

Real Time Graphics

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**LIFE
on the
EDGE**



Commentary by Ben Delaney

Thoughts on the state of Virtual Reality

A few weeks ago I attended the IEEE VR 2000 conference, held this year in New Brunswick, New Jersey. I have always considered New Jersey a likely candidate for virtualization, with its bleak, decayed urban centers ringing New York, and its quaint, quasi-colonial suburban enclaves. However, New Jersey is also home to Rutgers University, and Rutgers is in turn home to CAIP (Center for Advanced Information Processing), which itself provides a place for Dr. Grigore Burdea (conference co-chair with Dr. Bowen Loftin) and others to conduct some solid research on several VR-related topics. Burdea developed one of the first force-feedback systems for the hand, and his lab has continued to refine the Rutgers Hand Master, as it is now called.

In many ways, attending this conference, the last VR conference of the 20th century (as the organizers implied), or the first of the 21st (as intuition assumed) was a trip back to the dark ages of 1995, when VR conferences were everywhere, and the community of camp followers, like those following the Grateful Dead around the world, were enthusiastic, though of widely varying

levels of comprehension of the technology they worshiped. Many of the same issues are still being discussed, many of the same people, grayer now like myself, are still chasing many of the same obscure research objectives (the more obscure, the less likely success, the more funding possible), and many of the same disconnects between real life (the capitalistic world of commerce and paying rent) and academia (where there is always a new "dad" to pick up the tab) seem to be evident, like dandelions in the spring. While there is certainly some comfort in this constancy, one wonders where it all leads.

That said, just like the good old days, there was value in this meeting, provided on several levels. The exhibit hall, while small (14 exhibitors and 6 demonstrations), provided a pretty good cross section of technology. The attendance was just about right for a small conference: more than 450 delegates from 25 countries, 25% students, 25% international. It was a good mix, and the number of people was enough to establish the proper "buzz" without the overcrowding that bigger meetings force one to endure. There was time to talk with the other attendees, and better yet, time for the exhibitors to discuss their products and services at some length.

Two of the exhibits made an impression on me. First, 5DT, the South African company that sells the 5DT Glove announced, along with some new products, that they have established a U.S. office in Santa Clara, California. This company has been plugging away for several years, selling a \$500 glove that has met with reasonable acceptance among experimenters with small budgets. But 5DT has been hampered by



A replica of the control panel used to operate 5DT's Continuous Mining Machine Simulator.

geography. They have relied on a U.S. distributor, General Reality Company, that was sold a year ago, and has never seemed to regain its footing. Also, 5DT, while known in the U.S. primarily for its glove, is actually more of a consulting company. So, while they showed a new HMD, based on the now-defunct SONY Glasstron, and a virtual binocular based on the same display system, 5DT's Continuous Mining Machine Operator Training (CMMOT) simulator was much more interesting.

The CMMOT is used to train machine operators in coal or potash mines how to operate this immense and dangerous machine safely. The HMD-wearing trainee holds a control console that is a functional and visual analogue of the device used to control the real machine. The array of buttons control various options, such as cutter height and speed, dust-reduction water flow, fore and aft movement, and other operations. The visible and audible cues tell the operator what is happening, and as in any training simulation, mistake-prone operations can be replayed until a thorough understanding is achieved.

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Life on the Edge

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You know that I like real-life applications, and I like to see VR applied in the down and dirty industrial world. Well, it doesn't get much downer or dirtier than at the bottom of a coal shaft. The CMM is a very expensive piece of machinery, and the consequences of making a mistake in operating it range from very expensive to deadly. So this is a perfect application of VizSim.

The other product that really caught my attention was shown in Fakespace's booth. To be accurate, it isn't really a product, but the ConCave is one of the more clever devices I've seen recently.

If you have ever seen an image of a 3-D model projected on the inside of a dome, you may have noticed what I think of as the false-stereo effect. For reasons I don't understand, a 3-D model seems to be stereoscopic when seen projected on a concave surface. Fakespace started with that illusion, and has built an office-sized, large-screen display that has a large concave center section. They included a pull-down screen that rolls up and can be lowered to cover the concavity when a flat screen is desired. More interesting, the flat screen makes the false-stereo even more convincing.

The ConCave (the name may change if this device is put on sale) is six feet square and 32 inches deep. The concave area is about 60 in. (five feet) wide, 48 in. high, and about 30 in. deep (152.4 x 121.9 x 76.2 cm). The bottom of the recession is flat, which means that images can appear to rest on a ground plane. Also, the flat area gives you a place to put things, be they physical models, measuring tools, or a cup of coffee. (Just kidding! You shouldn't put your coffee there, but I know people will.) The system uses a standard video projector, located in front of the system. Marketing Manager Jeff Brum, who demoed the system for me, told me it had been developed with oil and gas exploration in mind. However, it was obvious that this system will be a hit with engineers and designers in many fields. It provides an illusion of substance that very few

display systems can match. And with a target price of under US\$50,000, it is a cost-effective alternative to CAVEs and other mid-size displays. I think it will find favor as a display for small teams to use for collaborative design, analysis, and experimentation.

Showing on the big screen

Meanwhile, in the main hall, the presentations were generally interesting, though both research and presentation quality varied greatly. There was a welcome accent on applications. There were a number of papers on various aspects of haptic displays, including sculpting with force feedback, and new ways of modeling haptic interfaces. However, though this is a popular research topic, haptic interfaces remain on the sidelines of what is still essentially a visual metaphor. Other papers covered algorithms, applications, and tools, but it seems to me that we need more mixing between academia and the workplace. Some of the projects reported on seemed to have little bearing on the real-world problems that developers and the struggling users of VizSim are grappling with. I think Andries van Dam summed up things properly when he pointed out in his keynote address that the biggest issues facing VR are that there is too much data, and that current interface devices have far too little resolution – they are far inferior to human perceptual capabilities. This is hardly front-page news, but virtually no one addressed these key issues.

Overall, IEEE VR 2000 was a worthwhile event. I certainly would like to see more industrial participation, because as long as the professors and their students work in a vacuum, their work will continue to lack direction and applicability. There is no doubt that we still need basic research into the techniques of building good virtual worlds. But wouldn't it be nice if that research was a bit more in line with what the day-to-day users really need to have? ▲

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