

**Joint Commission on Technology and Science
Tuesday, August 3, 2004
Blacksburg, Virginia**

On Tuesday, August 3, 2004, the members and staff of the Joint Commission on Technology and Science toured facilities at Virginia Tech to learn more about the new technologies and applications being researched and developed in the region.

System X - High Performance Supercomputing

Virginia Tech transformed the field of high performance supercomputer and garnered international prestige, winning top honors in Computerworld's international science category in June of 2004. Virginia Tech was cited for creating the fastest machine at any university in the world, and third fastest anywhere in the world, at a price of only \$5.2 million; traditionally, a machine of that caliber costs from \$100 million to \$250 million. Researchers built the supercomputer by connecting 1,100 Apple G5 computers to achieve a speed of more than 10 teraflops.

Virginia Bioinformatics Institute (VBI)

The Virginia Bioinformatics Institute's (VBI) research portfolio encompasses more than \$40 million in grants and contracts since its creation in July of 2000. VBI serves as the genomics and bioinformatics core for a 15-university biodefense collaboration. Its most recent grant in excess of \$10 million from the National Institutes of Health includes faculty from Virginia Tech's College of Engineering and the Virginia-Maryland Regional College of Veterinary Medicine. Among its projects is the Global Pathogen Web Portal Project (PathPort), a system that will enable researchers from around the world to collect and analyze data on pathogens that is stored in systems around the world. This tool will give them the ability to build upon one another's work and advance research in areas to combat some of the deadliest pathogens in the world.

Nanotechnology: Cutting Edge Research Investment in Emerging Technologies

The Fiber & Electro-Optics Research Center (FEORC) in the College of Engineering has a long and distinguished record of extraordinary achievement in research and commercial development. The new Virginia Tech Applied Biosciences Center (VTabc), a University Center, shares facilities and personnel with FEORC and collaborates closely with it on nanotechnology research and commercialization. Created in 1985, FEORC's mission is research in advanced materials and electronics with emphasis in optics and sensors. Its researchers have engaged in more than 450 separate research programs, producing more than 1000 papers and more than 100 issued patents. Eighty percent of its intellectual property is licensed by industry and it has spun off about 20 companies. VTabc conducts focused research and engineering activities involving optics and other disciplines to create knowledge and technology to benefit the medical, biomedical and veterinary fields, while supporting the practical goals of improving services and reducing the costs of health care. Among its projects are biocompatible coatings for implant structures, a revolutionary and inexpensive method for DNA analysis, and a targeted cell killing

method that will someday replace chemotherapy. VTabc's efforts have led to commercialization successes that are five times larger than the U.S. university average per \$1 million invested.

Unmanned Systems: A Market Drive Technology

Virginia Tech has developed internationally recognized unmanned systems programs with broad expertise and capabilities on the ground, under water, in the air, and even in space. The University's Center for Unmanned Vehicles simultaneously addresses the R&D needs of unmanned vehicle systems across autonomous air, land, sea and space systems. Some of these vehicles operate by remote control and others are self-powered and controlled. In addition to seeing pictures and videos of its systems, JCOTS witnessed the operation of two robots, one self-powered and one remotely controlled.

Virginia Tech entered the DAPRA Grand Challenge, a cross-country autonomous vehicle race from Los Angeles to Las Vegas. Out of 106 teams that entered, 25 were invited to qualify and only 15 actually qualified. Seven teams completed the 1.35-mile qualification course, and only three universities teams completed. Virginia Tech finished as the fifth seed overall. Next year, the prize doubles to \$2 million. Virginia Tech also entered the 12th Annual Intelligent Ground Vehicle Competition. Twenty-eight university teams entered. Out of three separate challenges with first, second and third place awards, Virginia Tech won two awards in each challenge finishing first in two of them.

Unlike typical research programs, these programs engage and involve undergraduate students primarily, though they often include graduate students as well. These programs have accomplished so much and serve as a test bed for unmanned systems research nationally and globally.

Virginia Tech Research Highlights

Dr. Charles Steger, Virginia Tech's President, explained to JCOTS other research initiatives taking place at the university. The University has initiatives in transportation, power electronics, biomedical engineering, molecular medicine, and agricultural and environmental issues. Built in collaboration with the Virginia Department of Transportation, Virginia Tech is home to the nation's only fully operational test road that can simulate most weather and lighting conditions encountered on the nation's highways. Its Center for Power Electronics Systems, a five-university consortium focused on efficient use of electrical energy, is one of the nation's few National Science Foundation Engineering Research Centers. In collaboration with Wake Forest University's School of Medicine, it developed the School of Biomedical Engineering & Sciences where researchers specialize in biomechanics, cellular transport, computational modeling, ergonomics, tissue engineering and much more. The University's Center for Molecular Medicine and Infectious Diseases researches the molecular events leading to immunological diseases and develops diagnostic tests and immunizations. The Agricultural Research and Extension Centers develop new technologies to serve Virginia's agricultural, forestry, and seafood industries. Other research includes energy fuel, flexible solar cells and much more.