

Increasing Usage of 3D Graphics by the Masses

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It has been estimated that by the year 2000 over 80 percent of all PC's will include some form of 3D accelerator. The question has been raised as to how this technology will be used and what new capabilities are needed to provide consumers with greater benefits from this technology. We must first look at who is purchasing these 3D accelerators:

1. Specified configuration Systems Buyers. These users tend to be technically savvy enough to identify their needs and order a system more accurately matching their needs and desires. If they do not need a 3D accelerator, they will not purchase one.
2. Pre-configured Systems Buyers. These users cover a wide range of the spectrum from inexperienced users to experienced users. These users buy a machine that fits their budget, although they may not actually understand the full capabilities of the machine they are purchasing. In this market, many of the systems include 3D accelerators even though the purchasers have no need for the performance provided by such hardware. It is actually becoming difficult to find a pre-configured system without a 3D accelerator.
3. Assisted Configuration Systems Buyers. These buyers go through an intermediary, often a professional consultant. The intermediary assists in determining the user's true needs and provides options and alternatives accurately matching those needs.

The Four Primary Classifications of Computer User's

Currently, many of the 3D accelerators that are being sold in the marketplace are being sold to users who don't know any better or have no need for this capability. Most users can determine some of the capabilities they need but either don't understand what a 3D accelerator provides them or aren't given a choice. Currently, outside of games, there are few uses for 3D accelerators, especially for the non-technical market. If we wish more of the public to use the 3D capabilities of today's machines, we must create 3D applications that improve current tools or provide currently unavailable capabilities. Currently, there are at least four types of users. These include:

1. Game Players. Game players are interested in 3D acceleration as it relates to game play. They are more accepting of the need to upgrade their systems to new technology in the interest of speeding up and improving the realism of game play. They are often aware of the 3D accelerator market sufficiently to determine what they need.

2. Technical users. Technical users are those who need 3D accelerators for work related tasks. This includes graphics artists, modelers, game programmers, and other 3D programmers. These users use 3D accelerators for the widest range of applications.
3. Business users. These are users who primarily use business applications on their computers, including spreadsheets, word processors, and presentation software.
4. Social users. Social users may use their systems for other tasks but they primarily use their system as a communication medium to others. This includes individuals who spend a majority of their computer time using chat, talk, IRC, ICQ, e-mail, and other social or communication tools.

Increasing Usage of 3D Graphics

Many user's needs can be satisfied with just a 2D accelerator. This will satisfy most social, business, and game users. So while 3D accelerators are becoming ubiquitous, their use is not.

What can be done to change this trend and provide 3D capabilities to a much wider variety of users? First, we must extend currently available tools to the 3D realm. Second, we must develop new applications that can only be provided acceptably in a 3D environment. After users become more accepting of 3D graphics, we can incorporate 3D technology into more applications. This will offset the hesitancy of the business community and the general public to accept new techniques.

Human Behavior

When deciding what tools to extend and how, we must look at the basis for many people's use of computers and at human nature in general. Everything we do has a genetic basis - Desmond Morris. People in general like to interact with others, which is why chat and IRC are so popular. These tools are currently one-dimensional. 3D environments can provide user's with a greater variety of capabilities for interaction. IRC, which is divided into discussion groups, can have a virtual environment for each discussion group, which can be representative of the group's theme. Currently, users describe actions and expressions. Gestures are a particularly important action which is vital to communication but is currently missing from online social environments. A virtual environment would allow users to actually perform the actions and gestures rather than just describe them. Several 3D chat rooms have been developed in which the user can walk around a 3D model and chat with other users but no environments currently allow the users to interact with the environment or perform various action.

We can also see human behavior in many of the more popular games available. Humans have an inherent urge to hunt that remains from the time when it was necessary for survival. In more recent times, we have satisfied this urge by going to work and making a killing in the city. More recent advances in technology have allowed us to get much closer to the actual experience of hunting through 3D games such as doom, quake, etc.

By looking at human behavior we can see how we may potentially want to use our computers or how we can use them better. We must not forget our genetic heritage when designing software, tools, games, or hardware.

To-Scale Virtual Entities

Users also look for applications that save them time and expense or keep them from having to leave the office or home to perform time consuming tasks. Common tasks include clothes shopping,

furniture shopping, house hunting, and car buying. An important aspect of these tasks is that the user's point of view must be taken into account. In particular, the user's dimensions are important when purchasing these products. The user should be able to examine the interior and exterior of a virtual product from what would be their point of view. They should be able to examine the items in various atmospheres and environments to determine with more exactness what suits their tastes; perhaps testing potential furniture in a virtual representation of their home. Through advanced interaction devices they should be able to get the feel for a vehicle on a representative road. The user should be able to provide accurate detail as to their dimensions and have clothes made to those dimensions and get feedback as to how well suited a product is for them. The user should be able to take their virtual wheel chair around potential virtual homes to verify the dimensions of doorways, walkways, etc. The user should then be able to purchase the products and also use the products in virtual environments to create virtual personalities. Ultimately, the user will be interacting with many connected virtual environments that interact, affect, and link to each other.

Bringing Common Tasks to a Virtual World Near You

We must also look at everyday tasks and items that are naturally 3D but are often represented as 2D. Providing true 3D representations would be more informative and more easily understandable. This would include maps, photographs, traffic patterns, diagrams, product instructions, product specifications, etc. Everyone uses maps and standard 2D maps can be difficult to interpret and offer nothing in the way of landmarks. Providing a 3D representation that is more informative will be readily accepted.

Needed Capabilities

Incorporating such features will require improved network performance to handle the load of 3D graphics, new interaction protocols to aid inexperienced users in manipulating the same environment with the inherent network delay, interaction devices that can accurately model the feedback of real world devices, and more efficient protocols for transmitting 3D data. This will require the use of a binary encoding for VRML 2.0, Internet 2.0 features, more robust software and tools, new hardware, etc. These environments may preclude the use of modems and require a direct Internet connection, cable modems, or some other form of high speed Internet connection.

Conclusions

Thus, the first uses for 3D graphics by the general public will be through virtual environments and product selection. These virtual environments are the first step in bringing visualization to the general user. Our primary goal must be to avoid intimidating or alienating potential users. Therefore, I suggest that the first step be to examine how users interact with such environments to develop interaction methodologies and hardware to accommodate non-technical users. A virtual chat or IRC would be the best type of environment for analyzing user interactions and would be quickly adopted due to its greater versatility. A second type of environment we must examine is virtual maps. Once users are familiar with virtual environments, they will be more accepting of 3D representational objects in other environments, such as business applications.