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Design and implementation of 3D Virtual Digital Campus -- Based on Unity3D

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***Abstract*- Based on the Unity3D multi platform to establish a three-dimensional virtual digital campus system, has a strong practical. Using the Unity3D engine to realize the virtual digital campus scene design, access and interactive roaming and other functions, the need to achieve a combination of various simulation effects. The 3D Virtual Digital Campus Based on Unity3D development system has high efficiency and low maintenance cost, which has obvious advantages. This paper will mainly elaborate the principle of system design, design of virtual scene and the practice of the system.**

Keywords- 3D virtual, Digital campus, Unity3D multi platform

Further application of digital technology in the campus to build digital campus provides the possibility of implementation, with the further development of the Internet information technology, the digital campus will learn from traditional network office for the development of realistic virtual roaming, learning, and office. The use of Unity3D multi-platform technology to achieve efficient development of virtual digital campus system provides implementation way, is a kind of stable operation, friendly interface of high development tools. It is based on an open source component of the game engine (Mono.net), which can realize the 3D virtual scene and good interaction of digital campus system, and realize the online office and to learn.

Ⅰ.THE DESIGN PRINCIPLE OF 3D VIRTUAL DIGITAL CAMPUS

In the process of designing 3D virtual digital campus, the following principles should be followed, which is the step of the whole design plan.

First, to obtain the overall geographic information data on the campus, which mainly includes the CAD Auto and other buildings.

Second. In the 3D modeling software, the 3D digital model is produced, which is based on PS and 3DMax. The rough model is processed and rendered, and the 3D virtual model with high degree of simulation is obtained.

Third, import the production of good three-dimensional model, and according to the geographic coordinates of the model into the Unity3D platform, the development of virtual technology to prepare.

Fourth, the Unity3D software platform using Terrain tool to create specific terrain, and the design of the user interface, the existing digital campus system database to achieve shared data connection. Figure 1 is a framework for the design of 3D virtual digital campus system.

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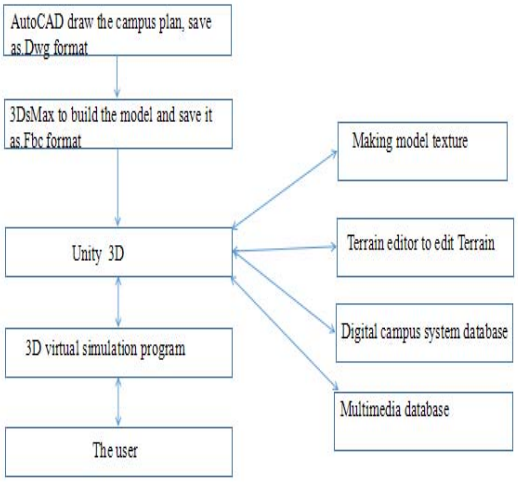
Figure 1.3D virtual digital campus system architecture diagram



Ⅱ.VIRTUAL SCENE DESIGN

A.Create and import the model

Derived from 3DsMax will create good model, its storage format for fang binxing. Assets at the same time, the Unity3D project file directory of the new name of the file named Object, and in the folder instead continue to two new folder to store the virtual model respectively the material of the ball (Materials) and map file (Textures). Then fang binxing model file into the Object folder, the software system can automatically identify the folder under the different types of storage folder, create the material of the ball on the save Unity3D and map files, can automatically identify.

B.Texture and texture

Texture map can guarantee the quality of the model, in Unity3D software environment, design also need to ensure the quality of the texture and texture, virtual to achieve good results. At the time of making modeling, should also be pre-determined all sorts of style of model material, texture and physical properties, to smooth the model imported into Unity3D software in the texture map and script Settings (Shader). Unity3D software platform has the formidable material written and audio-visual language tools, equipped with tools and CgFX and Direct3D syntax is similar, not only can record the basic point of endpoints and impression (vertex/pixel) properties, also can describe the material has all the attributes. With glass material programming code below as an example to illustrate:

Sub Shader{Pass{Tags{ " Queue" = " Transparent" " Ignore Projector"

= " True" " Light Mode" = "Always" }

ZW rite On Cull back

Color mask 0}

Tags { " Queue" = " Transparent" " Ignore Projector"

= " True" " Render Type" = " Transparent" }

ZWrite Off Blend One One Fog { Color (0，0，0，0) }}}

C.Using the Terrain editor to edit Terrain

In the development of 3Dvirtual system in the process of digital campus, Terrain editor is an extension of the Unity3D platform tools, based on the editor that designers can efficiently produce 3Dvirtual Terrain map, and the editor USES a unified standard, to the mountain, can achieve a higher degree of urban and rural scene simulation. Secondly, can also be friendly GUI interface design, the whole terrain texture on the shop decoration virtual environment, make 3D virtual interface can be more realistic. By mixing or merging terrain texture can achieve a smooth transition, from one to another in a map, can produce diversified environment. The editor that allows including trees, rocks, trees and bushes, grass, houses, walls of any object, such as a quick layout, realize flexible combination. Will also be able to apply the image as a blueprint in each object, also can change its color attribute. In place of every detail, can choose the rotation of the scale, location, location, etc., and able to implement all the unity of the same object

color, such as trees, etc.

Ⅲ .VIRTUAL DIGITAL CAMPUS SYSTEM IMPLEMENTATION

A.Roaming technology

Similar to the game scene, 3D virtual digital campus system, can be operated through the keyboard and mouse control role in moving in the scene (roaming), can choose any direction after left before and after the walk. You can also select the walking style such as: running, jumping, walking, etc. Roaming in the implementation. Mainly through the following aspects.

First, in the 3DsMax software to make character images of various motion states such as: walking, standing, jumping and running, etc. Again after completed the animation model export and saved as a set (fang binxing) format of the document. Finally the model imported into Unity3D platform project folder (Assets).

Second, based on Unity3D platform Project column options , you can import all kinds of animation model, and in the properties pane to set the start of the different actions of different model frame and end frame. In dragging animation model on the stage, choose the menu bar command Component/Character/Character Motor, can increase a Character for animation controller model. And then to adjust the task in the attributes panel controller, the outline of the height of the task, and so on.

Third, for animation model add Controller and rotating Controller can be realized after any movement of the virtual objects. For example: "Mouse Look" wheel can very good implementation object rotate up and down or so. By designing the function of the rollout of "Axes" for the "Mouse X", and then set the attribute value is 0, Y can achieve only within about rotation. And add the Controller in the camera object "Smooth Follow", through the "Target" set, pointing to the animation model can finish the camera and animation model of binding targets.

Fourth, in athletic result established in implementation, can deal with all kinds of sports Animation JS script, named by "move Animation Control" script specify various Animation model. The control code expressed as: static initial state of the animation is: **function Start ()**

Is the state of play set to cycle: **{animation "jump" layer = 1; / /**

Beating screen showing setup mode to Clamp, in the flash to the last frame, if the program does not change, will have been playing the animation of the last frame. Generally program is to modify the animation of wrap Mode. Not to introduce one of animation program setup code. The following figure 2 for the role roaming in the 3D rendering of virtual digital campus.

Figure 2.3D virtual digital campus roaming rendering

B.Collision detection and switch scene

In the process of improve the interactivity of virtual environment, collision detection is the need to first solve the problem. By setting the model can effectively solve the physical properties of a wall, in Unity3D platform, a collision detection component Mesh starts the component calculation model can effectively act collision Mesh automatic generation, if the grid is more and will affect the execution efficiency of the system. Therefore, general meeting to grid model to add a more basic model as the father of this model, it is set to become an apply colours to a drawing object. This is very effective to solve the collision problem.

The scenes when the character's perspective into the switch that is a particular area, after switching the

behavior of the scene, here also need to first select the collision, and then according to the result of the collision detection switch to the next scene. After entering the room, for example, you can use event On the Trigger Enter judgment through a Trigger, but with two functions to Load a new scene at this time (**Application. The Load Level (lv)**) and keep the objects in the scene in the process of the switch all the properties of the reserve (**Don 't Destroy On the Load (object)**).

C.Database access

In Unity3D platform, the software System can smooth access various database, which use a dynamic file (System. Data. DLL and System. Enterprise Services. DLLZH) create a database connection and very efficient. In the process of realization of 3D virtual digital campus, to ensure the safety and reliability of the existing data, the system also needs to implement the existing database query function, and text data query (Sql) My connections. Among them, to establish or disconnect from the database code can be expressed as:

Connection code:

Private static void open Sql Connection(string connection String){ / /。Db Connection = new My Sql Connection (connection String);Db Connection．Open( ) ;}

Disconnect the code：**dbConnection.Close( ) ; / /**

D.Platform to build more

Unity3D4. Version 2.2 supports a variety of operating systems and server platforms, such as: the PC, the Web, IOS, Flash, Android, Black Berry, Apps, etc., will also be able to better support the WAMP (Windows + PHP + Apache + My SQL), LAMP (Linux + PHP + Apache + My SQL) and the IIS (Internet Information Services), and other common Web application platform. The latter can also be very good with the host operating system to write, in the aspect of management and control is very convenient. Based on Unity3D multi-platform 3D virtual campus digital system implementation process combines a variety of software configuration and database system. To be one to one correspondence file extensions of each system, in order to more efficient implementation system development. Vivid display effect of 3D virtual digital campus system, under the stable operation, intuitive user experience can be implemented and roaming effect, also can provide rich multimedia audio, its sense of reality will be very strong and intuitive.

REFERENCE

[1] Wang-Xingjie, Li-Chunhua. Research and development of 3D virtual city based on Unity3D platform [J]. 2013 (04).

[2] Li-Qiang, Ouyang-Pan, Lu-Xiuhui. Research and implementation of virtual campus development based on Unity3D [J]. modern electronic technology. 2013 (04).

[3] Li-Junfeng. The research and practice of virtual reality technology and Virtual Campus -- Taking Weifang University as an example of the construction of virtual campus of as a case study on the Journal of engineering graphics, 2011 (03).

[4]He-Xianpeng. The thought of building a new generation of digital campus [J]. intelligence. 2010(08).

[5]Wu-Wenwu, Zheng-De. The construction of University Information Technology campus [J]. computer knowledge and technology. 2010(34).