2. Why 3D on the Web

The hype and many of the initial 3D Web applications have left many people wondering why to use 3D. The point is that 3D content is not like a 3D movie. Rather, is an interactive experience so that one can move around objects and explore spaces on his/her own. For example, watching a training video to learn how to assemble a part, one may want to run one spot over and over. However, in 3D, he/she assembles the part himself/herself, takes it apart and put it back together until he/she is comfortable with it. In addition, the viewpoint belongs to the viewer rather than the author of the content. So, he/she can view objects and worlds in any sequence as desired. It is this level of interaction that makes the experience so vivid. Today, these enhancements have entirely changed the way people interact with computers.

Internet software today is focused on the idea of producing contents, including production studio, which implements exciting media-rich Web for online services. Such contents, in fact, embodies - and delivers via the Net - what is so-called “Second Web”. For some 3D visionaries like Kai-Fu Lee (Lee, 97) the vision of the Second Web is that someday you will be able to turn on your TV and enter a three-dimensional world. In fact, most of them bet on the convergence of the PC and TV functionalities. But before this happens, there are some simpler uses for 3D on the Web that are quite viable today. Potential applications for 3D on the Web are virtual travel; virtual communities, which include chats and 3D spaces; 3D games; 3D learning; 3D shopping; 3D advertising and so on. These are likely to make a big difference to the greatest number of people.

For some very specific applications on the Web (both Internet and Intranet) 3D will not only add value, but will actually drive growth of the Web. The following are only the first steps to a more immersive Web experience: product demonstration, product support/documentation, entertainment, architecture/walk-through, communication space, simulated physical experience, shared virtual environments, learning, visualization, etc. These examples show just a few areas where 3D will make experiences on the Web more powerful and rich than ever before. Thus, with 3D, cyberspace, and imagination we really do not know where we go next.

In fact, 3D is a means and not an end. Still, within the next twelve months perhaps, 3D will become mainstream and entertainment, communication, learning, etc. applications will begin to use it.

3. Terms Definition

Inside a virtual environment the users are represented by Avatars, which are 3D models used to indicate the position and situation of the user. In some cases, avatars can be 2D images (bitmaps). When multi-user on-line systems first appeared, users could create textual description of themselves. With the moving to graphical environments, avatars became 2D bitmapped images (Roehl, 96). And now, with the Web gaining 3D capabilities, avatars are gradually evolving into geometric models of humanoid figures.

Apart from Avatars, Objects are the components of a virtual world. An object can be composed of one or various 3D models. This object may have functions (behaviors) associated with 3D animation, answer to environment stimulation, among another possibilities. An Static Object is an unmovable object in the virtual world. A Dynamic Object have a movement behavior associated with it.
Rooms are defined spaces inside a virtual environment that limit certain actions of actors and objects that affect the virtual world. Most of the actions executed in a given Room does not affect another one. A Room does not need necessarily to be represented by a 3D room. It can be a field with no visible boundaries. In some environments, the effect of actions are limited by an Aura, which is the name given to the virtual space that an actor has for some actions, specially for communication.

Collision Detection are algorithms and techniques used in VR systems that prevent that two or more objects share the same 3D space inside the virtual world. There are simple techniques, like an invisible sphere around the object indicating a spatial volume, or complex ones for preventing not so simple collisions.

Finally, Texture Mapping is the use of 2D images for wrapping over a 3D object. This technique adds more realism to an object without costing too much processing.

4. VRML x Java 3D

A variety of tools and techniques now being developed support images, moving images, audio, and virtual environments on the Web. VRML and Java serve as the springboard for sophisticated animation environments that allow user interaction and intelligent objects that can track their users. Developers can even add behaviors to their applications.

The VRML technology is of much greater general significance in establishing standards for interactive 3D graphics, whether on the Web or off it. The use of VRML, as virtual environment description language, has become common on the Internet. In the 1.0 spec, it had only objects description resources and a small support for object hierarchy management. In the more recent 2.0 spec, the language has become richer, having support for multi-user, real-time interaction and animation, and explicit integration with Java language.

Java 3D is an API that is still in the preliminary stages. Anyway, for 3D to matter on the Internet, people who are going to have to jump in and create content are rather 3D artists than programmers and, no matter how good an API like Java 3D may be, it is something that appeals to programmers. So, the future of the 3D on the Web is more likely to be realized through VRML authoring tools.

5. Bandwidth Issue

According to Lee (Lee,97), most of the challenges in making 3D on the Web a reality have been solved, or a solution is within sight. Of course, a realistic 3D Web that is attractive to billions of people is going to require very large bandwidth. The bandwidth is really a challenge. However, there are lots of things one can do with 3D today. A VRML Pepsi Web banner advertisement, for example, created by Silicon Graphics is just 11k in size. At this point, VRML is getting relatively stable and is actually thinner than many other types of data.