

Immersive high resolution virtual reality demonstration

Dynamic Headtracked Multiscreen Stereo Display

Sun brings its high resolution virtual holographic workstation technology to the big screen by creating a completely immersive virtual reality environment. A six foot by six foot by eight foot room becomes a Virtual Portal, enabling the display of full size virtual environments and objects.

Viewers are shown a variety of virtual worlds and objects, including interactive encounters life size virtual creatures. Headtracked stereo display technology enables the viewer to perceive interactive three dimensional stereo imagery.

Three walls of the portal are screens with rear screen stereo projectors, controlled by three SPARCstation 10ZX workstations. The user, wearing only light weight stereo glasses, is free to look above, below, and to the sides of nearby virtual objects in a natural fashion, perceptually similar to interacting with a hologram. The three walls appear to melt away, revealing a virtual environment that continues from infinity right into the room itself.

At 2048 x 960, Sun's three screen system displays nearly two orders of magnitude more color pixels than most contemporary head mounted displays. New stereo display techniques employing highly accurate calibration and detailed optical models of the human eye coupled with low-latency 3-D predictive headtracking enables extremely high quality display and the perception of virtual environments. Indeed, individual variations in intraocular eye separation are significant enough to require calibration for each viewer in the demonstration to ensure realistic display. For more technical details behind the system, see the paper *High Resolution Virtual Reality* by Michael Deering in the proceedings of SIGGRAPH'92.

By creating more realistic 3-D images and interacting with the computer in a more natural way, this technology allows users to gain more insight and information than with traditional 3-D displays. The stereo image display gives users a realistic sense of dimension, and when combined with the tracking mechanism allows users to freely

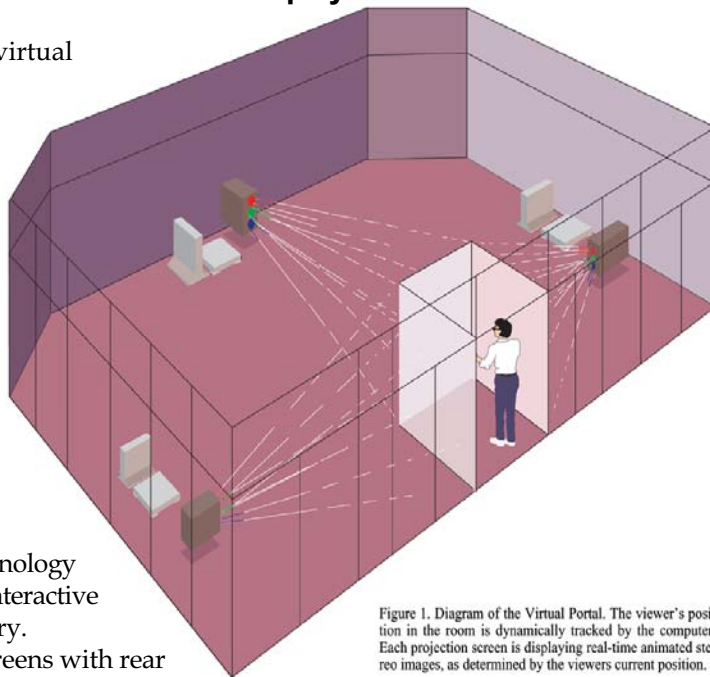


Figure 1. Diagram of the Virtual Portal. The viewer's position in the room is dynamically tracked by the computer. Each projection screen is displaying real-time animated stereo images, as determined by the viewer's current position.



interact, manipulate, and explore in 3-D.

This new form of 3-D display will find uses in a wide variety of industrial, scientific, control, training, and medical applications, particularly those that can benefit from rapid natural perception of 3-D objects.

Equipment Used:

- Sun SPARCstation 10ZX 3-D graphics workstation
- CrystalEyes LCD stereo shutter glasses by StereoGraphics Corporation
- Six-axis ultrasonic head tracker from Logitech, Inc.
- Video projectors by Electrohome USA, Inc.
- Rear screen projection system by Stewart Filmscreen Corp.

Software:

The demonstration was written in-house at Sun entirely in standard XGL™ and Sun's XGL_VR libraries.



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