APPLICATIONS OF THE DIGITAL MODEL DATABASE FOR TAIWAN CITY AND ARCHITECTURE

The interactive entertainment platform

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1. Introduction

In Taiwan, the National Science Council (NSC) has launched the "National Digital Archives Program" (NDAP) since 2002. We participated in two projects: "The 3D digital museum of Taiwan city and architecture" and "Digital model database and professional service for Taiwan city and architecture". The first one attempted to build a virtual museum for Taiwan city and architecture through the past four hundred years. The second one was a value-added project which intended to further apply the digital contents of the previous one. This project was consisted of 3D refined data, digital knowledge database, and architecture professional service. We were responsible for the 3D refined data. As a result, the digital model database included three cities: Hsinchu, Chiayi, and Tainan, as well as sixty-four architecture models.

The interactive entertainment platform is an important leisure in our daily life. In general, the interactive entertainment includes five types: arcade game, PC game, on-line game, TV game, and mobile entertainment. This research pays attentions to the arcade game which presents dynamic interactions between machine and users. Following the improvements of design techniques, we have opportunities to experience many arcade games with different purposes, such as drum game, dance game, and fishing simulator. However, we further apply the digital model database to create an interactive entertainment platform for a racing arcade game.

The crucial aspect of designing arcade game is how users can be immersive into the virtual environment (Jacobson 2003, Koster 2004). This key characteristic indicates that a well-design game not only requires a good theme with an imaginative environment, but also equips with active

responsive apparatus to the users. As shown in Figure 1, the VR core engine of the game is Unreal Engine, which rapidly modifies textures of level and attributes of characters importing from 3ds max. The engine also can edit 3D acoustic effect, represent level in the equipments of stereoscopic projection, and transmit signals of force feedback to the Stewart platform. This research focuses on the level developments within the VR core engine by utilizing the three city models of the digital model database.

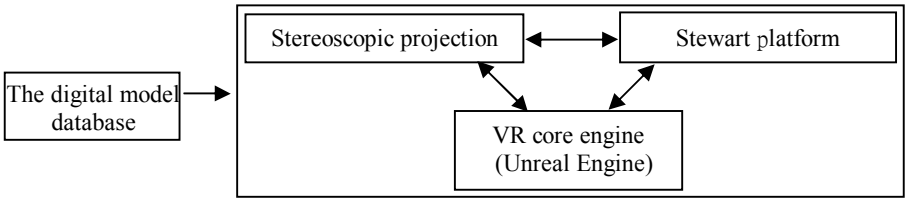

Figure 1: Research framework of the interactive entertainment platform.

2. Methodology

The working process of VR core engine can be divided into three parts: modeling tools, export plug-in, and level editor (Figure 2). In the modeling tools, level modeling emphasized modeling and texturing of digital model. Data optimization aimed to reduce polygon size. Next, export plug-in was to send out animation and static meshes to Unreal Engine. The key task of engine editor was level editing that dominated qualities in the stereoscopic projection. Then, physic and artificial intelligence editing created dynamic interactions among racing car, user, and level settings. Finally, level optimization was to verify every aspect of level ready transmitting into stereoscopic projection and Stewart platform.

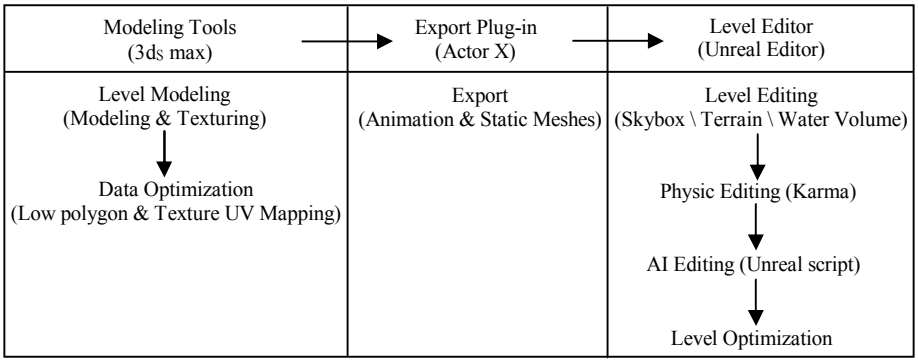

Figure 2: The working process of VR core engine.

3. Results and Future Studies

This project only tested the VR core engine so far. We will try to assemble the stereoscopic projection, and transmit level settings into the projection for confirming representation qualities. Then we will focus on the interactive aspects between VR core engine and Stewart platform. We will collaborate with several private enterprises for developing and testing relevant techniques of the force feedback of the interactive platform.

References

Jacobson, J.: 2003, Using Cave UT to Build Immersive Displays With the Unreal Tournament Engine and a PC Cluster, *Proceedings of the 2003 symposium on Interactive 3D graphics*, pp. 221-225.

Koster, R.: 2004, *Theory of Fun for Game Design*, New York: Paraglyph.