Designing Virtual Museum Using Web3D Technology

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Abstract

VRT was born to have the potentiality of constructing an effective learning environment due to its 3I characteristics: Interaction, Immersion and Imagination. It is now applied in education in a more profound way along with the development of VRT. Virtual Museum is one of the applications. The Virtual Museum is based on the WEB3D technology and extensibility is the most important factor. Considering the advantage and disadvantage of each WEB3D technology, VRML, CULT3D AND VIEWPOINT technologies are chosen. A web chatroom based on flash and ASP technology is also been created in order to make the Virtual Museum an interactive learning environment.

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Keywords: Virtual reality modeling language; Virtual Museum; Cult3d; viewpoint; flash.

1. Introduction

Virtual reality technology in computer graphics, computer simulation technology, human-machine interface technology, multimedia technology and sensing technology developed on the basis of a foreign technology. WEB3D VRT technology is one of the form, based on the Internet, rely on to the desktop software technology to realize VRT level.

From the 1980s began in the world VRT dew clue. In 1992, the first batch of VR system development tools. In recent years, new VR system application, application scope and increasing greatly extended. Now vRT positively active in entertainment, audio and visual arts, military training, aerospace and other fields. And, with its VRT also has more interactive mode, telepresence, various characteristics of the education field gradually aroused wide attention. Some tentative efficient and practical education VR system was born in the field of education VRT become policies.emicient servicea beginning. This application including education in the virtual museum[1].

A virtual museum is the application of the virtual simulation, who can create the VRT and museum, the audience in a virtual museum, except in real-world telepresence, also can undertake interactive
participation and operation. Based on the Internet virtual museum, can use 3d modeling techniques to create a real world, and achieve anything, it can hit that anyone could theoretically at any time to visit the museum of any exhibits. Secondly, virtual museum is not only a visit, is an interactive learning platform. On one hand, it is to show the exhibits visitors can also present the history, and provide exhibits and related links. On the other hand, many visitors can also is a exhibits express their own opinions, and some problems are discussed[2].

A virtual museum is the progress of technology, it is precisely because the product on the technology available soon. Caused a real sense of virtual museum is very few. The significance of this research is considering various WEB3D technical advantages and disadvantages, to select the suitable WEB3D technology to develop a real sense of virtual museum, and solve the WEB3D technology and integrated with the web compatibility. This article will discuss the advantages of virtual museum education application, Analysis of the design principle and the virtual museum WEB3D technology, Introduced the structure and function of virtual museum, A detailed introduction of several related WEB3D technology and Flash, ASP technology, And the future work.

2. The design of virtual museum

Online virtual museum of the building is a systems engineering, need longer period. A virtual museum may have many exhibition, exhibition has numerous each exhibits. A virtual museum is not unchangeable, but need to constantly adding new exhibition and exhibits. In order to attract more customers. In order to facilitate later added to virtual museum exhibition and exhibits, the extensibility is our top priority.

In virtual museum web server for constructing the system platform, to provide users with various network services, scalability, performance in three aspects: the system can be transplanted respectively, module can be Shared resources, reusable[3].

The traditional site on the text or picture information. Unlike traditional online virtual museum web site, it provides more information is 3d data, a relatively large. In order to support the interaction between user and server needs to provide some special network services, such as support chat function. Provide a platform of network service, we have many Windows operating system adopts the IIS platform. In order to provide the services and ensure compatibility of normal display page, we will define the resources for virtual museum of two types: one is the page resources, another kind is network services. Using HTML page resource plugin. Network service USES Asp dynamic web technology. Because most of the computers are installed Windows operating system, therefore can guarantee the virtual museum website server in the Windows system of portability[4].

Modules can be reused refers to software developers to the realization of the function of the development time, after only need the same function only using existing module can be achieved, without the need to write code. A virtual museum is divided into three aspects, respectively, 3d virtual hall exhibits resource construction and chat rooms. In two aspects, can be after abstract software module can be divided into two types: virtual 3d objects and exhibition roaming type display type. Because of the virtual museum exhibition and exhibits more, so the two types of software modules are highly reusability.

Resource sharing is the development direction of virtual museum around the world, through the network interconnection of the virtual world, can the user view. As long as we take the virtual museum website on the Internet, we hang the virtual museum open source close to the world[5].

3. A virtual museum system integration and function
A virtual museum is a website, it takes virtual scene for web browsing, embedded in a chat room, and develop with the Flash development interface module USES Asp dynamic pages. Bottom. Concrete frame structure (see fig 1).

![Diagram of Virtual Museum Web Site]

**Fig. 1 The Structure of Virtual Museum Web Site**

### 3.1 Introduction page

First is to use the welcome screen making Flash plugin installation test, then is the page. Because this museum website using VRML, CULT3D VIEWPOINT, three WEB3D technology, in order to successfully browsing our website should be installed three IE plug-in. When a page can be normal 3D scene shows that has been properly installed plugin.

### 3.2 The main page

As a web page navigation home page, in order to maintain the stability of the painting. Using page framework of speech, HTML tags for the whole pages of three parts: the title bar, Key parts for virtual scene box, show the virtual hall, virtual exhibition hall, virtual objects, For Flash chat module impinging part.

Navigation page for virtual museum website provides the frame structure, it is itself a special website, which itself is not content, but other essential contents of the embedded web pages. So when the user clicks on each link, only when roaming virtual hall, virtual scene changes dialog title bar and chat module are unchanged. This will avoid a web page, and the frequent user can set in use process stable roaming chat.

Virtual scene box default page is the use of virtual hall hall of a VRML language writing, in the wall, ground, on the pillars node texture, suitable to make it look like a solemn gate. Museum, In this scene users can use the avatars realize tele-immersive roaming, also can choose "movement", "review", "fly" and many roaming. On the wall, door have five with anchor node Settings, click the link of virtual hall. Move the mouse to the door will show links the name[6].

1) **Virtual exhibition**

There are five virtual museum exhibition hall, plants, animals, including automotive hall hall, museum, weapons, robot. They are using CULT3D technology. In each of the three exhibition setup by lens: "1"
activation, can be in top roaming freely within the exhibition hall, according to the direction key control roaming roaming. Click "2" activation left can be conveniently, parallel lens on the right side of the hall exhibits: see by "3" activate the right can be conveniently, parallel lens see hall exhibits the. In each of the exhibits. Click on the link set of virtual popup window display exhibits. In the hall at each end of the one door, and also set a hyperlink, click and after the exhibition hall can enter different.

2) The virtual objects

Each has at least four virtual exhibition, using the virtual objects VIEWPOINT. When the user clicks the virtual hall exhibits will pop-up Windows display specific virtual objects. Exhibits, rotate freely zoom-in watch.

3.3 Chat module

Chat with Flash technology development, using Asp technology. The default is landed on interface, user name after landing.

4. A virtual museum of the key technology used to

The technology is based on virtual museum VRT, VRT application in network environment is WEB3D technology. Using the virtual museum, CULT3D VIEWPOINT, VRML, and three WEB3D ASP technology is developed and Flash chat. The key techniques are introduced below.

4.1 VRML technology

VRML is an open, extensible, industrial standard scene description language for describing the 3D scene in the Internet or the world. VRML document is the most basic part of nodes is node, the definition of nested and node with the use of the virtual world[7].

In the virtual hall in compiling VRML, wall five door. The virtual exhibition to five respectively. In order to realize the click door namely link to correspond to the effect of virtual exhibition in every door. We set up the Anchor node.

The first is the child nodes or Anchor node parameter, the second is a child node or parameters correspond to the type of data, and the third is the interface or domain, the fourth is the default value. In order to set up correctly, you only need to connect with super set a few basic parameters. Specific Settings are as follows:

\[
\text{Anchor} \{
\begin{align*}
\text{Url} & \quad \text{"targeturl"} \\
\text{Parameter} & \quad \text{"the name of virtual museum"}
\end{align*}
\}
\]

TargetUrl is that the relative links virtual hall. The relative path can make system in transplant without changing link path, guarantee system expandability." virtual "refers to the point that exhibition hall, names of virtual when the mouse pointer to a standstill on the door when writing tips. Will have links to which the virtual hall. In order to embedded VRML web documents, we EMBED the spectacular HTML tags, specific Settings as follows,

\[
<\text{EMBED NAME=VRMLObject} \\
\text{Src="targeturl"} \\
\text{Align=center} \\
\text{Border}=0 \\
\text{Width}=200 \\
\text{Height}=200> \quad </\text{EMBED}>
\]
4.2 CULT3D technology

CULT3D is a new 3D network technology, its image quality, speed, interactive ability. Through the Cult3D, developers can increase in model on the basis of sound, connection, animation, JAVA code of clickable regions, and can control the movement, and then output into web support format: *.CO. Its development process as shown in fig2.

Fig. 2 The Development Process of CULT3D

CULT3D is a kind of very strong ability to interact WEB3D technology, but the software itself and 3d modeling capabilities, so no need, AUTOCAD, main MAYA RHINO, professional software to build a 3d model touch. We choose the most popular main. CULT3D installation[8].

The main plugsn (main CULT3D output plug-in), established in the main hall of the virtual room to stick with floor. Stone texture, to stick with red brick walls, then the map on the wall and door model established several frame model is stuck with wooden texture map and exhibits. Through the texture of the authenticity of the hall to render greatly increased. Finally, through CULT3D output plug-in output into C3D * (CULT3D model format)[9].

CULT3D out with C3D * open files in the event of graph, setting free roaming, top video camera, right camera parallel roaming three roaming around in two doors, and then on to other exhibition hall, the hyperlink in each representative in the frame of exhibits, click the link popup new page shows the virtual objects. Specific format for:

\(<A \text{href="targeturl" target="_x"}>\)

TargetUrl refers to the relative documents which address, _x set to open framework, in the framework of open exhibition, fill in the other, to open a new page is _blank fill.

In order to CULT3D embedded in a web page, need to introduce the HTML tags and EMBED OBJECT tag. The part OBJECT and EMBED tag parameters are repeated, but both must maintain consistent. The OBJECT of the ID and EMBED the NAME that is CULT3D OBJECT embedding line WIDTH, and the regulations for 200 * 200 embedded box, in pixels SRC PBCOLOR set in relative path, the background color.

4.3 VIEWPOINT

VIEWPOINT generated file format is very small, the three-dimensional polygon meshes structure with scaleable transmission characteristics and streaming, making it very suitable for transmission over the Internet. In the process of 3d data download from low precision rough model transformed complete accuracy model. A VIEWPOINT scene is comprised of media of elements: the 3D objects, material, animation, interaction and the scene of the definition of information. A VIEWPOINT is pure software
quality real-time rendering engine, rendering effects to real and does not require any hardware acceleration equipment, so we using technology to develop virtual exhibits. Its development process as shown in fig3.

Fig. 3 The Development Process of VIEWPOINT

Although VIEWPOINT also has the ability to 3d modeling, but it is enough to build more complex model, so we still using the virtual objects to the main model, setting up good map into the support after VIEWPOINT ases format. In one SCENE BUILDER inf VIEWPOINT in the SCENE, ASE documents set lamplight, shadow, hot, and then output text tips into web support format: *.MTS and *.MTX. 3d data and documents stored MTS texture data files, the scene is MTX and parameters of the interaction of description based on XML data.

Using JavaScript scripting language VIEWPOINT object embedding pages. In the first HIML language SCRIPT tags within the HEAD tags inserted in using JavaScript statement, and fill JavaScrip target man SRC SCRIPT, and the relative address to define a variable, VMP. Specific Settings are as follows:

```
<HEAD>
  <SCRIPT language="javascript" src="targeturl">
  </SCRIPT>
  <SCRIPT language="javascript" src="targeturl">
    Var vmp;
  </SCRIPT>
</HEAD>
```

And then again in the BODY in the label inserting SCRIPT labels, using JavaScript scripting language statement for the new definition, VMP, targetUrl parameters MTSPublisher fill one goal exhibits the relative address, MTX files midth line and the size of the box parameter setting embedded[10].

4.4 Flash+ASP chat

In order to facilitate communication between users and support of cooperative learning among users, we have developed a chat module. In this module, we use Flash chat developed user interface, its function is to collect user information, information is transmitted to the server, and then from the server and accept feedback. The server using ASP technology development, its function is to accept the FLASH interface message, according to the key words and processing of information, and then sent to FLASH with information. It realized user login and send information, remove chat logs, suspension connecting etc. Function.

5. Conclusion
Currently on the function of virtual museum has comparatively perfect, both large virtual exhibition and the virtual objects, chat rooms available for users to communicate. In a follow-up study, we will introduce database. Use database to store information and exhibits, in order to realize the user information to users and the support of exhibits. In order to support asynchronous discussion, still need to add to compensate for real-time chat BBS.

References


