



Bethany Koetje, MS '08, digitizes a crash test dummy at the National Crash Analysis Center.

Events

NCAC Wins \$19 Million Grant

The National Crash Analysis Center (NCAC), based on GW's Virginia Campus, has won a five-year, \$19 million research grant from the U.S. Department of Transportation's Federal Highway Administration.

This major grant continues the NCAC's longstanding efforts to promote advanced crash analyses technologies that improve highway and vehicle safety and infrastructure security. It also marks more than 15 years of collaboration among the Federal Highway Administration, the National Highway Traffic Safety Administration, and GW.

The NCAC was chartered in 1992 as part of SEAS and for the past 15 years has "developed unique capabilities in crash analysis, crash data statistics, simulation and modeling, and vehicle and barrier design," according to the center's director, Professor Cing-Dao "Steve" Kan.

"The capabilities, expertise, and resources housed within the National Crash Analysis Center are not duplicated elsewhere in the world at this level," explains Kan. "For example, we have vehicle computer models that allow us to take a vehicle completely apart and rebuild it part by part. Once completed, these models can be used for different

impact applications and are available on our Web site for researchers and the government to download. No one else develops these types of models."

The NCAC's 40-member staff and graduate students conduct vehicle safety and biomechanics research, highway safety and infrastructure research, and simulation and advanced computing research. They also run full-scale crash testing and composite and material tests at the Federal Outdoor Impact Laboratory in McLean, VA. The center also houses the National Crash Analysis Center Library, the largest and most comprehensive source of crash test data and vehicle safety reports in the nation.

"The NCAC is also examining the impact of hybrid and electrical cars on road safety," says Kan. "In doing so, we provide data that help both government craft appropriate legislation and the automotive industry produce better and safer vehicles. One of our key assets as a research organization is that we can help the government and industry work together to address the technical issues of new innovations and technologies," he says. "This is just one of the many unique features of our center."

Research Team Demonstrates "Voter-Verifiable" Voting System to Media

In late October of last year with the national elections fast approaching, Professor Poorvi Vora and doctoral student Stefan Popoveniuc of the Department of Computer Science (CS) demonstrated their "voter-verifiable" voting system research to members of the media at a breakfast meeting. CS Professor Rahul Simha and doctoral student Ben Hosp also attended the breakfast and participated during the question and answer session with the media.

Because the topic was so timely, SEAS received an unusually high amount of publicity from the meeting, with the research covered by WMAL, WAMU (Washington, D.C.'s National Public Radio affiliate), *The Washington Times*,

Voice of America (radio, broadcast, and Web), and Mediill News Services.

With approximately two-thirds of Americans casting their votes in the presidential elections on paper ballots, Vora and Popoveniuc's presentation addressed the question, "How can voters be assured their votes are counted and kept private?" They demonstrated for the media their "voter-verifiable" voting system, Scantegrity.

Scantegrity involves optical scan ballots and invisible ink, and provides a fool-proof way for voters to ensure their ballots are collected and correctly tallied. It is the only such system in the country that can be used with current optical scan ballots, and it does not change the voting experience for users.

Under the Scantegrity system, each optical scan ballot has a serial number, and every choice on the ballot has a special confirmation number attached to it. Using a special pen, voters select their choices, and when they do so, a special confirmation number associated with each choice is revealed; this number does not reveal the voter's choice. The confirmation numbers are posted publicly following the election, and voters can check to see that their confirmation numbers have been recorded. To obtain the election tally, the list of confirmation numbers is decoded in a manner that can be verified by any organization or individual who wishes to check the mathematics. The decoding and the verification do not reveal the candidate choices of a voter.

Scantegrity is a joint project of University of Maryland, Baltimore County; Massachusetts Institute of Technology; University of Ottawa; University of Waterloo; University of Newcastle upon Tyne; GW; and David Chaum, its chief inventor.

POORVI VORA





The GW inaugural float parades down Pennsylvania Avenue.

SEAS Plays Key Role in GW Inaugural Float Success

On January 20, 2009, GW had the honor of being a part of the presidential inaugural parade; the GW float that processed down Pennsylvania Avenue was the only university-affiliated float in the parade.

The float was a great success, one that made both GW and SEAS look good, but it didn't come without much effort. It required countless hours of work by a group of GW students, staff, and faculty—all of them volunteers—whose efforts helped give GW a few moments in the national (and international) spotlight.

Citing the student involvement, Dean David Dolling said, "Thirty-five students from across GW participated in building the float; among them were our own SEAS students: Sible Antony, John Bermingham, Jonathan Binetti, Andrew Breest, Max Dandridge, Murrad Kazalbash, Matt Knouse, Matthew Mancuso, Gregory McEnteggart, Christine Penfold, Caitlin Stahl, Shayna Weinsel, and Gabriel Yessin. SEAS student and Student Association President Vishal Aswani and GW senior Charlie Burgoyne merit special mention for their leadership of the project."

SEAS faculty and staff were integral to the project, as well. Michael Veedock, SEAS administration staff, took on the role of trolley design lead, while Stephen Pothier, a senior research scientist, and Roger Cortesi, a lecturer, both of the Department of Mechanical and Aerospace Engineering (MAE), provided structure, organization, leadership, and wise mentoring to keep the project on target and on time. They had the support of Michael Plesniak, chairman of the MAE department, and Professor Roger Kaufman, who provided many just-in-time, mechanical engineering feats.

SEAS Celebrates "E-Week" 2009

SEAS students set a high bar for themselves this year in planning and carrying out activities to celebrate National Engineers' Week, and they cleared it with room to spare. Led by SEAS Engineers' Council, the students organized more than 30 events—everything from speakers and educational displays to contests, competitions, and games—that made for a wonderful combination of fun and learning experiences during the February celebration.

The culmination of the week's activities was the Engineers' Ball, held that Friday evening at the Andrew W. Mellon Auditorium, not far from campus. "E-Ball," as it is known, is a student-centered event, but a number of the school's friends also attended, including GW President Steven Knapp and Mrs. Knapp, SEAS National Advisory Council members, and several alumni. The evening included a dinner, dance, and an awards ceremony.

Prior to the ball, students had the opportunity to vote for the Professor of the Year in each of the five SEAS departments, and the winners were announced that evening. The winners of the 2009 Professor of the Year awards are: Professors Sameh Badie of the Department of Civil and Environmental Engineering, Abdou Youssef of the Department of Computer Science, Shahrokh Ahmadi of the Department of Electrical and Computer Engineering, Lile Murphree of the Department of Engineering Management and Systems Engineering, and Ryan Vallance of the Department of Mechanical and Aerospace Engineering. Awards were also given to two seniors, Sible Antony and Kachi Odoemene, for their leadership and involvement at SEAS.

In short, the evening was a terrific success. Said Dean David Dolling, "The smiling faces, the laughter, the overall noise level, the endless flashing of cameras, and the numbers who stayed around to the very end make me think students, faculty, and our guests all had a great time. If you missed it, don't worry; there'll be another one in February 2010."





SEAS Associate Dean Martha Pardavi-Horvath and ABET President L.S. "Skip" Fletcher

SEAS Receives ABET Diversity Award

In October of last year, Associate Dean Martha Pardavi-Horvath accepted a 2008 ABET President's Award for Diversity on behalf of the School of Engineering and Applied Science. ABET, the recognized accrediting agency for college and university programs in applied science, computing, engineering, and technology, presents these awards annually to schools and universities, individuals, associations, and firms to recognize their extraordinary success in achieving or facilitating diversity and inclusiveness in the technological segments of American society.

According to the citation on the award, SEAS merits this award "For its commitment and achievement in hiring female faculty and in recruiting, retaining, and graduating a significant number of women in undergraduate and graduate engineering programs while providing the graduates with leadership skills and opportunities as they enter engineering practice."

In addition to SEAS' achievement in hiring female faculty into our engineering programs, ABET congratulated SEAS for its success

in attracting women to our graduate programs, where 27.8 percent of our master's candidates and 26 percent of our doctoral candidates are female. ABET also noted that SEAS has significantly increased activities for female engineering students through our Society of Women Engineers (SWE) chapter and our active peer mentoring network. These efforts have helped with the recruitment and retention of female engineering students at GW. In addition, this environment has provided women graduates with an extraordinary learning experience.

Congratulations go out to all at SEAS who work to make our school a welcoming environment in which all can thrive.

GW Establishes New Institute for Nanotechnology

Sixteen faculty in SEAS and the Columbian College of Arts and Sciences founded the GW Institute for Nanotechnology (GWIN) last fall, after receiving financial support from the university under an initiative that fosters promising areas of research and academic programming at GW. Led by Professor Ryan Vallance of the Department of Mechanical and Aerospace Engineering, GWIN brings together faculty from mechanical and aerospace engineering, electrical and computer engineering, civil and environmental engineering, physics, chemistry, and biochemistry.

Nanotechnology, a field at the intersection of science and engineering, studies and applies natural and man-made materials with dimensions below 100 nanometers. It attempts to manipulate matter through the fabrication of nanostructures and engineer new applications for medicine, computing, data storage, and energy. To understand the scale of nanotechnology, Vallance helpfully explains, "a thousand 100-nanometer particles placed side by side equals the average width of a human hair."

GWIN will undertake research projects related to nanostructured materials

and their properties, applications, and devices, incorporating nanostructures, computational modeling and analysis, and nano manufacturing and metrology. Projects underway include developing a system for nanopatterning with scanning tunneling microscopy, studying the growth of carbon nanotubes, computational mechanical modeling of nanomaterials, researching nanomagnetism, and filtration with nanostructured materials.

GWIN's efforts in nanotechnology will also be an important addition to the university's engineering and science education programs. "Nanoscale phenomena are frequently incompatible with our classical intuition and experiences," explains Vallance. "Traditional engineering theories, like continuum mechanics, which engineers have used for over a century to design new devices, break down in nanotechnology. We now have to teach students additional physical, chemical, biological, and statistical principles that govern nanotechnology. GWIN can help us incorporate nanotechnology into our educational programs, both at the undergraduate and graduate levels."

Dean David Dolling is very supportive of the new institute, adding, "Nanotechnology is a vital area of national importance with applications across a wide spectrum from medicine to electronics to improving water quality world-wide. National laboratories, federal agencies, and private sector corporations all recognize the untapped potential for discoveries in this emerging field, and I believe that our engineers and scientists will be among those who unlock some of its exciting secrets. GWIN facilitates their task by creating an infrastructure that fosters multi-disciplinary efforts and provides research support."

GWIN FACULTY



SEAS Faculty Advance Wide-Ranging Research Interests

SEAS faculty are engaged in a wide range of research, for which they have received more than \$8.4 million in funding thus far this year. A sampling of this ongoing research demonstrates the breadth of both the topics and the funding provided for them.

Last fall, five faculty from the Department of Computer Science received a total of \$1.32 million in grants from the National Science Foundation (NSF) to support their research. Professors Rahul Simha and Bhagirath Narahari received a \$600,000, four-year grant from the NSF's CyberTrust program to support their ongoing research, which explores how additional hardware can be utilized to provide more secure computer systems. Professor Poorvi Vora received a two-year, \$164,000 NSF grant, also from the CyberTrust program, for research on voting systems, and she also received another NSF grant to study statistical cryptanalysis of block ciphers as channel communication. Professors Xiuzhen "Susan" Cheng and Hyeong-Ah Choi received a four-year, \$330,000 grant to study a number of fundamental problems critical to mesh network throughput optimization—a process that attempts to optimize the total amount of traffic delivered through a network within a unit of time. Separately, Professor Choi received a two-year, \$100,000 grant for a project that studies resource management in secure open wireless networks.

Four other SEAS faculty also are conducting research under NSF grants that they have received this year. Professors Rajat Mittal and Ryan Vallance of the Department of Mechanical and Aerospace Engineering (MAE) received a three-year, \$240,000 grant to analyze the flight of butterflies in GW's Center for Biomimetics and Bioinspired Engineering lab, while MAE Professor Michael Plesniak was awarded a two-year, \$240,000 grant to support a project entitled "Unsteady Flow Phenomena in

Models of Curved Arteries with Stents." In the Department of Civil and Environmental Engineering, Professor Majid Manzari received a three-year, \$235,000 grant to support a project that aims to develop theoretical and computational methods that enable engineers to evaluate the seismic response and stability of certain civil infrastructure systems.

Meanwhile, several SEAS faculty members have been working on research funded this year by other entities outside GW. Professor Jason Zara, of the Department of Electrical and Computer Engineering (ECE), was awarded two sponsored projects from Imalux Corporation to investigate new technologies for epithelial cancer detection using optical coherence tomography. MAE Professor Charles Garris is working with Multiaqua Corporation to commercialize his patented invention, the supersonic pressure-exchange ejector, and MAE Professor Andrew Cutler is part of a multi-institutional team that was successful in winning the competition for the Air Force Office of Scientific Research/NASA National Hypersonics Research Center in Propulsion. This center, to be called the Center for Hypersonic Combined Cycle Flow Physics, is led by the University of Virginia, and the GW subcontract is for \$1.06 million over five years.

Three faculty in the Department of Engineering Management and Systems Engineering (EMSE) have been undertaking emergency management-related research for both the U.S. Government and the Government of the Netherlands. Professor Joseph Barbera was awarded \$343,000 for a project to support the professional development of Veterans Health Administration personnel in the area of health care emergency management, while Professor Gregory Shaw received a contract from the Federal Emergency Management Agency to update its university-level

course, Business Crisis and Continuity Management. Professor Shaw is also working with Emeritus Professor John R. Harrald as part of a U.S. team that is acting as observers for the Netherlands National Flood Exercise and providing observations and comparative practices through reports and presentations to Netherlands government officials and emergency management personnel.

SEAS faculty have also received a number of GW-sponsored research grants this year. ECE Professor Matthew Kay received a Dilthey Award from GW for research on "Endocardial Sources of Ectopic Activity During Cardiac Ischemia and Low-Flow Reperfusion," while MAE Professor Pinhas Ben-Tzvi received a University Facilitating Fund Award for his research on "A Precise Piezoceramic Actuated Dispensing Array for Microdrops Generation and a Vision Based Testing Setup." In addition, SEAS faculty won four of the eleven awards sponsored by GW's newly-created Institute for the Analysis of Solar Energy. Two of the awards were given to EMSE Professor Jonathan Deason, one to ECE Professor Robert Harrington, and one to Professor Emeritus Lance Hoffman and co-principal investigators Professor John Sibert and senior research scientist Costis Toregas, all of the Department of Computer Science.

In addition to research grants, SEAS faculty have also had success with patents this year. U.S. Patent Number 7,420,724 was issued to ECE Professor Jason Zara and his collaborators earlier this year, while MAE Professor Charles Garris had a U.S. patent allowed, entitled "Pressure Exchanging Ejector."