3D Annotations in Immersive Environments

Francisco J. Pinzón L.

Universidad de los Andes
Departamento de Ingenería de Sistemas y Computación

Ecole Nationale Superieure d'Arts et Métiers. Paris Tech.
Institut Image

July 2011

USA.

0 Brief

The requirement of a 3D Annotation System for Immersive Environments with telecooperation capabilities was a basic and unfulfilled need present at the Institute Image when I arrived. For this reason I was given the task of developing such system as my undergrad thesis. The use of the immersive facilities present at the Institute in the provided solution was a requirement, as well as keeping the compatibility with standard computers. The provided application succeed in the fulfillment of the original requirement. The following document describes this solution as well as the considerations taken in account for developing it.

Smoke whirls
After the passage of a train.
Young foliage.
Shiki Masaoka (1867-1902)

1 Introduction

For a long time now I've wanted to visit France. Actually, thinking about it, I had that desire before I started to study Systems and Computer Engineering at Universidad de los Andes. Someday I just asked Tiberio about the possibilities of making my thesis abroad. He gave me certain options and one of them was the Institut Image at Chalon-sur-Saône (in which I am writing this Introduction). Since then a few months passed before the bureaucratic nightmare started.

From the university demanding information they already had, and for which I had to pay a considerable amount of money; to the French Embassy and their Kafkesque process to give me a 5 minutes appointment after weeks of collecting innumerable documents, without taking in account my travel to Brazil to participate in Interactivos? 2010 BH, Christmas and New Year's eve, I thought I wouldn't be able to fly to France in time. After all it actually happened.

The subject of this work was given to me by Frédéric two weeks after my arrival at Chalon. In standard circumstances I prefer my projects to be product of my ideas and not someone else's, but the opportunity to come here for a whole semester easily took over that. Looking backwards, this project

has been a great learning opportunity, both personal and professionally.

The instructions for developing my project were simple and precise: A system for making annotations on 3D models using the cave facilities present at the institute, however usable in a standard computer. The idea is to be able to comment collaboratively and in distant locations a 3D model. The annotations would be simply a plain text comment, with an author and a priority attached.

So, as you can see, rather than the traditional way to choosing a thesis I was given a determinate topic and a narrow and precise expected solution. For this reason, in this project, I will work on the possibilities, contexts in which it might be used, constraints and potential scopes of the given solution.

Some of the basic design choices of the solution were given by the facilities present at the Institute. Windows XP running in the cave computers, infrared tracking cameras, passive stereo projections and the Android powered tablet are some examples of these design choices. The software was developed using Microsoft Visual C++ for the software running in the servers and the Eclipse IDE for the tablet application; thus C++ and Java were used to build the solution. OpenSceneGraph and VRPN were also used.

Aca falta **Diseño e implementación, Resultados obtenidos. Estructura del documento (cómo leerlo y seguirlo)**

First of all I thank my mother and my sister for supporting me, I know it have been tough. I also thank Tiberio and Frédéric for supervising this work, and giving me this opportunity. Luisa for her friendship and love; David for his friendship and ¿?, and both for their support and our shared memories. Sadly I can't thank God because I don't believe in him, nevertheless I can thank Alan Turing for making this work possible.

2

General Description

2.1 Goals

The objective of the project is to create a 3D Annotation System for Immersive Environments with not concurrent tele-cooperation capabilities and which might be used in a standard computer. The projected is developed for fulfill the need of such system at the facilities of the Institut Image and at the COLIVRI Laboratory at the Universidad de los Andes; without being restricted to these two contexts.

The final solution must be capable of performing this task in models of a variety of 3D formats, associating with each annotation its type and urgency to be managed. On the other hand the system meet the ever-present needs of scalability, flexibility, performance and specially usability. The project must be developed using C++ and OpenSceneGraph and must run in Windows XP.

2.2 Prior Work

2.3 The Problem

Complex 3D models [1] [2]

3

Design and Specifications

3.1 The Problem's Definition

3.2 Specifications

3.3 Restrictions

4

Design Process

4.1 Information Gathering

4.2 Design Alternatives

5 Implementation

5.1 Implementation Review

5.2 Expected Results

6 Validation

6.1 Methods

6.2 Validation of Results

6.3 Discussion

6.4 Future Work

Bibliography

[1] Gonçalves, D., Jesus, R., Grangeiro, F., Romão, T., and Correia, N. Tag around: a 3d gesture game for image annotation. In *Proceedings of the 2008 International Conference on Advances in Computer Entertainment Technology* (New York, NY, USA, 2008), ACE '08, ACM, pp. 259–262.

[2] Kadobayashi, R., Lombardi, J., McCahill, M. P., Stearns, H., Tanaka, K., and Kay, A. Annotation authoring in collaborative 3d virtual environments. In *Proceedings of the 2005 international conference on Augmented tele-existence* (New York, NY, USA, 2005), ICAT '05, ACM, pp. 255–256.