Technologies

Realistic Holograms

In the future, a military commander may be able to plan strategy on miniature battlefields using miniature, but realistic troops, tanks and other weapons in the form of three-dimensional holograms that move on command.

Sound like science fiction? It is, for now. However, a small group of researchers at the Army Research Laboratory are working to make 3-D holograms a useful reality for advanced displays for the military and other applications.

The group lead by Dr. Gary Wood, a physicist in the Sensors and Electron Devices Directorate, have created a monochromatic three dimensional hologram using a laser to illuminate an object and "write" its image into a photorefractive crystal. Another laser then projects that image into a liquid scattering material. The result is a realistic 3D holographic image that is written and read in real time.

Wood says although the research has been fruitful in terms of science and potential applications, none of them are mature enough to be put in an Army system as yet. He sees a number of potential uses for 3-D holograms including data storage, advanced displays, medical applications and entertainment.

A problem that must be solved before those and other potential applications can be accomplished is fixing the diffraction gratings (which contain the image and information) permanently within the crystal. Now, when a crystal is read out, the information disappears. It can be read once or, at best, a limited number of times.

Although his group is not working directly on the problem, he says they are keeping abreast of developments by the Advanced Research Projects Agency to solve the problem. If gratings are fixed and read out with a laser. A three-dimension view of the work can be stored.

That would have practical applications not only in advanced displays for the military but others like the medical community which could use the technology to project a realistic 3D display of organs within the body cavity for training your surgeons or working through a difficult operation before actually performing it, for instance. Wood also things the holograms would be a great interest to the entertainment industry for uses ranging from illustrating books to 3D presentations in theaters or in the home.

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Forward Area Language Converter (FALCON) headed for Bosnia

The FALCON is a system consisting of a laptop computer and accompanying software that enables a user with no foreign language training to translate foreign language documents. Its purpose is to enable U.S. Forces to translate and determine the military significance of enemy documents. Five of these systems are scheduled to go to Bosnia by the end of March for use by the Army's V Corps.

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Medic-Cam brings doctor onto battlefield

A miniaturized TV camera, TV monitor, microphone and earplug attached to a visor permits field medics to broadcast pictures and sound of soldiers under treatment to a vehicle equipped with a satellite uplink. The satellite can broadcast to medical facilities almost anywhere in the world and permit a doctor to monitor the medic's actions and treatment by broadcast. Also has potential for disaster relief, automobile accidents and emergency treatment.

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Virtual Sandtable

Anyone familiar with military battle planning is familiar with the sandtable commanders use to plan strategy. However, they probably haven't seen one like the virtual sandtable being developed by ARL on which troops and equipment actually move in color and 3D. Researchers are currently developing software to make the table simulations even more realistic and useful while keeping an eye toward making it smaller and lighter and more portable. The intent of the sandtable is to connect with battlefield sensors to give the commander up-to-date information that he can use to make the right decisions on the battlefield. The sandtable will give him several viable options and permit him to preview how each option will work before making his selection

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Technology Transfer

Special effects masters join Army's simulation effort

ARL and the Communications-Electronics Command's Night Vision and Electronic Sensors Directorate have entered into cooperative research and development agreements with Silicon Graphics, Inc., to improve visual simulation capabilities for the Army while providing enhancements to the company's current and future products.

"Silicon Graphics is a recognized leader in the visual simulation field, which is an area of increasing importance to the Army," said ARL Director Dr. John Lyons. "In almost every current and future situation, our leaders and soldiers have less time to prepare for operations and have more information that must be digested about the operation. With this agreement, we can develop methods for displaying information that are better than just printed text or the spoken word."

Headquartered in Mountain View, Cal., Silicon Graphics, Inc. Mountain View, Cal., is a leading supplier of high-performance

interactive computing systems. The company offers a broad range of products from low-end desktop workstations to servers and high-end Cray supercomputers. The company also markets MIPS microprocessor designs, Alias/Wavefront entertainment and design software and other software.

Under the agreements, the company will work cooperatively with ARL and the Night Vision and Electronic Sensors for a two-year period. Interest in establishing a pact began when former Army Chief of Staff Gen. Gordon Sullivan saw the special effect created by Silicon Graphics systems for the Aladdin ride at Walt Disney World in Orlando, Fla.

Sensor pad has medical, monitoring applications

Michael Scanlon, inventor of an acoustic sensor pad that is useful for combat casualty care and soldier performance monitoring has been nominated by the editors of *Discover* Magazine for one of the magazine's 1997 awards for technological innovation.

Heartbeats, breathing, motion and other physiological sounds relating to an injured soldier can be detected by the pad, transmitted and analyzed for diagnostic purposes. The pad is a fluid-filled bladder with a hydrophone that couples to the torso. Since the human body is mostly water, the pad acts as a fluid extension of the body to form an acoustical conduit to the hydrophone within the pad that detects body sounds. The pad can be hand-sized or a full torso pad and also has applications for medical diagnosis, patient care and research.

Another application would be to monitor infants for Sudden Infant Death Syndrome or adults afflicted with sleep apnea or other sleep disorders. The pad can also be equipped with an internal vibrator to stimulate and help revive victims of those disorders.

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Honors and Awards

ARL shares R&D awards

Two companies that developed products under Small Business Innovative Research (SBIR) contracts with the Army Research Laboratory have been named winners of R&D Magazine's 1996 R&D 100 Awards for most technologically significant new products of the year.

They are the Materials and Electrochemical Research (MER) Corp., Tucson, Ariz., and SRICO., Inc., Powell, Ohio. MER Corp. was selected for an award for its Plasma Discharge Spheroidization Powder Synthesis (PDS Powders) process. Robert Dowding of ARL's Weapons and Materials Research Directorate, Aberdeen Proving Ground, was named as a co-developer of the technology.

The work was to develop very fine intermetallic aluminide powders for powder injection molding. Powder injection molding (PIM) is a powder processing technique in which powders of a desired composition are molded to net-shape. The PIM process is very useful where; the part shapes are complex, where the material is difficult to machine, and when large volumes of parts are needed. The strength of the P-SHS process is in its ability to form very fine powders of materials where, due to the composition and other processing factors, they were previously unavailable. These powders sinter to higher densities than typical commercial powders, which are much coarser, and as a result yields higher levels of strength, fracture toughness and ductility. The net shape processing of PDS powders in the form of titanium golf clubs heads, offers an immediate commercialization potential for this technology.

SRICO. Inc.. was honored for development of a Photonic Electric Field Sensor. John Latess. of ARL's Sensors and Electron

Devices Directorate, was co-developer of the technology.

By producing selective reversed poled regions in an optical crystal substrate, it was possible to produce entirely dielectric integrated optic electric field sensors. Prototype devices are well suited to measure extremely fast electromagnetic pulses and high-power microwave energy used in electronic warfare. The sensor can also analyze electromagnetic pulses on and in aircraft as well as near-field strength for antennas and radars on ships.

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OSA names Miziolek fellow

Dr. Andrzej W. Miziolek of the Weapons and Materials Research Directorate's Propulsion and Flight Division, has been awarded the rank of fellow by the Optical Society of America. Dr. Miziolek was recognized for distinguished achievement for pioneering work on ultraviolet laser photo fragmentation for chemical analysis and sustained support for fundamental and applied spectroscopy.

See contact information to send questions or comments about this web site.
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