

The Construction of Digital Campus with Virtual Reality Technology--Taking Xinhua College of Sun Yat-sen University As an Example

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Abstract. The project is based on Sun Yat-sen University, Xinhua College, using 3Ds Max as the main modeling software, and by the method of combination of the modeling of the campus static scene model, rendering and baking a mapping scenario model with a high degree of simulation. And then we use the Max-for-VRP plugin to import static model into VRP-Builder platform of scene and edit function. Finally, we use VRP-Builder platform to realize the interactive between users and various objects in virtual environment, and in the way of optimizing and collision test to the system scene, improve the authenticity and flexibility and interactivity of the system further, providing great convenience for the users to understand geographical environment and campus information of Sun Yat-sen university, Xinhua College.

Introduction

The advent of virtual reality technology speeds up the process of building the digital world, and the virtual campus as an important application of virtual reality technology in the field of education, made a major contribution to promote the digital campus, so in the field of education it has aroused great attention, and is widely used in major universities. At present, there are 29 fully virtual universities in the world, accounting for 9.9% of all virtual university curriculum of the total, while the remaining 90.1 percent of colleges and universities have also added a virtual teaching ministry. In China, since 1996, Tianjin University was first developed a virtual campus and caused a sensation, government and research departments began eyeing this area. And this project is based on 3Dsmx and VRP-Builder, building a virtual roaming platform of Xinhua Zhongshan University School, to promote the construction of digital in Sun Yat-sen University, Xinhua College.

Virtual Campus Roaming System Overview

In this project, two of the most critical parts respectively are virtual scene model and functional modules. The two parts constitute the main body of the whole virtual campus roaming system.

The three-dimensional scene modeling

Modeling methods. In the three-dimensional modeling, we use the most common method of polygon modeling, by analyzing the topic structure of the building, to simplify and produce roughly the shape of a building model, according to the "big - small - big" Modeling concept, firstly build the basic model, then fill in the details, and then put them together, and finally realize three-dimensional modeling of each building.

Roaming Module. Profile of Roaming Tool VRP-Builder. Virtual Reality Editor (Virtual Reality Platform Builder, referred VRP-Builder) is a direct-to-three-dimensional art virtual reality software developed by typical CTV Digital Technology Co. Ltd. It has a friendly editing interface, powerful graphics capabilities and physical systems, and supports interactive features online multiplayer.

Function Module. In the VRP-Builder editor, the two main functional modules are designed to interface and the scene systems optimization.

In this system, in addition to the interface background and the user-friendly features button, Users can not only according to their needs, in manual roaming, choose to the scene to zoom, clockwise and counterclockwise rotation freely, you can also choose to automatically roam through a predetermined route to watch the scenery along the way, giving the user the car tour feel more sense of substitution.

The roaming of virtual navigation system. project production process.

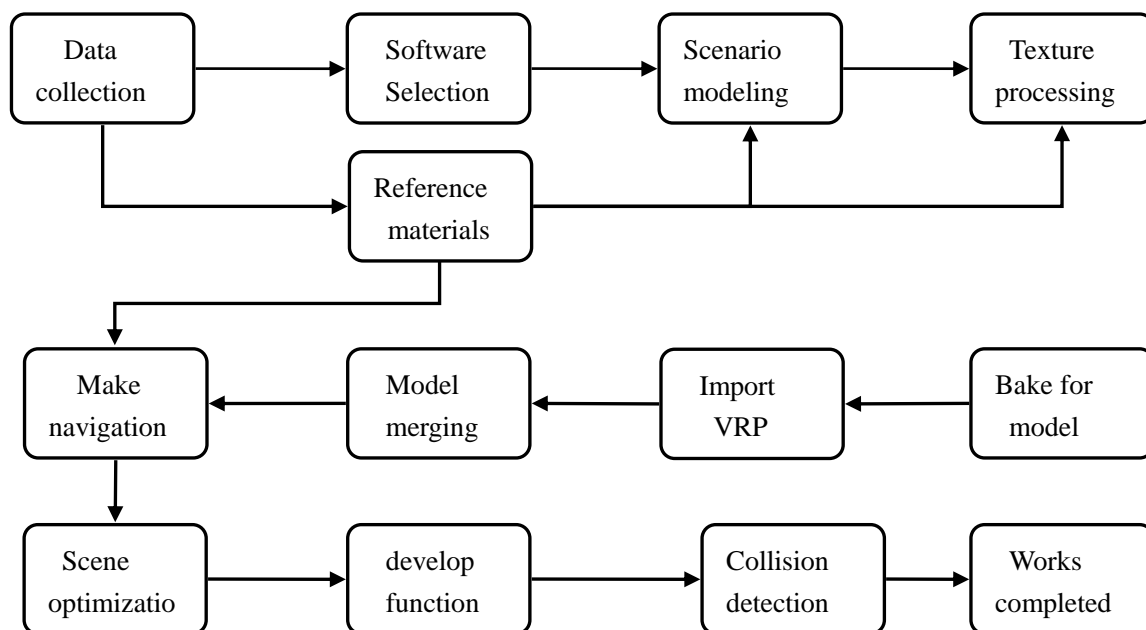


Figure 1 Full flow chart of the project

Detailed steps of system implementation

Scene data collection and data preprocessing. Before examining this project, you must first do the work of collecting and processing data. First, the project team searches the information through the Internet and field shooting scene photos, etc., to collect more detailed image information for the later work of three-dimensional modeling.

Second, the geographic characteristics of the fieldwork throughout Xinhua College of Sun Yat-sen University, this is also very important in the three-dimensional scene modeling. The field is measurements of each building to campus precise numerical value. such as length, width and higher. Finally, we draw CAD floor plan (as shown in Fig 3) for reference according to the map data and field photographs.



Figure . 2 Xinhua college of sun yat-sen university planning map

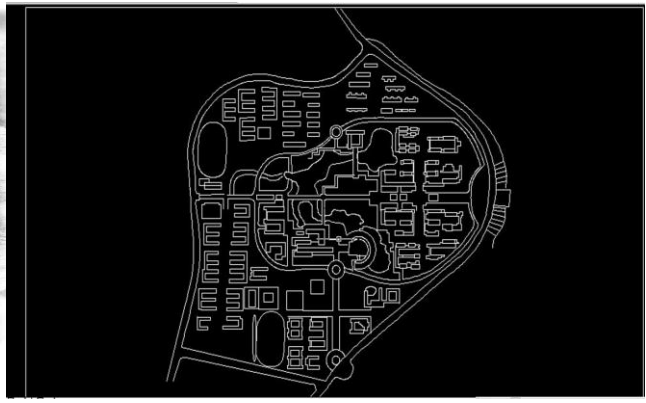


Figure. 3 CAD planar graph drawing according to the planning graph

Creating three-dimensional models. When you create a three-dimensional model of the building, we often used three modeling methods: polygon modeling, surface modeling and NURBS modeling pieces. We use the most convenient way of modeling - polygonal modeling in the project, after establishing a base model through its extensive modification operations, such as point-editing of objects, edges, borders, noodles, and other sub-element level, it the shape of the building and the reality is exactly the same, to finally achieve a three-dimensional simulation of the building.

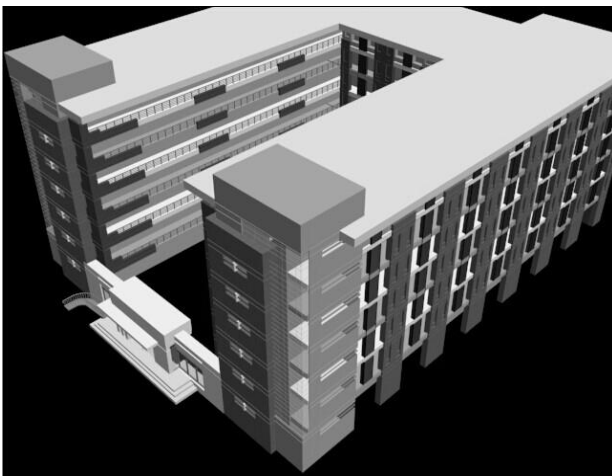


Figure. 4 Sun yatsen university xinhua college student dormitory building

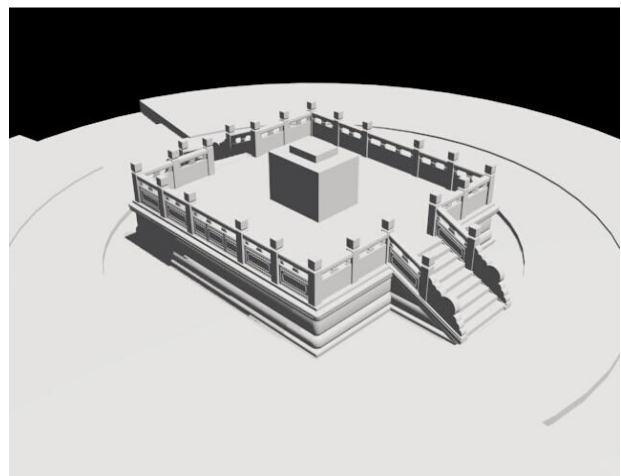


Figure. 5 The base of the statue of Sun Yat-sen

Post-processing model. Post-processing models typically include modeling after textures and materials handling, processing and rendering baking lighting effects. After building the basic model, we should add texture or material to the model to make the scene look more realistic. If you want the picture errors or loss does not occur when you import the editor, you can use the object map jpg, bmp, tga, png, dds format. In addition, the composition of a scene put together a good model, you need to add lighting effects. In the virtual campus roaming, the most used function is the Skylight, and modify the model, depending on the location of the appropriate lighting parameters. Finally, we use the bake ware Render To Texture in 3Dsmax to bake on the scene, so that the original non-real-time rendering can be applied to real-time scene.

VRP roaming function design

After completion of the baking processing model, the next step is to import the model into roaming VRP-Builder Editor by MAX-for-VRP plugin. And the import is completed, synthesizing the models into complete scenes.

In order to increase the interactivity of the system, allowing users to more freely roam the campus experience, we have developed manual roaming and automatic roaming function in the system. Users can use the manual roaming, move through a full range of three-dimensional perspective of the keyboard, the first person in the form of a close or distant to watch individual scenes, and then assisted to the campus map, enjoy the entire teaching environment of Xinhua College of Sun Yat-sen University in real time. Users can also through the function of automatic roaming, along a pre-determined route automatically. In addition, this system also increase information management module in the main building, users can understand campus construction and information of Xinhua College of Sun Yat-sen University through introduction of the illustrated information. This function will bring convenient to campus information management and publicity.

VRP roaming optimization

In order to make the roaming system more real, it is necessary to add some weather factors in the system, real-time display features of the campus in different weather conditions, we joined a sunny, rain, snow effect. And among them, the main effect of rain and snow is produced by particle system. We need open the system in the VRP script editor, and then set the number of particles, and determined the range of coordinates, then set the particle size and speed, and add render good snow texture. For example, the effect of the rain on the command line as follows:

- Open sleet, 1
- Set the number of particles sleet, 55000
- Set snow boundary, 150,150,0
- Set snow particle size, 0.2, 1
- Set snow particle color and texture,, D: \ rain.Bmp
- Set snow particle velocity, 5,1

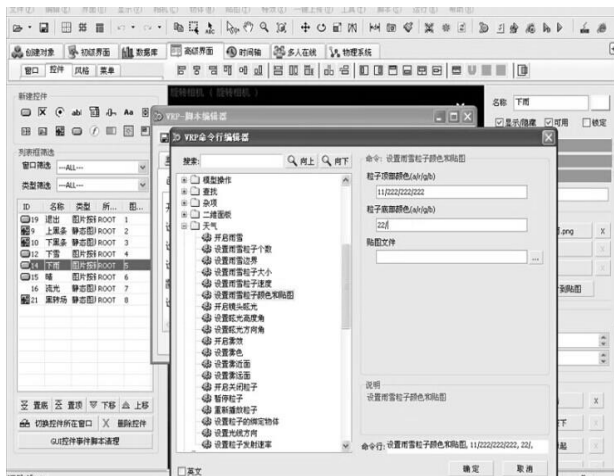


Figure. 6 script editor of raining effect

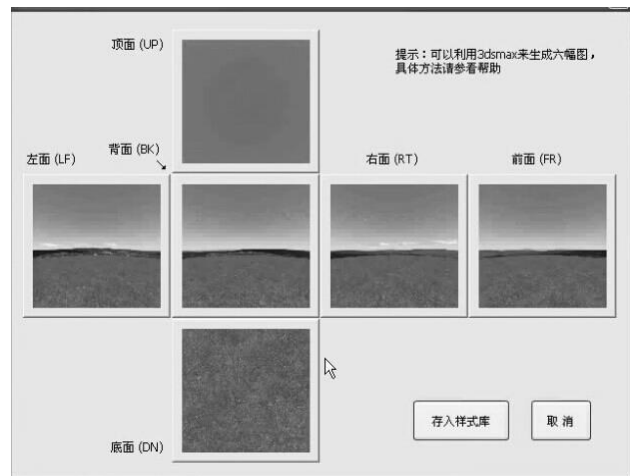


Figure. 7 sky map importing

After executing the above command, the system can simulate the effect of heavy rain in accordance with predetermined parameters. The day and night light effect is first to produce light efficiency model in 3Ds max, then add texture and rendering, before the final export, back, left, right, up, down six maps.(It is worth noting here: first, the exported map size is generally select 512px * 512px or 1024px * 1024px; second, import the map into editor in the correct order, otherwise there will be errors scene.)Then import these few maps into editor, and by location in good order, and finally create a strong authenticity skybox background.

Summary

With the development of society and science and technology, virtual reality technology will become increasingly mature, combined closely with the computer technology and virtual reality technology will greatly change people's life in the future. We can expect that the humans in the future will not just live in reality, also will live in the virtual world, the full development and use of virtual reality technology to improve the living standard of people has become the goal of our struggle. This system is made with 3ds Max and VRP - Builder platform, through a lot of research and technical operation, finally realizes the virtual roaming of xinhua institute of zhongshan university building. And the practice of the project, make us learn more about this new and high technology, and will be a stepping stone for our study and promotion of virtual reality technology.

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