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Director's Note

By Dr. Richard Nadolink



On October 1, 2007 the ETC welcomed its first permanent Executive Director, Robert Kavetsky (see story page 3) and I moved from my capacity as the interim Director to become the Chief Technology Officer. I am delighted to welcome Bob aboard and look forward to working with him to establish a strong organization in Southern Maryland.

I want to take this opportunity to thank the numerous people in Southern Maryland who provided tremendous support in making the ETC a reality. With the help of these enthusiastic supporters the ETC has had a successful launch, and we can now begin the task of making Southern Maryland a powerhouse in energetics research and development.

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Virtual Reality Lab Open for Business

Most of the Virtual Reality (VR) laboratories in the United States reside at major research universities. Because of academia's prominent role in VR technology development over the past 20 years, its practical applications have been largely confined to those with ties to universities that have VR research facilities. The Energetics Technology Center (ETC) in Charles County, Maryland — a private sector entity — is a notable exception.

Max Schwartz, the engineer in charge of the ETC's state-of-the-art VR Laboratory, says the facility is ready to engage with Navy investigators, private companies, and researchers from other service branches, federal and state agencies, and organizations seeking ways to employ VR tools.

A New World

Schwartz took an interesting path to the ETC. He emigrated to the United States in 1990 when his family sought asylum from Uzbekistan when it was part of the Soviet Union. He was just 11 years old at the time and knew very little English. Enrolled at a Jewish day school in suburban Maryland that provided him with free tuition, Schwartz soon distinguished himself as a quick, hands-on learner destined to excel in the computer world.

After earning his bachelor's degree in computer science from the University of Maryland in 2003, he became a software engineer at the Department of Mechanical Engineering's Center for Energetic Concepts Development (CECD). There, Schwartz was an integral part of Dr. Satyandra Gupta's virtual reality design team. Now at the ETC in charge of the VR Laboratory, Schwartz is looking forward to expanding the uses and capabilities of the VR tools he helped pioneer.



The user interacts with the tutorial using a Head Mounted Display (HMD) and a wireless wand.

Present and Future Capabilities

The VR Laboratory, as currently configured at the ETC, consists of three components:

1. Virtual Workspace. This is a software component of the Virtual Training Studio that contains the basic software infrastructure for loading CAD models into the virtual environment and interacting with those CAD models using a virtual laser pointer. The Virtual Workspace also contains the code for playing animations, video clips, and audio files in the virtual environment.

2. Virtual Authoring Tool. This software automatically generates multimedia training instructions for use in the Virtual Workspace, based on assembly tasks performed by an engineer within the virtual environment.

3. Virtual Mentor. This tool is designed to simulate the master-apprentice training model by monitoring the actions of trainees in the Virtual Workspace and assisting them with error messages, hints (such as arrows showing the correct insertion point of a part), animations, and other interactive mentoring features.

These components represent the state-of-the-art in virtual training and can be adapted for other uses as well. Cooperative research continues at the University of Maryland, and further enhancements in the technology are expected that will bring the full capability of VR tools to bear in the field of energetics.

Roots of the VR Lab

The VR Laboratory's initial purpose, when conceived and developed by the CECD, was to demonstrate a way to teach Navy technicians at NSWC Indian Head how to assemble and disassemble cartridge-actuated devices.

The Virtual Training Studio was found to have advantages beyond the initial training of technicians. VR-based training also helps maintain the proficiency of experienced technicians who may perform certain manufacturing tasks only intermittently. By practicing first in the virtual training space, a technician's memory is refreshed, and errors can be tracked and corrected before he or she undertakes actual fabrication.

The ETC adopted the VR Laboratory developed at the CECD in order to expand its applications and range of users and partnerships, and Max Schwartz migrated to the ETC along with the technology.

New Frontiers: Virtual Prototyping

The VR system housed at the ETC was originally designed for training, but other uses are contemplated. "We plan to branch out to other areas, particularly virtual prototyping," says Schwartz.

Virtual prototyping tools allow an engineer to load a new CAD design of a rocket engine, for example, into the virtual environment and try to assemble it without having to build a scale model or prototype. "Among other things, the VR Laboratory can help solve accessibility issues that arise during assembly – for instance, determining whether a technician can actually reach the place where a part must be inserted and whether there is enough clearance for part placement," explains Schwartz.

"Virtual prototyping enables an engineer to detect potential engineering problems during the design phase, play around with the configuration, and notice things that might not become evident until a physical prototype is built," Schwartz says. "These capabilities have the potential to improve the design process and save quite a lot of time and money."

Other potential applications are possible as well. According to Schwartz, the ETC Virtual Reality Laboratory is open and ready to work with users who may find that virtual reality holds very real promise for solving their energetics technology and training problems.



The virtual workspace simulates the adequate level of realism to support training.

Agreement Signed with NSWC-IH

One of the focuses of the ETC is economic development in the area of science and technology. In this vein, the ETC recently signed a Partnership Intermediary Agreement with NSWC Indian Head to foster cooperative research and expand the transfer of technology and economic development in Southern Maryland. The goal of this Agreement is to develop a more effective outreach program for small businesses, state agencies and academic institutions to expand the utilization of technology and the facilities at NSWC Indian Head and other federal laboratories.

“One of the assets that the ETC brings to this relationship is our ability to help small business firms develop partnerships with NSWC Indian Head. We have the technical support available to help these firms get through the federal process and form beneficial collaborations,” says Bob Kavetsky.

Through this Agreement, the ETC and NSWC Indian Head will work jointly to operate a Technology Transfer Outreach Program, headed by Dr. Nadolink. As part of this partnership, the ETC will help small business firms and educational institutions partner with NSWC Indian Head to conduct cooperative and joint research as well as to work with Indian Head in development, testing, and engineering activities.

Ultimately, this program will strengthen the Maryland high technology economy by more effectively reaching small businesses and institutions of higher education for the benefit of the state and national economy and NSWC Indian Head.

ETC Appoints New Executive Director

Robert Kavetsky has been appointed the Executive Director for the Energetics Technology Center (ETC), effective October 1. Dr. Richard Nadolink, who was serving as the interim Executive Director, has become the ETC’s Chief Technology Officer, where he leads the development of science and engineering projects for the ETC.

Prior to joining the ETC, Mr. Kavetsky served as the Director of the National Defense Education Program at DDR&E, reporting directly to the Deputy Undersecretary for Labs and Basic Sciences, where he was responsible for the development and execution of a critical Department of Defense workforce development initiative.

“Bob has been a champion for the science and technology workforce for years. He’s written a book on the subject and developed the ‘N-STAR’ Program (Naval Research - Science & Technology for America’s Readiness). He also understands the critical importance of the ETC’s role in enhancing NSWC- Indian Head’s mission in energetics research and development,” said Michael Middleton, Chairman of the Board of Directors for the ETC and President and CEO for Community Bank of Tri-County. “Along with economic development, these issues are the primary initiatives of the ETC and his proven experience in all of these areas is a critical asset to the ETC.”

Mr. Kavetsky holds a Bachelor of Science, Mechanical Engineering; a Master of Science, Mechanical Engineering; and a Master of Engineering Administration, all from Catholic University. He is a recipient of the Navy’s Meritorious Civilian Service Award (2002) and the Navy’s Superior Service Award (2007). He holds one patent. Mr. Kavetsky is the principal author of “From Science to Seapower” as well as over 15 journal articles and publications.

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Mr. Robert Kavetsky

CSM and ETC Unveil New Program

The workforce shortage in science, engineering and technology is well documented, as is the dearth of women in these fields. In response, the Energetics Technology Center and the College of Southern Maryland have partnered to encourage women to earn advanced degrees in science and engineering.

Beginning in 2008, CSM will pilot an energetics team; a cohort of 20 female students recruited from local high schools. Team members will receive peer support from within the cohort along with individualized support, including academic advisement and financial assistance. Upon completion of the two-year degree at CSM, each team member will be provided with transfer assistance to the four-year college of her choice.

"One of the most exciting aspects of this program is that each student will be matched with a mentor; a female scientist or engineer at NSWC Indian Head or another federal installation," reports Kavetsky. "This way, the students receive hands-on learning from someone who is working in the field.

In addition to this unique mentoring opportunity, students will be provided with other enhanced educational opportunities, including summer employment, cooperative education, and distance learning.

Individuals interested in learning more about this program should contact, Ann Smith at the College of Southern Maryland at hickory245@comcast.net.

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Staff Announcements

The ETC is pleased to announce the following staff additions.

Dr. Jerry Forbes joins the ETC as a Senior Scientist. Dr. Forbes has extensive research experience in material response to rapid energy deposition, in particular, shock wave loading of inert and energetic materials. He is an internationally known scientist in the fields of shockwave and detonation physics. He is a participating guest at Lawrence Livermore National Laboratory, a member of the technical review committee for Los Alamos National Laboratory, a visiting Professor of Engineering, University of Maryland, and a consultant, researcher and lecturer on energetics at NSWC-IH. He became a Fellow of the American Physical Society (APS) in 1992. Dr. Forbes' work has been published in over 110 publications in journal articles, Detonation (International) Symposium articles, Conference Proceedings and Laboratory Technical Reports. These publications include a chapter in a book on Energetic Materials (2005) and a chapter on Shock Waves and Detonations in the Encyclopedia of Physics (2005).



Dr. Jerry Forbes

Maxim Schwartz joins the ETC as its software engineer. His main expertise is in development of geometric algorithms for virtual environments. His current work involves building a virtual environment based training system to enhance learning of device assembly, disassembly and maintenance processes. His experience includes 3D visualization development, desktop application development, as well as web-based and database application development. He is the author of three publications.



Mr. Max Schwartz