CAVE

The CAVE Automatic Virtual Environment is an immersive virtual reality environment comprised of four projection walls, a tracking system and hand wand. It enables scientists to interact and view three-dimensional models of biological systems, including cells, tissues and entire organisms.

For more information see our CAVE Automatic Virtual Environment Whitepaper or Wikipedia

Technical HighlightsFirst collaboration between Sun Microsystems and Fakespace SystemsFirst Java 3D enabled CAVE worldwide (three walls and floor projection)First deployment of Sun Expert 3D graphics cards on a Sun Fire 6800 midframe server (used at 1280 x 1024 pixels per projector at 112 Hz). This has been changed to a standalone Sun Fire v880z with XVR-4000 graphics accelerators
- Complete unlink of the server room from the CAVE environment through Digital Lightwave gear (more than 100 m distance) About the CAVE
The CAVE, installed in 2002 was custom designed by Fakespace Systems to fit into a 21' x 21' room at the Health Sciences Centre. It features four projection walls (3 sides surfaces, 1 floor surface) which are 8' x 8' (2.4 m by 2.4 m). Four Marquee 8500 CRT projectors operating at full 1280x1024 resolution project the images onto the wall with a frequency of 112Hz. Users wear electronic shutter glasses (stereo-glasses) which create the 3D perspective via a process called Active Stereo - alternating between the left and right eye views rapidly (56 times per second per eye). The stereo-glasses are synced with the projectors and contain an LCD shutter screen for each eye that either becomes transparent (open) or black (close). This enables each eye to see the same image from a slightly different angle – giving depth to the scene. An electro-magnetic motion-tracking system (Ascension Flock of Birds) was installed in the ceiling of the CAVE to provide positional data. A motion-tracking sensor is mounted on the glasses of the main user, which feeds back the user's head and eye position to the CAVE application. This information is then used to compute the correct viewer-centric perspective. Interaction within in the CAVE is provided by a six degrees of freedom, motion tracked 3D mouse called a "Wand". The wand consists of a thumb-stick for navigating and thee programmable buttons for interactivity.
CAVE Server & Up-link The CAVE is powered by a Sun Fire v880z equipped with four 1.2GHz UltraSPARC III+ processors and 32GB memory. The system layout is fully redundant with 3 power supplies, 6 local disk drives (mirrored) and SAM-QFS attached file systems. Two Sun XVR-4000 Graphics Accelerators power four projectors with a resolution of 1280x1024 and a refresh frequency of 112Hz. The server is housed in a secure data center which provides adequate power and cooling for it's operation. Video Display Extension (VDE) Systems up-link the v880z server via optical fibre to the CAVE room over a distance of 70 meters (230ft). The VDE technology extends the monitor display and peripherals, including serial and USB connections (keyboard and mouse) without any loss of video resolution - enabling the CAVE to be located in a conveniently accessible location. This also removes any server noise from the CAVE environment. The Sun Fire v880z server was installed in 2004 taking over from a Sun Fire 6800 . The 6800 was the original CAVE server (installed in 2002) and was equipped with twenty 750Mhz UltraSPARC III processors, 20 GB of Memory. It had four Sun Expert 3D graphics accelerators – a first for a 6800 – which were used to drive the projectors. Since then, the 6800 has been upgraded and now acts as a core compute server. CAVE Projects
2004-2008

JABIRU: Java3D Application Behaviors Immersive virtual Reality Utilities

CAVEman Human Body Project: 4D Mapping of Genomic and Medical Information
2002-2003
Art Show Image Art Collaboration with Marjan Eggermont
Bone Project Image - The Bone Project by Andrei Turinsky
Lac Operon - Lac Operon Simulation in Java 3D

Anatomy Image - 3D Anatomy Collaboration Project
(now part of the WEPA Human Body Project)

p53 image - Java 3D Bioinformatics Tool Translation by Julie Stromer
(now part of JABIRU)
Virtual Toolkit Image "Flying Carpet" Virtual Toolkit Concept Project by Jeroen Keijser
Evolutionary Dynamics Project by Paul Newton CAVE Demos

The demos provided here are desktop versions of the demos we have in the CAVE. By altering a simple configuration file, the same models that we bring up in the CAVE are viewable on your desktop.

- First time users: Install the necessary Java, Java 3D and Java Web Start tools. Follow Installation instructions below:

CAVE First Time Installation Instructions - The instructions provided here will walk you through a "first time" installation of the various Java components required to view the CAVE demos. If you're not sure about any of the components below, feel free to contact us.

Instructions Windows Notes Solaris/Linux Notes Install the Java 2 Platform, Standard Edition JRE , v
or up.
None
None
Install the Java 3D Runtime for the JRE . Ensure DirectX 8 (or greater) is installed, before installing the Dir
Runtime version of Java 3D.

Execute the downloaded script in the top-level directory of the jre directory.

- I've installed this stuff before on this computer. I'm ready to see the demos!

CAVE Demo Description RAM Required (MB) Screenshot File Looking inside the human heart

110 [Download] [Download] Negative 3D reconstruction of vascular canals in human cortical bone from micr
scans

150 [Download] [Download] Human Skeleton

256 [Download] [Download] Advanced Molecular Viewer

Additional Instructions:

* Download and unpack the zip file into a directory
* Change to that directory
* Type demo_protein or demo_rrna

[Note that this application requires the use of an Internet connection to ensure the latest version is run]
250
[Download] [Download]