

ENGINEERING news

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COLLEGE OF ENGINEERING

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

SPRING 2002



Sleek sub and dedicated divers
win first place second year in a row

“We joke and have a lot of fun, but we’re very professional when it’s time to get down to business,” said Justin Hlavin, captain of the 2001 Virginia Tech Human-Powered Submarine Team. For the second year in a row, Phantom III, the team’s hand-built vessel, placed first in the International Human-Powered Submarine Races.

The races, held in June 2001 at the U.S. Navy’s David Taylor Test Basin in Craderock, Maryland, tested the speed and control of 15 teams of students and their submarines. Although Phantom III didn’t clock

the fastest times during the five-day races, the sub and the Virginia Tech team proved the most efficient and reliable in starting and completing the underwater courses.

Phantom III is a one-person, propeller driven sub that Virginia Tech engineering students began designing about three years ago. The submarine’s sleek fiberglass hull, designed to be as small as possible to minimize drag, has a vacuum-sealed hull of two thin layers of fiberglass with foam in between — only one-half-inch thick, yet strong enough to withstand water pressure at a depth of more than 40 feet.

Two engineering faculty win CAREER awards in 2002

Erik Westman of mining and minerals engineering and Craig Woolsey of aerospace and ocean engineering received prestigious Faculty Early Career Development Program (CAREER) awards from the National Science Foundation (NSF) in 2002. CAREER awards are presented annually to a select roster of young faculty nationwide who have the potential to make significant contributions to engineering research and instruction.

With his \$375,000 CAREER grant, Westman is developing a practical method for predicting failures in rock masses. The ultimate goal of Westman’s project is fewer fatalities, lower construction costs and improved environmental protection in the construction and operation of mines, bridges, tunnels, dams, underground buildings and waste repositories.

Westman is adapting tomographic imaging — the same technology used in medical CAT scans — so that it can be used by engineers in the field to monitor redistribution of stresses within rock masses. Tomographic imaging “looks inside” a mass by transferring energy in the form of acoustic or seismic waves from one bound-

ary to another. Scientists have done some testing of tomographic imaging on rocks in laboratory settings. Westman plans to advance the technology from the lab to the field, so that images of large rock masses can be successfully scanned.

Westman’s project also will be



Erik Westman

used in his undergraduate and graduate courses, offering students images of real rock masses for their studies of stresses and failures.

With spinning wheels, moving masses and \$675,000 awarded



Craig Woolsey

ground or from ships, Woolsey explained. But suppose the Predator, in addition to taking off, flying within a limited range and snapping photographs as ordered, could sense an anti-aircraft missile coming its way and take evasive action?

Such vehicles would have to

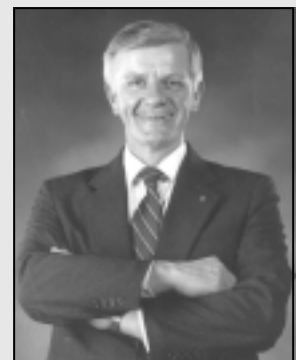
use sophisticated control devices and advanced control algorithms — the muscles and brains of any unmanned vehicle—in order to perform complex maneuvers, Woolsey said. His research for both the NSF and ONR projects will extend new methods of advanced control design to underwater ve-

hicles by incorporating the important effects of lift, drag and other fluid forces.

Woolsey and his graduate students are building a spherical underwater vehicle with internal rotors that will be tested in a water tank being constructed in Randolph Hall. “As a first step, we’ll program the vehicle and have it perform maneuvers similar to those of an unmanned spacecraft,” Woolsey said. “The next step will be to add a streamlined hull and a propeller and control how the vehicle swims.” Woolsey also is exploring the use of moving masses for underwater vehicle control.

recently in research grants, Woolsey aims to help improve the maneuverability, robustness and reliability of underwater, air and space vehicles. Woolsey, who came to Virginia Tech in 2001, has received a \$375,000 CAREER Award as well as a \$300,000 Office of Naval Research (ONR) Young Investigator Award to study the design of advanced controls and control mechanisms for unmanned vehicles.

A number of unmanned vehicles, such as the U.S. Air Force’s Predator aerial vehicle and underwater exploratory vessels, perform well in limited maneuvers with humans controlling them from the



F William Stephenson

Stephenson retires as College of Engineering Dean

F William Stephenson has retired as dean of the College of Engineering. Malcolm McPherson, former associate dean for research and graduate studies, has accepted the role of interim dean during the search for Stephenson’s replacement.

A native of Newcastle upon Tyne, England, Stephenson joined the faculty of Virginia Tech in 1978. His distinguished career at the university includes service as associate dean for research and graduate studies from 1986-1990, head of the Bradley Department of Electrical Engineering from 1990-1994, and dean of the college from 1994-2002.

His tenure as dean has been marked by a number of lasting
See Stephenson, page 2

RESEARCH

The Virginia Tech Institute for Critical Technologies

An ambitious plan to bolster research and the economy

The College of Engineering has taken the lead in developing plans for the Virginia Tech Institute for Critical Technologies (VTICT), an interdisciplinary initiative aimed at fostering collaborative research in areas of science and technology that are growth-oriented and have the highest potential for development, outreach and economic impact.

Two years ago, Virginia Tech President Charles Steger announced the goal of advancing the university into the ranks of the top 30 research institutions. VTICT — which will support research in information technology, advanced materials, biotechnologies, transportation, and energy and environment — is viewed by Steger and other university administrators as a crucial step in achieving that goal.

During FY 1999, total Virginia Tech research expenditures were \$167 million, a figure that increased to \$192.6 million in FY 2000 and to \$216.3 million for FY 2001. However, the schools ranked by the National Science Foundation as among the top 21-30 research universities averaged \$267 million in research expenditures, and those schools have been increasing their expenditures by an average of more than six percent per year.

The plans for VTICT are based on a study begun by the College of Engineering in 1997 of successful organized research units (ORUs) at highly ranked universities. Research expenditures at universities with successful ORUs averaged \$325 million in FY 1999.

Those who have investigated successful ORUs predict a \$455 million increase in Virginia Tech's research activity during the first 10 years of VTICT's operations. The economic benefits to Southwest Virginia and the rest of the Commonwealth are also a primary consideration in the development of VTICT.

Based on studies of established ORUs, Virginia Tech estimates that by 2010 Southwest Virginia would realize about \$800 million worth of increased economic activity as a result of VTICT's technical assistance to industry, licensing of intellectual properties, and technology company start-ups and resultant jobs. In the long term, the economic im-

impact on the region and the state in terms of gross product and jobs would be very much greater than research expenditures within the university.

Virginia Tech estimates that by 2010 Southwest Virginia would realize about \$800 million worth of increased economic activity as a result of VTICT's technical assistance.

Traditionally, research dollars at Virginia Tech are funneled and research is conducted through departments and centers, which often are competing with one another for funding, facilities and students. Regardless of their department affiliations, faculty and graduate students associated with VTICT will share funding, lab facilities and support staff. Researchers from throughout the university will work together in teams.

The major facilities planned for VTICT are three buildings — two on campus and one in the Corpo-

rate Research Center — that will provide 205,000 square feet of space. The initial 10-year plan for the institute also calls for additional tenure-track and research faculty positions and about 350 additional Ph.D. students. Increasing the number of graduate students is critical to the university's efforts to elevate its status in academic rankings as well as to attracting more research funding.

"The initial investment in VTICT is critical to enabling Virginia Tech to attain the status enjoyed by the most highly ranked universities," said Malcolm McPherson, interim dean of the College of Engineering and primary architect of plans for the institute. "VTICT will help the university attract top faculty, students and funding — all crucial elements in becoming and remaining one of the nation's leading universities."

Scholarship fund established



Richard Blood

when terrorists rammed American Airlines Flight 11

Several people who escaped from the World Trade Center on Sept. 11 are grateful for the quick thinking and professionalism of Richard M. Blood, Jr., a 1987 electrical engineering graduate of Virginia Tech.

Blood, a vice president with AON Risk Management Inc., was in a meeting on the 105th floor in the South Tower

into the North Tower. Blood immediately ordered his group to evacuate the tower. Thirteen minutes later, United Airlines Flight 175 crashed into the South Tower, which collapsed within an hour. A handful of the people Blood led in evacuation made it to safety. Blood was not among them.

A scholarship endowment in the College of Engineering has been established in his honor by his parents, Richard and Constance Blood, and his widow, Kris Dal Pozzol Blood. Alumni wishing to contribute to the Richard M. Blood, Jr. Memorial Engineering Scholarship Fund may do so by contacting Lauren Ehrlich, engineering development coordinator, at (540)231-6586.

ENGINEERING news

Interim Dean, College of Engineering: Malcolm McPherson

Editor / Writer: Elizabeth Crumbley

Contributing Writers: Lynn Nystrom
Karen Gilbert

Designer: David Simpkins

Photographers: Rick Griffiths,
John McCormick,
Michael Kiernan,
Damian Salas

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College of Engineering
333 Norris Hall, Virginia Tech
Blacksburg, VA 24061-0217
(540) 231-6641

College of Engineering fares well in latest rankings

In its "America's Best Colleges 2002" survey released in September 2001, *U.S. News & World Report* ranked the Virginia Tech College of Engineering's undergraduate program 20th among all the nation's engineering schools that offer Ph.D.s and 13th among engineering schools at public universities.

As part of the survey, eight of the college's undergraduate programs were rated among the top 25 in the nation by engineering school deans: aerospace was ranked 17th, chemical 22nd, civil 11th, computer 19th, electrical 16th, environmental 10th, industrial 8th and mechanical 17th.

In the most recent survey of the Engineering Workforce Commission of the American Association of Engineering Societies, Inc., the college ranks 9th nationally for the number of undergraduate degrees awarded, 12th for the number of degrees awarded to women, 15th for the number of master's degrees and 18th for the number of Ph.D.s.

The college ranks 11th among all engineering schools in the U.S. for the total number of degrees awarded.

Stephenson

Continued from page 1

achievements, including the construction and opening of Durham Hall, a highly successful capital campaign that raised more than \$68 million for the college, and development of plans for the Virginia Tech Institute for Critical Technologies (see article this page).

"Bill has been an outstanding leader for the College of Engineering since his appointment in 1994," said Virginia Tech Provost Mark McNamee, "and we can all take pride in the accomplishments of the faculty, staff, students, alumni and friends of the college during Bill's tenure." McNamee hopes to complete the search for a new dean by the beginning of Fall semester 2002.

Stephenson looks forward to continuing his efforts to support the college and the university.

ALUMNI NOTES



Pictured during the dedication are (left to right) Paul Torgersen, former president of Virginia Tech; Tom Reece, chairman, president and CEO of Dover Corp.; Eleanor Davenport; Thomas Sutton, former CEO of Dover; William Davenport; and F. William Stephenson, former dean of engineering.

Durham Hall and Dover Lab dedicated

On Sept. 29, 2001, Virginia Tech dedicated Durham Hall in honor of Fred D. Durham, a 1922 civil engineering graduate and the first president, CEO, and chairman of the Dover Corporation.

The Dover Corporation Manufacturing Systems Integration Laboratory (MSIL), which is housed in Durham Hall, also was dedicated.

In 2000, Durham's daughter, Eleanor Durham Davenport and her husband, William M. Davenport, along with their children, Victoria

A. Shivel and William Martin Davenport, Jr., pledged \$5 million to establish a scholarship endowment to support undergraduate and graduate engineering scholarships. This spring, the Dover Corporation pledged an additional \$250,000 to establish a scholarship endowment.

Durham, who died in 1998, was a member of Ut Prosim, Virginia Tech's most distinguished donor recognition organization. He received the College of Engineering's Distinguished Alumnus Award in 1987.

ESM alumna comes to the aid of September 11 burn victims

When Total Contact President Jennifer Whitestone heard the news about the Sept. 11 attacks in New York, she knew there would be many victims who could benefit from the unique burn masks she designs. Whitestone, a 1986 graduate of engineering science and mechanics at Virginia Tech, loaded her digital imaging scanner on a rental truck and transported it from her company's office in Germantown, Ohio, to the Cornell Burn Center at New York's Presbyterian Hospital.

Whitestone trained a burn center therapist to use the digital scanner. Mask preparation begins with a digital imaging



Jennifer Whitestone with a face mask mold and a burn mask produced by her company Total Contact.

scan of the patient's face, which takes only about 15 seconds. Then the data is sent electroni-

cally to Whitestone at Total Contact, where she creates the mask format. A mold is milled out and a thin plastic mask is produced from the mold. The mask is sent back to the patient, who wears it for 23 hours a day.

The burn mask minimizes wounds by pushing on them and reducing scars significantly. A dramatic difference can be seen in a burn patient after only a few days of wearing the mask. So far, Total Contact has made 20 masks for burn patients in New York.

A children's hospital in Boston now uses Whitestone's scanner and mask technology for its burn patients. "Children readily accept the mask," Whitestone said. "Once it is on their faces, they soon forget about it." Johns Hopkins Bayview Medical Center in Baltimore, Maryland, also is using the technology.

Attracted to the field of biomedicine by her desire to help patients with wound healing

See Alumna, page 4

Wagner receives Distinguished Service Award

In addition to juggling her job as manager of spectra technology at Honeywell with her role as a parent, Lori Wagner manages to devote time to her alma mater. In honor of her service, the College of Engineering presented Wagner with the 2001 Distinguished Service Award.



Lori Wagner

"Lori is most deserving," said Malcolm McPherson, interim dean of engineering. "She is a founding member of the chemical engineering department's advisory board and the former chair of the college's advisory board. In fact, she chaired both boards simultaneously."

"The challenge came from chairing both groups at the same time," Wagner said, "but my involvement in both better enabled me to align the focus and initiatives of the department with the college."

The chemical engineering (ChE) board was in its infancy so the members were new to their responsibilities and roles. "There was substantial work involved with developing the board structure as well as coaching and directing the interaction between members," Wagner noted. "Since the college board had already been in existence and had many members with prior board experience, that chair served more as a moderator." She also cites the helpful support of F. William Stephenson, former dean of engineering, and Lynn Nystrom, director of news and external relations for the college.

Wagner, who earned her B.S. in 1982 and her Ph.D. in 1987 from ChE, went to work for AlliedSignal 15 years ago and stayed with the company after it merged with Honeywell. "I've always felt that much of the success in my career was due to the top-notch teaching and mentoring environment that I had at Virginia Tech," she said. "By serving on the advisory boards I could give back some of what was provided to me."

Wagner was the Honeywell corporate liaison for Virginia Tech in 2000 and has been the campus manager for Honeywell since 1995.

In her role as campus manager, Wagner facilitates Honeywell's support of Virginia Tech, which typically receives \$80,000 to \$100,000 annually from the Honeywell Foundation. Wagner said it's relatively easy to get Virginia Tech projects funded by Honeywell because the proposals are well thought out. Another of Wagner's roles is student recruitment for Honeywell, which is a major employer of Virginia Tech ChE graduates. "I'm always confident that Virginia Tech students will impress my company when they come here for a visit," she noted. "I see the same work ethic, dedication and integrity in Tech's engineering students today that meant so much to my own development more than a decade ago."

Yearbooks available

If you couldn't afford a yearbook when you were a poor engineering student, it might not be too late. To find out if the yearbook you wish you had now is still available, call the Bugle office at (540)231-9851, email bugle@vt.edu, or order online at www.bugleonline.com.

STUDENT ACHIEVEMENTS

The Virginia Tech Autonomous Vehicle Team received high marks during the international Intelligent Ground Vehicle Competition held in June 2001 at Oakland University in Rochester, Michigan. This year the team entered three vehicles, which placed second, third and fourth in the autonomous challenge; second and third in the design competition; second and fourth in the navigation challenge; and second and third in the follow-the-leader challenge. The team from West Point, which placed first in the design challenge, cited the Virginia Tech team for helping develop West Point's program and providing technical assistance. In 2000, the Virginia Tech team swept the competition, placing first in all four challenges. Charles Reinhardt, professor of mechanical engineering (ME), is the team's faculty advisor.

A team of Virginia Tech engineering students won second place in the 2001 Future Energy Challenge and received a \$9,000 Performance Award for their original prototype of a low-cost inverter that could convert fuel-cell energy into enough electrical power to sustain a household. This type of inverter could lessen the nation's dependence on conventional power sources and also reduce environmental pollution. Teams of students from 14 universities competed in the challenge, which was hosted by the Institute of Electrical and Electronics Engineers (IEEE) in Chicago, Illinois. The Virginia Tech team, which was commended for the quality of their workmanship and the success of their inverter in the challenge's power supply test, finished second by a close margin to the first-place team from Texas A&M. Troy Nergaard, a senior in electrical and computer engineering (ECE), was the Virginia Tech team leader.

A team of Virginia Tech aerospace engineering students, working in collaboration with a team from Loughborough University in England, received an Honorable Mention Award during the 2001 NASA/



Bird in space!

This little Hokie Bird became an astronaut, thanks to Virginia Tech alumnus Jeffrey Sugar. Sugar, who received his B.S. in aerospace and ocean engineering in 1997 and his M.S. in industrial and systems engineering in 1999, helped train a NASA Space Shuttle crew for their Hubble Space Telescope mission earlier this year. While working with crew, Sugar talked the astronauts into taking the Hokie Bird along for the ride.

FAA National General Aviation Design Competition. The Virginia Tech and Loughborough team designed "Tempus," an aircraft with a flight range of 3,600 nautical miles. Last year, a Virginia Tech/Loughborough team won first place in the competition with their design of "Pegasus," a vehicle that could travel by road and/or air. Jim Marchman of aerospace and ocean engineering is the team's faculty advisor.

Six students from the College of Engineering received 2001 Paul E. Torgersen Graduate Student Research Excellence awards. The annual awards were established in 1990 by the college's Graduate Student Committee to honor Torgersen, former dean of the college and president of Virginia Tech. Three awards were presented to M.S. candidates: Jason Burdette of engineering science and mechanics, a student of Professor Ken Reifsnider; Karl Sheldon of ME, a student of Professor Walter O'Brien; and Todd Pechar of chemical engineering (ChE), a student of Associate Professor Eva Marand. The three Ph.D. awards were presented to Xingsheng Liu of materials science and engineering, a candidate working with Associate Professor G.Q. Lu; Diane Vaughan of industrial and systems engineering (ISE), who completed her Ph.D. with Associate Professor Pat Koelling; and Barbara Fraticelli of ISE, a candidate working with Professor Hanif Serali.

Alyssa Nicolaisen, junior in ME, is the Virginia Tech General Electric Scholar for the 2001-2002 academic year. She works in the Center for Intelligent Material Systems and Structures (CIMSS) as an undergraduate research assistant with Don Leo, assistant professor of ME. Nicolaisen and Leo will characterize the force and deflection of ionic polymer sensors and actuators to find applications useful in biomedical engineering and other fields.

America Online has awarded a Home Wireless Networking Technologies fellowship to Max Robert, a Ph.D. candidate in ECE who is working on wireless access technology with Jeff Reed, professor of ECE and director of the university's Mobile and Portable Radio Research Group. AOL is interested in bringing multiple information devices together to share limited resources, including a single broadband connection to the Internet, a printer and files. Cooperative activities such as multiplayer games could also benefit from resource sharing.

Cole Smith, a Ph.D. candidate in ISE, won first place prize for his dissertation in the national Institute of Industrial Engineers' (IIE) Pritsker Doctoral Dissertation Award competition. The award includes a \$1,000 cash prize and a plaque and will be presented

See Students, page 5

Student's discoveries may help prevent water-borne diseases

A Virginia Tech engineering graduate student has made drinking water treatment discoveries that may help prevent outbreaks of water-borne diseases in the future.

Paolo Scardina, a Ph.D. candidate in the Via Department of Civil and Environmental Engineering (CEE), began his research as an undergraduate on the problem of air bubbles in drinking water. Working with Marc Edwards of the CEE faculty, Scardina has continued his research through his master's and into his doctoral program, and he recently won a highly competitive grant worth \$150,000 from the American Water Works Association Research Foundation (AWWARF). His research also is being used by engineers with the California Department of Health Services to identify problems at two facilities that have experienced eruptions of air bubbles.

But why would ordinary air bubbles, which occur naturally in water, be a source of concern in drinking water treatment?

"When you open a can of soda, bubbles form and rise to the surface," explained Edwards. "The same thing can happen in water from lakes and rivers. When air bubbles are released in a 'burp' during the treatment process, pathogens and other particles can escape removal." The last treatment barrier in most drinking water treatment plants is filtration, Edwards said, and a burp of bubbles can punch holes in filters — tiny holes, but large enough to let particles and pathogens escape into the water that goes out to customers.

Scardina, who began studying air bubbles at Edwards' suggestion during his senior year at Virginia Tech, identified the causes of bubble formation while he was working on his master's. "Before Paolo's findings, we knew that bubbles could cause problems," Edwards said, "but we didn't know how they formed or the range of the impacts." In searching the literature about water treatment, Scardina noticed that serious problems often occurred at plants that experienced air bubble eruptions. "We thought this path was worth investigating," he said.

In addition to studying why bubbles form and how they punch holes in treatment plant filters, Scardina has made some discoveries. Air bubbles can interfere with the first drinking water treatment process — settling — where solid particles from incoming surface water drop to the bottom of treatment tanks. "If bubbles are present at this stage," Scardina noted, "pathogens and other particles can attach to them and float on through the treatment plant."

In 2001, the Mendocino District Office of the California Department of Health Services flew Scardina to the West Coast to help engineers there identify the source of air bubble eruptions that have occurred at two water treatment plants. "Paolo is doing some very important work," said Guy Schott, associate sanitary engineer for the Mendocino District. "He's the only person I've found in the U.S. who does work in the field of dissolved gases and their impact on treatment."

In August, the AWWARF awarded a \$150,000 grant to Scardina for continuation of his air bubble research. Scardina will use the grant to "get a handle on the magnitude of the problem," he said. Working with treatment plant engineers, he is investigating air bubbles in Boulder and Denver, Colorado; Bay City, Michigan; San Diego, California; Myrtle Beach, South Carolina; and Buffalo Pound in Canada.

Alumna

Continued from page 3

and prosthetics, Whitestone earned her master's degree in biomedical engineering at Wright State University in 1996. She started Total Contact in 1998 after helping a friend who was a burn victim. Jim Van DeGrift, the high school football coach in her hometown of Lebanon, Ohio, was burned seriously when his tractor caught on fire. Whitestone designed a burn mask that alleviated his facial scars and played a crucial role in healing his burns. "It then made sense to me to develop the product commercially to help others," she said.

STUDENT ACHIEVEMENTS

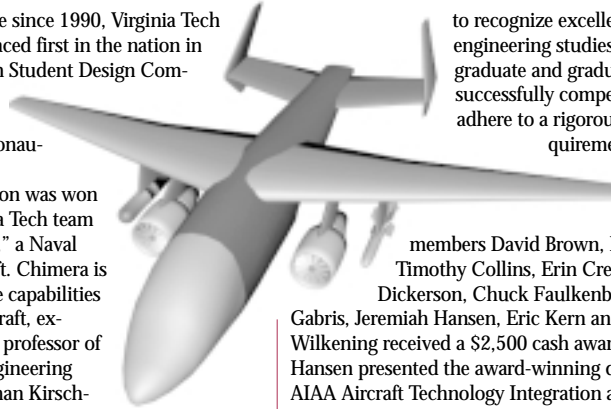
Virginia Tech students win AIAA design competition for seventh time

For the seventh time since 1990, Virginia Tech engineering students placed first in the nation in the Undergraduate Team Student Design Competitions sponsored by the American Institute of Aeronautics and Astronautics (AIAA).

The 2001 competition was won by a ten-student Virginia Tech team that designed "Chimera," a Naval common support aircraft. Chimera is designed to combine the capabilities of four Navy carrier aircraft, explained William Mason, professor of aerospace and ocean engineering (AOE). Mason and Nathan Kirschbaum of AOE are faculty advisers for the team.

Chimera is a high-wing, twin-engine plane that can perform airborne early warning, electronic surveillance, anti-submarine/anti-surface warfare and carrier onboard delivery — feats performed by four separate Navy aircraft.

Competition entries were judged by members of AIAA technical committees. AIAA established the competitions to increase the practical skills of students and



to recognize excellence in aerospace engineering studies at the undergraduate and graduate levels. To successfully compete, teams must adhere to a rigorous series of requirements and design objectives.

Virginia Tech team members David Brown, Kevin Cogley, Timothy Collins, Erin Crede, Brett Dickerson, Chuck Faulkenbury, Stephen Gabris, Jeremiah Hansen, Eric Kern and Mark Wilkening received a \$2,500 cash award from AIAA. Hansen presented the award-winning design to the AIAA Aircraft Technology Integration and Operations Forum in Los Angeles, California, in October 2001.

Two members of the team were freshmen and the rest were seniors in AOE while they worked together to design their winning entry during the 2000-2001 academic year. All were members of the Virginia Tech student chapter of AIAA.

Virginia Tech teams have placed first, second or third or received honorable mention in each AIAA undergraduate design competition for the past 12 years, Mason noted.

Students

Continued from page 4
at the IIE Conference in May. Cole's doctoral adviser is ISE Professor Hanif Sherali.

Gunmar Lucko, a Ph.D. candidate in civil and environmental engineering, received an Arthur S. Tuttle Memorial Scholarship for 2001-2002 from the American Society of Civil Engineers. Lucko also is the graduate student representative on the Virginia Tech Board of Visitors.

As an undergraduate in ChE at Virginia Tech, Diane Wegl conducted research that led to a first place in the American Institute of Chemical Engineers' (AIChE) 2001 National Student Paper Competition. She received the Edwin O. Eisen Award, sponsored by Omega Chi Epsilon, the national chemical engineering honor society. Wegl worked with a team of researchers led by ChE associate professor Kimberly Forsten in a study of the effects of mechanical compression and hormonal changes on cartilage cells. Wegl, who graduated from Virginia Tech in May 2001, is now a Ph.D. candidate at North Carolina State University.

FACULTY AND STAFF ACHIEVEMENTS

Emergency wireless communications network demonstrated

A number of federal agency representatives and Southside Virginia officials attended a demonstration Jan. 7 in Chatham, Virginia, of a new emergency wireless communications network developed by Virginia Tech's Center for Wireless Telecommunications (CWT) and the Virginia Beach offices of SAIC, a high-technology research and engineering company based in San Diego, California.

The unique broadband wireless network can be set up quickly

for communications in emergency and disaster response and recovery efforts. The project is sponsored by the National Science Foundation, with additional funding from the National Response Center.

Communications systems connected by wire and fiber can be wiped out by attacks or natural disasters. The new wireless network can be deployed rapidly in such situations to carry vast amounts of voice and computer information — including Geo-

graphic Information System (GIS) access and audio/video conferencing — among emergency and relief personnel.

When connected to the surviving ends of optical fibers or data cables, the network can provide broadband wireless communications to as many as eight remote stations using the 28 GHz band. The network was successfully demonstrated at Virginia Tech in November 2001 to the Virginia Preparedness and Security Panel.

"The system we are developing is exactly what was needed in New York after Sept. 11," said Virginia Tech electrical and computer engineering (ECE) Professor Charles Bostian, co-founder and former director of the CWT and principal investigator for the project. "It took them days to establish the needed broadband connectivity."

Co-principal investigators for the project are ECE Professor Scott Midkiff and Richard Klobuchar of SAIC.

Watford receives Black Engineer of the Year Award

Bevlee Watford, associate dean for Academic Affairs and director of the Office of Minority Engineering Programs (OMEP) for the Virginia Tech College of Engineering, received the national 2002 Black Engineer of the Year Award/College Level Educator.

The Black Engineer of the Year Awards program is sponsored by the Council of Engineering Deans of Historically Black Colleges and Universities, Lockheed Martin Corp. and USBE and Information Technology magazine. Corporate sponsors include DaimlerChrysler Corp.

Appointed as founding director of the OMEP in 1992, Watford has developed numerous mentoring and training programs for students from the middle-school years through undergraduate university studies. Her work has led to significant improvements in the engineering college's recruitment and retention rates for minority students.



Bevlee Watford

Under Watford's leadership, enrollment of African American freshmen increased by 55 percent from 1990 to 2001, and the five-year graduation rate for African American students increased from 30 percent in 1992 to 45 in 1996. Watford also has enacted recruitment and mentoring programs for women and Hispanic students that have met with success. Watford also has secured well over \$1.5 million in funding and support for OMEP and other undergraduate programs from a variety of industry and educational sources.

In 1996, Watford received Virginia Tech's Affirmative Action Award for improving the campus environment for minority and women students. In 1997 she

received the Charles A. Tunstall Outstanding MEP Award from the National Society for Black Engineers (NSBE) and she was selected as one of the 50 Top Minority Women in Science & Engineering by the National Technical Association.

Murray elected to National Academy of Engineering

Virginia Tech engineering professor Thomas M. Murray has been elected to the National Academy of Engineering (NAE), one of the highest honors that can be accorded an engineer. Academy membership recognizes those who have made important contributions to engineering theory and practice and have demonstrated unusual accomplishment in the pioneering of new and developing fields of technology.

Murray, the Montague-Betts Professor of Structural Steel Design in the Via Department of

See Murray, page 6

FACULTY AND STAFF ACHIEVEMENTS

Three College of Engineering faculty were honored during the Faculty/Staff Awards Ceremony in September 2001. **Leslie Graham**, director of undergraduate affairs for electrical and computer engineering (ECE), received the Provost's Award for Excellence in Advising. **Daniel Inman**, a professor of mechanical engineering and director of the Center for Intelligent Material Systems and Structures, received the Alumni Award for Excellence in Research. The Alumni Award for Excellence in Teaching was presented to **Michael Vorster**, a professor of construction engineering and management in the civil and environmental engineering (CEE) department.

Annamalai Annamalai of ECE received the 2001 Leon K. Kirchmayer Prize Paper Award from the Institute of Electrical and Electronics Engineers (IEEE) for his work in wireless communications. The Kirchmayer award is presented for the most outstanding paper published in an IEEE journal by an author under 30 years of age.

Bob Beaton of industrial and systems engineering (ISE) received the Human Factors and Ergonomics Society's 2001 Paul M. Fitts Education Award. The national award was presented in recognition of Beaton's outstanding contributions and dedication to the education of human factors and ergonomics specialists.

Amy Bell of ECE received a research grant from the prestigious Alfred P. Sloan Foundation to study stereotype impacts on the academic performance and career aspirations of women engineering students.

Diana Farkas of materials science and engineering was elected a Fellow of ASM International. The designation of fellow recognizes ASM members for distinguished contributions to the field of materials science and engineering. Farkas was chosen for her research in modeling of defects, grain boundaries and fracture behavior in intermetallic compounds.

Richard Goff of engineering fundamentals received one of three Edward S. Diggs Teaching Scholar Awards for 2001. The Diggs Awards were established at Virginia Tech in 1992 to recognize outstanding teaching and exceptional contributions to the teaching program and learning environment.

Chris Hall of aerospace and ocean engineering (AOE) and **Sanjay Raman** of ECE were invited participants in the National Academy of Engineering's 2001 Frontiers of Engineering Symposium in Irvine,

California. Hall and Raman were among only 81 engineers from academia, industry and government invited by the academy to attend the national symposium. Attendees, who were selected through a competitive process, are engineers from 30 to 45 years of age who have made recognizable contributions to advancing the frontiers of engineering.

Christopher Haycocks of mining and minerals engineering (MinE) received the Rock Mechanics Award from the Society for Mining, Metallurgy and Exploration, Inc. in recognition of his contributions to the teaching of rock mechanics and to furthering the understanding of multiple-seam mining.

Bill Knocke and **John Novak** of CEE were inducted into the Academy of Distinguished Alumni by the Civil Engineering Department at the University of Missouri-Rolla.

In honor of his contributions to the study of the behavior of composite structures under complex mechanical loads, **Liviu Librescu** of engineering science and mechanics (ESM) was elected an Academician of the Academy of Sciences of Shipbuilding of the Ukraine.

Jim Mitchell, professor emeritus of CEE, received the Thomas A. Middlebrooks Award from the American Society of Civil Engineers as co-author of a paper published in the *Journal of Geotechnical and Geoenvironmental Engineering*.

Ted Oyama of chemical engineering (ChE) was selected as a Distinguished Lecturer for 2001-2002 by the ChE department of the University of Louisville in Kentucky. Oyama's lecture, "Hydrogen-Selective Membranes for the Conversion of Greenhouse Gases," describes his discovery of a new inorganic membrane that is 100 percent selective for hydrogen permeation. Oyama has received a patent for this technology, which is under license to a private company.

The Biomedical Engineering Society presented its Distinguished Service Award to **Daniel Schneck**, recently retired professor of ESM. The award is given periodically to recognize members who have made outstanding contributions to the society, and Schneck is only the fourth recipient since the award was established in 1992.

Paul Torgersen, ISE professor and former president of Virginia Tech, has been appointed by Gov. Mark Warner to a seven-member panel that will ad-

vised the governor on appointments to state college boards, the State Council of Higher Education and the Virginia Community Colleges Board. Torgersen also received the 2001 Frank and Lillian Gilbreth Award from the Institute of Industrial Engineers (IIE). This award is the highest honor presented by IIE and recognizes individuals who have distinguished themselves through contributions to the welfare of mankind in the field of industrial engineering.

Robert Trew, head of ECE, received the Harry Diamond Memorial Award from the Institute of Electrical and Electronics Engineers (IEEE)-USA for significant contributions to the field of electro-technology while in government service. Trew served for four years as director of research for the U.S. Department of Defense (DOD) and for five years as a program manager for the U.S. Army Research Office at North Carolina's Research Triangle Park.

Eileen Van Aken of ISE received second place in the Southeast Region New Faculty Research Award presented by the American Society for Engineering Education (ASEE). The award recognizes research and teaching contributions of faculty throughout the range of engineering fields. Van Aken works in the areas of team-based work system design and effectiveness, process/systems management, quality management practices and tools, and organizational transformation.

A paper co-authored by **Garth Wilkes** of ChE received national best paper awards in 2001 from the Technical Association of the Pulp and Paper Industry Polymers Laminations and Coatings and from the Engineering Properties and Structure Division (EPSDIV) of the Society of Plastics Engineers.

Roe-Hoan Yoon of MinE received the Distinguished Alumni Award from the College of Engineering of Seoul National University in Korea. Yoon earned his undergraduate degree from the university in 1967.

Murray

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Civil and Environmental Engineering, was elected for his leadership in developing criteria for floor serviceability and his major contributions to structural-steel design engineering practice.

Among Murray's numerous accomplishments is the development of techniques for building lightweight, affordable floor systems that reduce vibrations in large steel and concrete structures, such as airports and shopping malls. He is co-author of a design guide that is used extensively by structural engineers in the U.S. and Canada, and he has made more than 100 presentations on floor serviceability to engineering groups worldwide.

In addition, Murray has worked for many years with the metal building industry to develop more economical roof systems and connections. Working in Virginia Tech's Structures and Materials Laboratory, which he founded, Murray and his graduate students have developed alternate methods for connecting beams and columns in buildings in areas that experience high levels of seismic activity. This work was conducted in response to structural problems that were brought to light by the 1994 Northridge, California earthquake.

"We are very proud of Tom and his selection to the National Academy," said CEE department head William Knocke. "This is a most worthy recognition of the numerous ways in which Tom has made important contributions to the fields of structural engineering and vibrations."

Ellis named top engineering educator

The Society of Automotive Engineers, Inc. (SAE) has presented the 2002 Ralph R. Teetor Educational Award to **Kimberly Ellis**, an assistant professor at Virginia Tech, for outstanding contributions as one of the nation's top engineering educators in the field of industrial and systems engineering (ISE).

Since joining the Virginia Tech faculty in 1996, Ellis has been cited three times on the College of Engineering Dean's List for Teaching Excellence. Her undergraduate and graduate courses are designed to instruct students in successful methods of manufacturing design, production and distribution.

As a senior-design-project adviser for the ISE department, Ellis provides guidance for undergraduates who work directly with industry sponsors. Currently, she advises a senior-level project on redesigning an assembly

operation at Volvo Trucks in Pulaski, Virginia. She also is helping to plan a conference at Virginia Tech that will increase undergraduate students' awareness of career opportunities in the automotive industry.

For the past five years, Ellis has been the faculty adviser for the Virginia Tech chapter of Alpha Pi Mu, the national industrial engineering honor society. She also is active in the student chapter of the Institute of Industrial Engineers.

Ellis is co-director of the Dover Laboratory for Manufacturing Systems at Virginia Tech and an associate of the Center for High Performance Manufacturing. As a participant in the Teetor Award Program, Ellis plans to increase industry involvement in the education of her graduate and undergraduate students.



Kimberly Ellis

FACULTY AND STAFF ACHIEVEMENTS

Sherali receives Pletta Award

"A good researcher is usually a good teacher — you need clarity of thought and communication for both," said Virginia Tech Professor Hanif Sherali, recipient of the Pletta Award as the 2001 Virginia Engineering Educator of the Year.

The award, established in honor of the late Dan H. Pletta, a nationally renowned educator and an engineering science and mechanics professor at Virginia Tech from 1932 to 1972, is presented annually by the Virginia Engineering Award Committee to recognize an engineering educator who has demonstrated outstanding teaching and public service.

Sherali, the W. Thomas Rice Chair of Engineering at Virginia Tech and a professor of industrial and systems engineering, has received numerous education awards during his tenure at the university, including

the Outstanding Faculty Award from the State Council of Higher Education in Virginia and the Institute of Industrial Engineers' (IIE) Albert G. Holzman Distinguished Educator Award.

At Virginia Tech, Sherali's teaching achievements have been recognized with the university's Alumni Award for Excellence in Teaching, as well as four Certificates of Teaching Excellence and two Dean's Teaching Excellence Awards from the College of Engineering. Since joining the Virginia Tech faculty in 1979, he has directed 10 award-winning theses and dissertations.

In 2000, Sherali was elected to the National Academy of Engineering (NAE) for his contributions to engineering system design based on optimization theory. Election to the NAE is among the highest professional distinctions accorded an engineer.



Nancy Love

Love first to receive WERF's Busch Award

Nancy Love, an associate professor of civil and environmental engineering at Virginia Tech, has been looking inside the "black box" of biological wastewater treatment processes for several years, and her unique research in this field has led to her selection in 2001 as the first recipient of the Water Environment Research Foundation's (WERF) Paul L. Busch Award.

The foundation established the Busch Award to recognize superior achievement and creative vision in water quality and water environment research. The award is given in honor of the late Paul Busch, a former president and CEO of Malcolm Pirnie, Inc., and a past chairman of the WERF board of directors.

Love will use the \$100,000 award to continue her studies of wastewater treatment at the cellular and molecular level. Love is studying the molecular makeup of microorganisms used in wastewater treatment in an attempt to develop biosensors that can detect stress responses induced by toxic pollutants. Such biosensors would enable treatment plant operators to quickly identify toxins that are causing problems and to determine how to protect the community of microorganisms in the treatment process.

In announcing Love's selection as the first Busch Award recipient, the WERF cited her research as "the first step in creating the 'radar' that operators need, the early warning system to detect upsets and prevent the nightmare of process breakdown."

RESEARCH CENTERS

Center for High Performance Manufacturing established at Virginia Tech

In 2001 former Virginia governor James Gilmore awarded \$18 million in grants to Virginia's research universities from the Commonwealth Technology Research Fund (CTRF) to help Virginia's colleges and universities vie competitively for federal and private research grants.

Virginia Tech received a major award to enhance manufacturing statewide by establishing the Center for High Performance Manufacturing. The center received \$4.3 million over three years from the CTRF, matched by \$4.61 million from Virginia Tech and participating companies.

Leading faculty for the new center are Frank Chen of industrial and systems engineering; Ron Kander, formerly of materials science and engineering; and Al Loos of engineering science and mechanics. Partner schools are James Madison University, where Kander has relocated as a department head; and Virginia State University and the College of William and Mary, where there are also participating faculty researchers.

The major goal of the Center for High Performance Manufacturing is to enhance Virginia's research infrastructure for agile and lean manufacturing. Center faculty will

work to assist Virginia manufacturing firms in becoming high performance producers by providing a "one-stop source" of manufacturing research in strategy, design, and analysis for launching new products and facilities, and re-engineering existing manufacturing systems.

Areas of research and development of enabling tools and methodologies will include re-configurable manufacturing and assembly systems, supply chain engineering, advanced composites fabrication and rapid prototyping and tooling.

Learn more about the center at www.eng.vt.edu/chpm/chpm.htm.

Virginia Tech, Wake Forest establish joint biomedical engineering school

Virginia Tech and Wake Forest University are establishing a joint school of biomedical engineering and science. The Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences will offer M.S. and Ph.D. degrees in biomedical engineering (BME), as well as opportunities for collaborative research.

Elaine Scott, professor of mechanical engineering and director of the Center for Biomedical Engineering at Virginia Tech, wrote the original proposal for the school.

Researchers to monitor new interstate highway program

Virginia Tech engineering researchers will use a \$3.4 million grant from the Virginia Department of Transportation (VDOT) to monitor the cost savings and level-of-service effectiveness of a new state program that allows private contractors to initiate and implement interstate highway construction and maintenance projects.

When the Public-Private Transportation Act (PPTA) was enacted under former Gov. George Allen's administration in 1995, Virginia became the first state

See VDOT, page 8

Scott expects the new school to have an enrollment of about 80 graduate students within five years. Tech currently has 30 students in the BME graduate option.

"We are particularly enthused about potential for sponsored research opportunities," Scott said. "Wake Forest will take the lead in bioimaging and signal processing, while Tech will lead in the biomechanics and tissue and cell engineering areas. We expect that other focus areas, such as bioinformatics, will be added in the near future." Joint instructional and research programs will initially focus on biomechanics, tissue and cell engineering, and bioimaging and signal analysis.

Initially each university will support the school with existing faculty but plan to add new faculty as new funding is acquired. Currently, there are more than 20 faculty members participating in the biomedical engineering center at Virginia Tech. The school will be operated jointly by Virginia Tech's College of Engineering, the Virginia Maryland College of Veterinary Medicine and the Wake Forest University School of Medicine.

"This is a natural partnership between Virginia Tech, which has no human medical school, and Wake Forest, which does not have an engineering school. We are extremely excited about affiliating with a highly respected university like Wake Forest," said Virginia Tech President Charles W. Steger.

VDOT

Continued from page 7

to allow private contractors to submit unsolicited proposals for interstate maintenance and construction, explained Jesús M. de la Garza, professor of civil and environmental engineering at Virginia Tech.

"The idea behind PPTA is threefold," de la Garza noted. "First of all, the public needs timely acquisition of and improvements to transportation facilities. Secondly, these needs may not be completely satisfied by existing methods of acquisition, improvement and construction. Finally, authorizing private entities to acquire, construct, improve, maintain and operate transportation facilities may result in the availability of these facilities in a more timely and less costly fashion."

VMS Inc., a maintenance services contractor in Richmond, submitted the first proposal under PPTA regulations. Since 1997, VMS has managed maintenance projects for 250 miles of highway on portions of interstates 81, 95, 77 and 381. In 2000, VDOT turned to Virginia Tech for an independent assessment of VMS maintenance, and de la Garza and Professor Michael Vorster conducted a study of the cost efficiency of the pilot VMS project. "We were able to report a positive level of savings between the cost of highway maintenance as provided by VMS and what it would have cost VDOT to bid out the same work to contractors," de la Garza said. The study reported estimated savings of \$16 million to \$23 million over a five-year period.

Vorster and de la Garza will use the \$3.4 million VDOT grant to establish a center of expertise to study the cost efficiency and level-of-service effectiveness of private contractor projects under PPTA.

The College of Engineering hosts its first homecoming Register now for homecoming events and the Hokie football game

The College of Engineering will host its first homecoming on Saturday, Oct. 26, 2002. This special weekend will provide engineering alumni with the opportunity to learn about the latest accomplishments and newest goals of the college — all while you enjoy a beautiful Fall weekend in Blacksburg, reminisce with friends, visit with former professors and cheer the Hokies to victory over the Temple Owls.

On Saturday morning the college will host the Engineering Showcase, where faculty members from various departments will be on hand to greet you, answer questions, and highlight their departments' specific achievements and future directions. Also on Saturday morning, we will feature a special presentation of the latest initiatives for the college at large, including the Virginia Tech Institute for Critical Technologies.

Enjoy a continental breakfast at your leisure. Tours will be available, including some of the engineering labs and Durham Hall, the newest of the engineering buildings here on campus.

Registration is available on-line at www.VaTechAlumni.com. Select Fall 2002 Events and Engineering Homecoming. A limited number of hotel accommodations and football tickets are available to alumni who register to participate in the College of Engineering Homecoming. Please register now to reserve your place. Note that a change in the game time may alter Saturday's schedule. Please visit www.VaTechAlumni.com for updated schedules and further detailed information.

If you have questions about the event or registration, please call Heather Esteban, assistant director of Alumni Relations, at (540)231-6285.

We look forward to seeing you here on campus.

Game Ticket Policy

Football tickets purchased through the Alumni Association are for reunion participants and their registered guests only. Limit of one ticket per registrant.

- Your reunion registration fee does NOT include the cost of your football ticket.
- Tickets will not be mailed: they will be available for pick-up at Reunion Registration with photo ID.
- Tickets are available on a first-come, first-served basis and are limited in quantity. Register early and get yours before they run out.

Registration Form

College of Engineering Homecoming

Personal Information

Your Name _____ Class Year _____

Maiden Name _____ Major at VT _____

E-mail _____

Home Phone (____) _____ Work Phone (____) _____

Address: Home Business _____

City _____ State _____ Zip _____

Name for Your Name Tag _____

Spouse: (if attending reunion) _____

Name for Name Tag _____ VT Class Year _____

Guest(s): Please list ages of any children 17 or under. You can add or remove guests after you have registered by calling the Alumni Association at (540) 231-6285.

1. Name _____ VT Class Year _____

Name for Name Tag _____

Age _____

2. Name _____ VT Class Year _____

Name for Name Tag _____

Age _____

Special Needs

Do you have special needs while you are visiting us (i.e., diet, mobility restrictions)?

No Yes If "yes," please describe: _____

Reunion Registration

Note: # of registrants = class member + spouse (if attending) + # of guests.

Registration must be accompanied by full payment. Registration is free for children under 6. A full priced game ticket is required for EVERYONE attending the game, including children under 6.

Adults x \$12 = _____

Children (6-17 yrs.) x \$8 = _____

Please add \$5 per registrant (adult and child)

for registrations received after July 1 x \$5 = _____

Game Tickets (see Game Ticket Policy) x \$31 = _____

Temple vs. VT Total = _____

Please charge the total to my ...

Visa Master Card American Express Discover Card

Card Number _____ Exp. Date _____

Signature _____

Please find my check payable to "Virginia Tech Alumni Association" enclosed.

Register Now!

Register on-line at www.VaTechAlumni.com

Or mail your registration (and check or credit card information) to:

Virginia Tech Alumni Association Attn: COE Homecoming

Alumni Hall, Blacksburg, VA 24061

Or fax your registration 540-231-3039,

Attn: COE Homecoming

Fax registrations use credit cards only!

Please register by July 1. You will receive mailed confirmation of registration and lodging before the Engineering Homecoming.

Register on-line at www.VaTechAlumni.com

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