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Creating a 3D University website with VRML

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Abstract

One of the limitations of HTML websites is that even with high quality and aesthetically pleasing graphics, the visitor still experiences a flat 2D world. A three-dimensional world within a website can provide the visitor with a rich, stimulating and interesting experience. Here we describe how we created a model of our university within a website using VRML. The modeling was carried out using 3D studioMax and video and still images were mapped onto the models. A number of difficulties had to be overcome in order to successfully create the 3D website.

1 Introduction

Up to this point in time websites are designed and developed using 2D graphics. Recently considerable research has been conducted on the development of 3D virtual worlds. Virtual Reality Modeling Language (VRML) is the most widely accepted approach for creating virtual worlds on the Internet. The aim of our work was to create a completely functional 3D website using VRML.

VRML is the new standard file format for describing interactive 3D objects and worlds [1]. We used the final release version of VRML 97 for our research. For viewing the 3D website we chose Cosmo Player [2], a plug-in, by Silicon Graphics. We considered this to be the most fully featured and capable viewing system currently available. Other viewer systems render and navigate in various different ways.

All modelling for this work was performed with 3D StudioMax. This popular software package supports a number 3D file formats. It provides the capability of saving files in a format readable by VRML 97. Figure 1 shows an ex-



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ample of a VRML model created in 3D StudioMax. VRML allows us to map images and movies [3] onto the 3D models. One of the objects created in our virtual world is a representation of a television. The purpose of the television is to show visitors various news announcements and other information. This news information was recorded on a digital video camera and after editing it was mapped onto the television.



Figure 1: Example of VRML file created in 3D studio Max

The computing equipment used in this work was a Pentium 4, 1.7 GHz with 256 MB RAM and running Windows XP Professional. Our video equipment consisted of a Sony digital video camera and an EZDV video editing card.

2 Method

Here we give an overview of the method used for creating the website. The process is shown in diagrammatic form in Figure 2. There are two ways to place a VRML file into a web page. The first option is to create a link to the VRML file. For example, “

To display a 2D movie on a 3D object the movie is mapped onto the object. In our case the movie is mapped onto the 3D television object. The movie was recorded on the digital video camera and then transferred to the computer. The video sequences were edited on the EZDV video editing board. The video was originally saved in AVI format and later converted to MPEG, a format compatible with VRML. The conversion was done with AVI2MPG.

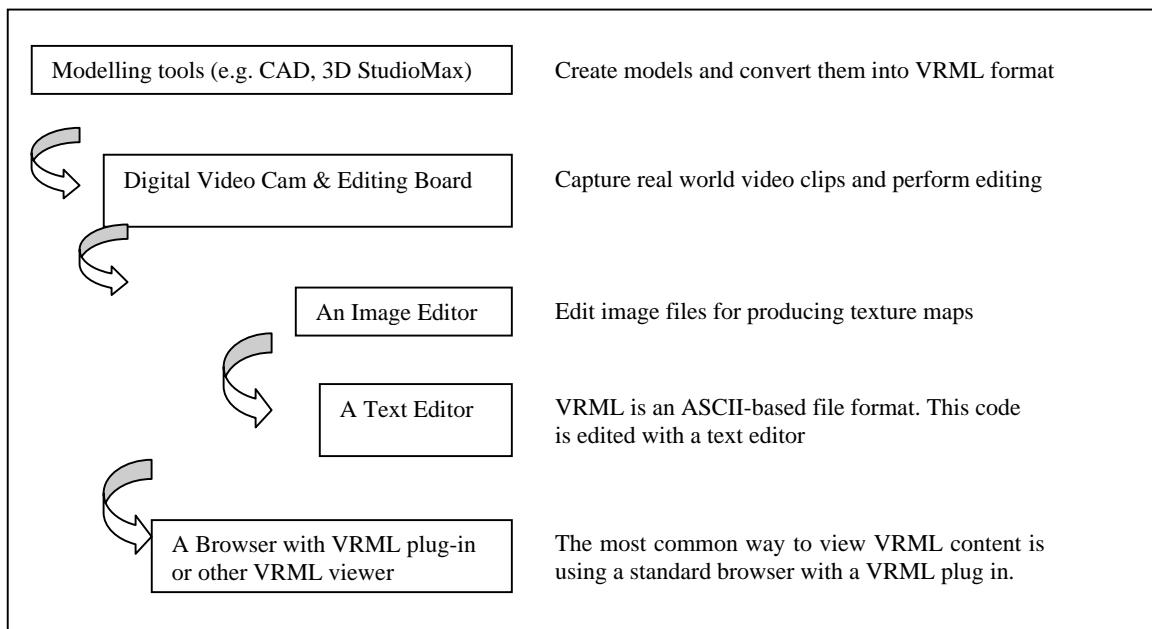


Figure 2: The process to create the 3D VRML website

3 Conclusion

In creating our 3D website a number of problems had to be resolved in the process. Following are some points that should be noted by developers that wish to follow our approach. Particular attention needs to be paid to how the models are created in 3D StudioMax. It is important to watch the polygon count as too many polygons can cause system failure. We recommend that scenes contain not more than 3000 polygons. Also faces that are never seen should be hidden or deleted. Animation that uses simple transforms tends to produce smaller VRML files than animation that uses coordinate interpolation. With coordinate interpolation, the VRML exporter has to calculate each vertex separately, while with simple transforms it calculates for the object as a whole. To control the viewpoint in the virtual world cameras should be placed in appropriate positions, otherwise viewing will default to perspective views. Only standard and multi/sub-object materials should be used, as 3D StudioMax will not export other types of materials.

A standard AVI file is restricted to a maximum size of 2 Gigabytes. This restriction is overcome on the EZDV video editing board with *Reference* technology. Reference AVI files are small AVI files that *point* to other files that contain the actual video data. To facilitate working with these large video files it is best to have a large amount of memory. Also, we could obtain more impressive results with the display of the movie within the website by using a

more powerful processor, more RAM and a hardware accelerated graphics card. We found that Cosmo Player is the best VRML viewer as it can provide full control of the navigation within our VR world. Browsers that are incompatible with Cosmo will cause some features to be disabled or malfunction. The browser we used was Internet Explorer 6.

4 References

- [1] Web 3D Consortium, “Web3D Specifications: VRML 97,”
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- [3] Walsh, A. E. & Bourges-Sevenier, M, “Core Web 3D,” 1st Edition, Prentice Hall, 2000