VIRTUAL REALITY: YOU ARE THERE

Telepresence is an emerging technology of broad potential. The term means that, with the help of advanced technology devices, a person may figuratively project himself into another environment, say, for example, the surface of a distant planet being explored by a robot; the telepresent person sees exactly what the robot sees with a sense of actually being there, and he can control the robot's movements although he is millions of miles distant.

Telerobotic control of automated systems in space is not yet a reality, but it is a NASA goal considered entirely feasible. Telepresence, to a limited degree, is a reality — or, to use the scientist's term, a "virtual reality."

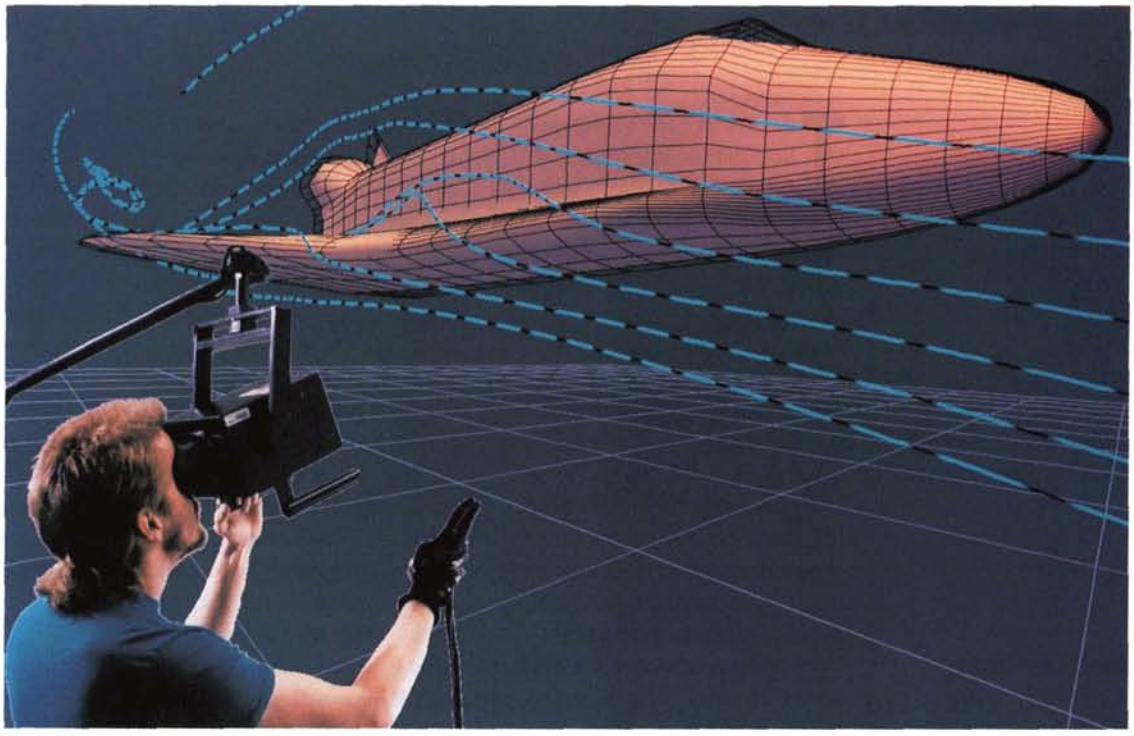
Although the technology is still at the "ground floor" level, systems that permit a human operator to "virtually" explore a computer-generated artificial environment — and interact with it — are routinely being demonstrated in both government and business applications. The key component of the technology — 3D computer graphics — is already in wide commercial use and expanding explosively.

A FAMILY OF TELEPRESENCE SYSTEMS HEADS A SELECTION OF SPINOFFS IN THE FIELD OF COMPUTER TECHNOLOGY

A world leader in virtual reality/telepresence research is Ames Research Center, which is exploring future uses of the technology and at the same time actively employing it in current applications. For example, Ames' Numerical Aerodynamic Simulation Facility is using virtual reality devices to add an extra dimension to the science of computational fluid dynamics. In an aircraft design effort, for instance, a virtual reality system allows a NASA scientist, wearing an electronic glove, to "enter" the virtual wind tunnel, release a smoke tracer and observe at first hand the smoke flow around the aircraft model.

A basic system Ames employs is a stereoscopic display presented on two small screens, one for each eye; the display may be an artificial environment generated by a computer or a real environment relayed from remote video cameras and converted to computer compatibility. With an electronic glove, the operator can interact with the computer environment; he might, for example, grasp an object within the simulation, a chair perhaps, and move it — and the computer will accordingly move the chair in the display. Taking it a step further, one can don a sensor-equipped suit that makes possible full-body interaction with the computer-generated virtual world.

Several telepresence systems manufacturers are taking this technology into the commercial world. One of them is Fakespace, Inc., Menlo Park, California, a spinoff company that got its start as an Ames contractor for development of a teleoperated motion platform for transmitting sounds and images from remote locations. The system, known as Molly™, pans, tilts and rolls in real time, matching the head motion of the user; coupled with a stereo viewing device and appropriate software, it creates the experience of telepresence, or "being there."



At right, an Ames Research Center engineer is viewing a computer simulation of the complex airflow around a Space Shuttle Orbiter model, using a stereoscopic viewing instrument known as BOOM2C; with the electronic glove on his right hand, he can "enter" and interact with the virtual reality display.

Fakespace used the NASA technology as a springboard for development of a family of systems that produce what the company calls "practical immersive technologies" — systems that generate a full range of the sights and sounds of a virtual world without the need for suits, gloves, headphones and other sensors usually employed in virtual reality presentations. The reduced requirement for accessory equipment opens up a new range of commercial applications.

Fakespace's companion piece to Molly is the BOOM™ (Binocular Omni-Orientation Monitor). Either system can be used alone. Together they comprise a complete telepresence system; Molly delivers sights and sounds from a remote location, the BOOM is the user's viewing device that provides the sense of being part of the virtual environment.

The BOOM is a counterbalanced stereoscopic viewer perfectly balanced on a six-jointed arm with a six-foot reach. The user holds the viewer by a handle and peers into the eyepieces, which are small CRTs — one for each eye — displaying the 3D virtual environment created by the computer.

Fakespace offers a basic high resolution BOOM2 model that provides monochrome views and an "extreme resolution" BOOM2C™ model that can be switched between a color mode and a monochrome mode.

In addition to NASA, Fakespace's growing list of customers includes such widely known organizations as Sandia National Laboratories, Stanford Research Institute, Mattel Toys and the National Center for Supercomputer Applications. Among initial applications are the earlier described computer-aided design technique, which can be employed in many industries, and virtual reality visualizations in scientific and architectural work.

A unique application that underlines the broad potential of the technology is one in use by Japan's Matsushita company, which has a vast display of lighting fixtures in a huge warehouse; a customer can virtually walk the aisles of the warehouse and inspect the whole inventory of lighting fixtures without ever leaving the comfort of an armchair in the front office. •

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