University Visualization and Animation Group ("VT-CAVE™")

WHO WE ARE

We are a diverse group of educators and researchers who share a common interest in creating, using, and evaluating the usability of visualization and virtual environment tools. These tools are used to educate students in the classroom as well as discover and create new knowledge in our research. Common to all our efforts is how we use virtual environments and visualization to transform our data intensive worlds into an information rich experience.

Shared resources located in the Advanced Communications and Information Technology Center (ACITC) of Torgersen Hall are affiliated with several college and departmental facilities across campus. Some of these facilities are:

- RDF VELab of Architecture & Urban Studies
- Interior Design Futures Lab
- Molecular Modeling Lab
- The Multimedia Lab and Office of Distance Learning & Computing in the College of Engineering
- Institute for Connecting Science and Research to the Classroom (TILT)
- Materials Response Group
- Center for Modeling and Simulation in Material Science
- Nonlinear Dynamics / Vibration Lab
- Digital Libraries Research Lab
- Center for Human Computer Interaction

Sponsors:
- National Science Foundation
- Office of Naval Research
- Naval Undersea Warfare Cntr
- Sun Microsystems Inc.
- Visual Numerics Inc.
- Lockheed Martin Astronautics
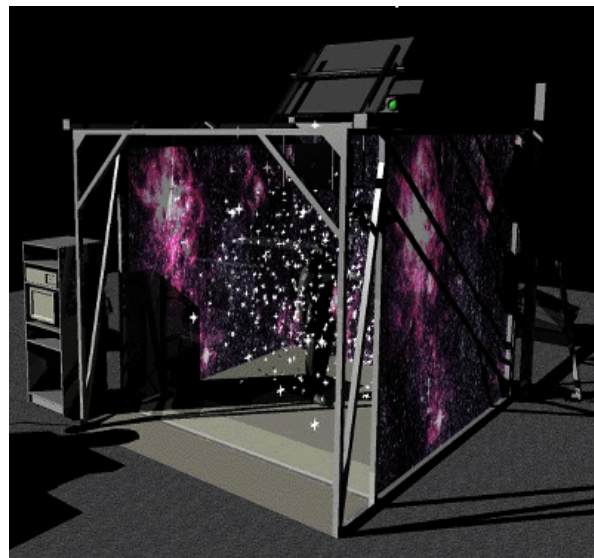- TASC: Northrop-Gruman IT

WHAT WE DO

Our visualization objectives were defined in a white paper, funded by NSF, to build a CAVE™ as a multidisciplinary resource in our Advanced Communications and Information Technology Center (ACITC): "*Breaking Education and Research Barriers with 3D Visualization CAVE Technology*". Thirty authors outlined how a CAVE would extend what we already do with graphics in each of our respective disciplines: Architecture, Interior Design, Materials Science and Engineering, Human Computer Interaction, Biochemistry, Computer Science, etc.

For three years of CAVE operation we have observed the creation of visualization tools that link the CAVE to labs on-campus and distance education projects off-campus. Connecting users in the CAVE with remote users has become a significant motivation in developing usable tools for shared collaborative virtual environments (CVE). How each of the disciplines use and improve on CVEs, has emphasized the multidisciplinary nature of our group.

Research – Our research focuses on use and development of visualization tools for analysis of data within each of our disciplines and shared collaborative virtual environments (CVEs). For the NSF Partnership in Advanced Computational Infrastructure (PACI) we developed the CAVE Collaborative Console (CCC) and CCC_atom. To promote the use of CVEs from the desktop to the CAVE we developed the Device Independent Virtual Environment; Reconfigurable, Scalable, and Extensible (DIVERSE). For a variety of ONR projects we have used DIVERSE to build a Virtual Ship Crane and Command and Control tactical visual interfaces. For Lockheed Martin we will use DIVERSE to develop a shared collaborative engineering design environment. We are also interested in the usability of VE applications. We are building new VE interaction techniques (for navigation, manipulation, etc.), and developing approaches for usability assessment of VEs. Additional areas of exploration include visualization of network traffic and structural mechanics.

Education – Courses created: ESM4714 Scientific Visual Data Analysis and Multimedia, CS 5984 Designing Virtual Environments, ESM-MSE5984 Computer Simulation of Mechanical Behavior. Distance education with Virginia Governors Schools, Architecture Cybercore project.

Facilities – Scientific Modeling and Visualization Classroom, Immersive-Desk, Immersive Work Bench, Head-Mounted Display Lab, CAVE™ with motion base in floor.

CONTACT INFORMATION

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