag bespricht zwei unterschiedliche Fallstudien der virtuellen Darstellungen, welche die Wahrnehmung des Ortes liefern.

Abstract:

Virtual representations of architectural artefacts present spatial properties of particular objects. It is not sufficient to provide visual accuracy of the model without broader context. Backgrounds, scenarios and narratives are necessary to immerse the viewer into virtual re-creations of the artefact. The concept of immersion has been explored by researchers in VR. Closely related to the concept of immersion is the concept of recognizable place. Mixed reality systems, involving real objects, images and synthesized ones deliver the most convincing sensory input to the viewer. The paper discusses two different case studies of virtual representations delivering the sense of place.

Introduction

Two-dimensional drawings and three-dimensional objects-models have traditionally been the medium for description, visualization and documentation of architectonic objects. Understanding spatial relations of different buildings and recognition of their specific style are vital to the researcher when trying to understand the evolution of architecture. Documentary sources provide partial evidences of changes that took place in the past. The mass of documents is constantly growing thus offering more space for combinations and possible scenarios of reconstruction. Two dimensional representation of data has found its valuable place in on line community through Geographical Information Systems and data repositories offering high resolution image scans [1,2,3]. On the other hand 3D visualization remains in close relation with communication goals. Virtual renderings present intuitively information about spatial properties of the object. A viewer instantly recognize the form and the style of particular building as long as its representation is not simplified. Geometrical complexity and lack of certain information about the building result in trial-and-error process of reconstruction. Extensive consultations with various experts is a must to in order to deliver accurate models of the real-life buildings. Off-line visualization either in a form of still images or digital video is meticulous but well documented and can be done after some training [4,5]. The problem of visual accuracy of virtual modeling arises in cases when interactive environments are the main goal of reconstruction. Simplification of geometry is a primary methodology in game programming, on line 3d repositories and low-cost visualizations [6,7]. It is possible to exchange some geometry details with their flat renderings -image textures.

This way almost photo realistic visualizations can be created. To convey information with context and in appealing way, it is necessary to presented as much background information to the viewer as it is possible. Textual and image documentary is relatively easy to present with the help of Hypertext and WWW. Environmental context, giving visual background to the presented virtual objects is more demanding. Several authors discussed the topic of accurate reproduction of complex visual environments [8,9,10] but they aim mostly at dedicated high-cost solutions. In the paper the author presents his experience with creation of complex virtual environments representing architectural artifacts with their environmental context but targeted at low-cost PCs. A case study of two different reconstructions is presented: The Castle in Chojnik (surrounded by Sudety mountains) and the Synagogue in Zielona Góra presented within the cityscape.

Virtual Reconstructions

Mixed reality systems involve real objects and artificial VRs offering the user the sense of actual objects within the place re-constructed. By exploring the technologies from the computer games industry it is possible to provide end-user with better sensory experience. Characters, animations and scene construction, while borrowed from game programming offer cost-effective solutions targeted both at proprietary museum display systems and at low-cost PCs with broadband internet access. Similar techniques have been used in two projects evaluating game programming in reconstruction of actual places of historical value. Based on low-count polygon modelers, scene assembly editors and image editing systems two environments depicting different artefacts have been constructed. The castle in Chojnik is a ruin of medieval fortifications in Sudety mountains, enchanting tourists with its history and prominent views from the tower. The synagogue in Zielona Góra was burnt in the 30's but before it had been one of central buildings in the cityscape. Two objectives were selected. To re-create the panorama of Sudety as seen from the castle. To re-create the mood of Glasser Platz, that originally hosted the synagogue in Zielona Góra. To meet the objectives extensive image rendering techniques were applied, including photogrammetry correction of the panoramic views and adjustment of lights and shadows. The VRML representation does not support active shadows. During the reconstruction process it was decided to represent the mountains in a shadow-less bright cloudy day. For the synagogue project, the shadows were faked by textures. The objects were put in a winter night scenery, hiding flaws in the re-constructions of surrounding buildings.

Conclusions

Currently available virtual reality systems offer an exciting experience for mass audience. The ability to recognize objects and places is vital in learning process and in more serious scientific analysis of facts and their meaning. The STREP project called ECHO (Environments for Cultural Heritage of Orient) currently being prepared will be based upon the technologies mentioned in the paper. The project is focused on the cultural heritage of Mediterranean countries.

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Figure Plates:

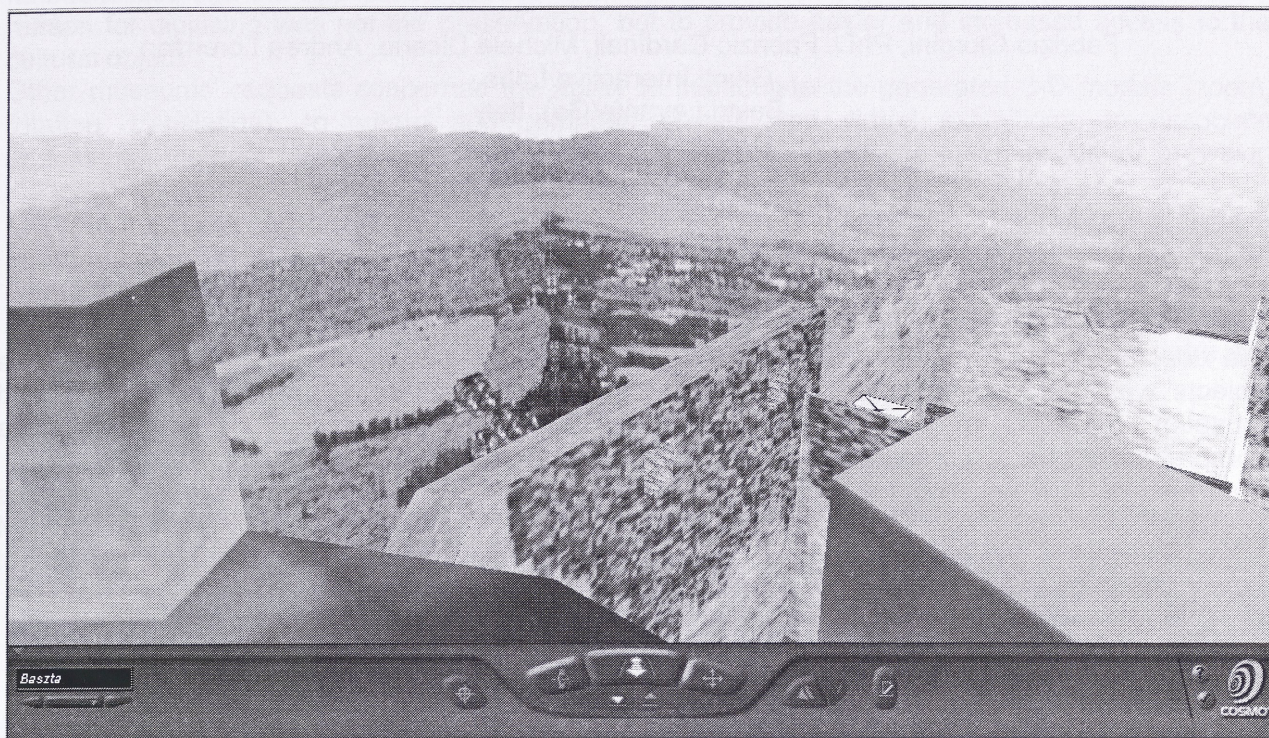


Fig.1 The Castle in Chojnik (Sudety Mountains in the background)

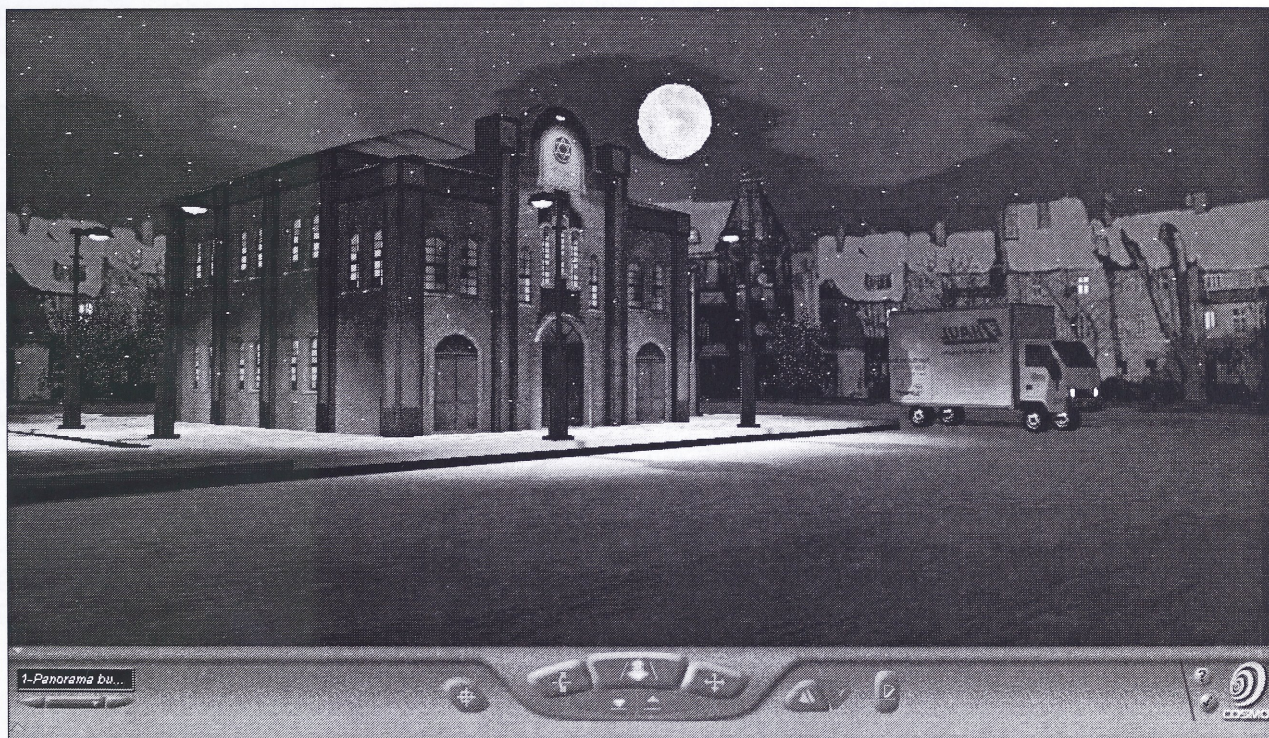


Fig.2 The Synagogue in Zielona Góra (a night view with the cityscape)