SBES, Ford team to cut fetal injuries, deaths in crashes

Stefan Duma, director of Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences (SBES), is teaming with Ford Motor Co. to stem a problem that until now has not received wide attention: the high number of fetuses injured or killed in automobile wrecks.

Although states are not required to report fetal deaths in accident data, it is believed that between 300 and 1,000 unborn babies die in car accidents each year. That rate is four times than those for victims between infancy and 4 years old, said Duma, the college’s John Jones III Fellow and a professor of mechanical engineering. “There is no silver bullet to solving these problems,” he said.

That is why Ford has teamed with SBES for the past three years, gathering data to develop computer-aided models of a pregnant woman for virtual crash test simulations. The new effort builds on 15 years of Ford research that helped lead to one of the first adult web body computerized crash models. These virtual crash models combine computer simulations and medical research to virtually test how crash forces affect the human body.

The model being developed could help Ford researchers better understand how crash forces specifically affect women who are with child. The “pregnant” crash model would add to Ford’s use of computerized adult test models in safety research. Duma’s research is expected to provide Ford’s safety researchers with vital data about pregnant women and their developing babies, such as abdominal shape and tissue properties.

“This is no silver bullet to solving these problems,” said Duma, “We developed new methods and techniques for this project in order to collect detailed internal organ geometry from MRI and CT scans, including accurate size and location of the uterus, placenta and fetus,” said Joel Stitzel of the Virginia Tech-Wake Forest University Center for Injury Biomechanics. The center performs research investigating the human tolerance to impact loading, especially as it relates to automobile safety, military restraints and sports biomechanics.

The virtual models used in this research project simulate regions of the body such as the head, neck, rib cage, abdomen, thoracic and lumbar spine, pelvis, and the upper and lower extremities, as well as the internal organs of the chest and abdomen. The models contain detailed representations of the bones and soft tissues of the human body.

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Researchers with the Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences and Ford Motor Co. are developing improved safety devices to protect expecting mothers.

The U.S. Army Medical Research Activity awarded $2.6 million to the Virginia Tech Transportation Institute (VTI) and the Center for Injury Biomechanics (CIB) to study the biomechanics of head, neck, and chest injury prevention for soldiers involved in military vehicle crashes. The Virginia Tech faculty members, Stefan Duma, Warren Hardy and H. Clay Gabler will head the study, specifically focusing on improving vehicle passenger restraint systems.

Duma is director of the Virginia-Wake Forest University School of Biomedical Engineering and Sciences (SBES). Hardy, director of CIB, and Gabler are associate professors of mechanical engineering.

The U.S. military’s 3 million active-duty and reserve personnel face constant injury risk while in service to their country. Even non-combat vehicle injuries can lead to potentially debilitating or fatal results. The research is tied to similar ongoing studies related to football players, and improved helmet designs.

Design changes to the High Mobility Multipurpose Wheeled Vehicle (HMMWV), such as additional ballistic armor, have lead to a severe increase in rollover accidents. Specifically, rollover accidents account for 42 percent of HMMWV accidents and more than 70 percent of all fatalities sustained in HMMWV vehicles in Iraq. Current restraints in the vehicles thus far have proved either inadequate or were intrusive upon soldiers’ ability to perform their mission tasks and protect themselves while wearing the harness belts. The study also will consider restraints used in military helicopters.

The Office of the Director of National Intelligence is expanding the engineering thrust at its Intelligence Community Centers of Academic Excellence (CAE), with a new program that partially will be based at Virginia Tech. Howard University, Washington, D.C., will serve as an academic partner.

The program strives for cross-disciplinary involvement, and students from all majors who have an interest in pursuing national security careers can reap benefits.

The Intelligence Community (IC) is comprised of 16 federal agencies, including the Central Intelligence Agency, Defense Intelligence Agency, National Security Agency and Geo-Spatial Intelligence Agency. It sponsors the creation of these centers at academic institutions to promote the alignment of curricula, such as scientific programs, international relations, foreign language/cultural immersion, in support of long-term national security efforts.

The Center for Injury Biomechanics (CIB) will study soldier injuries.

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“Traditional crash dummies are very important, but the computerized human models allow us to see underneath the skin inside the body during a crash,” said Stephen Rouhana, senior technical leader, Ford Passive Safety Research and Advanced Engineering. “Not all virtual models are the same. We chose to work with Virginia Tech and Wake Forest because we believe they better understand the biomechanics of pregnant women and could translate that into effective computer crash test models.”

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**Dean’s Message**

The year of 2009 and the first quarter of this year were marked with deep financial worry for American families, businesses, the university system and, like every other College of Engineering at Virginia Tech. We have had our share of cutbacks and tightened our belts to meet previous and forthcoming shortfalls in funding from the commonwealth. And we will continue to march onward.

I am glad to say our faculty, staff and students all have met these challenging times head on. In fiscal year 2009, we saw $89 million in direct research expenditures and $19 million in indirect research expenditures flow into the university, all based on the efforts of these fine people in trailblazing new areas of research while furthering education. The $98 million figure, by the way, is an 81 percent jump from five years ago, when annual research spending was at $54.2 million. As well, way-through our 2010 fiscal year, we have received $87 million new research grants and contracts, a significant uptick from the same period in fiscal year 2009 when new grants and contracts totaled $54 million.

This past year also has been marked with fantastic success stories in the College of Engineering. I mention only a few of these accomplishments here, but many more are detailed in the following pages as well as on our Web site. A five-year, $7.5 million institute in solar power/energy featuring the innova-tive, solar-powered Lumenhaus. The home recently was featured on ABC’s “Good Morning America.”

The undergraduate Blind Driver Challenge team led by Dennis Hong did what was previously thought impossible. But the key is that the blind one day can use to drive. The prototype vehicle’s concept linked scores of blind and low-vision people worldwide, as well as numerous media outlets, including CBS News and, if you can believe it, Silly Putty or Jet ski. As well, students in the computer science department were insti-tutionalizing their colleagues from the College of Architecture and Urban Studies to design the innova-tive, solar-powered Lumenhaus. The home recently was featured on ABC’s “Good Morning America.”

Our faculty research staff captured dozens of research grants and awards during the past 12 months. Among them: Six engineering faculty received the highly competitive National Science Foundation CAREER awards in 2009/early 2010. Leigh McGuire-Welch of aerospace and mechanical engineering was one, with a 2009 Presidential Early Career Award for Scientists.

### College ranks high in U.S. News

The College of Engineering continued to rank well under U.S. News & World Report’s listings of top undergraduate and graduate schools. Engineering programs ranked 14th among “America’s Best Graduate Schools” in 2010, the college advanced one spot to 27th place in the year-over-year ranking among all engineering schools. Three departments finished in the top 10 of their respective category: The Charles E. Via Jr. Department of Civil and Environmental Engineering, under separate lists, tied for seventh among civil engineering programs; the Grado Department of Industrial and Systems Engineering ranked fourth; the biological systems engineering department, also part of the College of Agriculture and Life Sciences, tied for seventh among biological/agricultural programs.

Additional ranked departments, in their respective lists, include aerospace at 16th, mechanical at 17th, electrical at 18th, and computer engi-neering tying for 20th.

The college’s undergraduate program ranked its spot among “America’s Best Colleges” in the Wall Street Journal’s "America’s Best Colleges 2010" list. (As a whole, the university ranks at 71.) In their respective category, students majoring engineering programs ranked fifth in the nation; aerospace and civil engineering departments each ranked 10th, while mechanical engineering and electrical and computer engineering tied for sixth in materials science and engineering placed 15th, while the environmen-tal track ranked 16th.

### Engineering Science and Mechanics (ESM)

Many of our friends in industry and among our ranks of alumni also helped us honor our students and faculty members who were killed in the shootings of April 16, 2007. The gifts in these cases truly honor the spirits of those who gave their lives because they help continue the always growing effort of education. The Engineering Science and Mechanics (ESM) Student Engagement Center, one of the six new rooms on the fully renovated second floor of Norris Hall, was renamed in memory of Libuše Líbraxová. ESM alumnus Pat Rowlands, who worked at Boeing, and his wife, Livie, turned this center, and we thank them for honoring such a heroic, courageous spirit. The new biomechanics research laboratory located in Norris 218 was named the Kevin P. Granata Biomechanics Laboratory. At Patton Hall, a renovated space on the second floor was named for G. V. Logothetan, a professor of civil and environmental engineering, and several of his students were killed.

The space contains two commissioned paintings: One is a portrait of Logothetan, the second a scene of the New River titled “The Journey.” A copy of that beautiful print, by Robert Tuckwiller, hangs in my office. To all those who gave their time, consideration and gifts to these heartfelt remembrances, I profoundly thank you.

As we move further into 2010, I see it as a year in which our faculty, staff and students reach new heights of achievement; where we race past the $155 million fundraising goal set for the Campaign for Virginia Tech; where direct research expenditures top $100 million; where the doors of the third ICTAS building are opened to a new future; where we secure state support for the Signature Engineering Building; and finally, with assis-tance from our many great alumni, we help the nation turn the brutal recession of the past several years into a time of growth and triumph.

Sincerely,

Richard C. Benson
Dean of Engineering, Torgersen Chair

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**College of Engineering**

**Dean, College of Engineering: Richard Benson**
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**DEANS’ MESSAGE**

2010 will mark new growth, new opportunities
College inducts 10 into Academy of Engineering, honors Air Force captain

Art McKinney was named as the 2009 Distinguished Alumnus by the College of Engineering. A 1966 graduate of Virginia Tech’s then architectural engineering program, now civil and environmental engineering, McKinney has a decades-long career in high-end, big-box construction and the building of sophisticated bio-safety containment structures.

McKinney, a 1966 Virginia Tech civil engineering graduate, spent his career with the communications industry, joining Western Electric, the manufacturing arm of AT&T, the owners of Bell Labs. He also spearheads The Vezcello Group.

Some 12 years ago, McKinney recalibrated his career, moving from designing big-box, high-tech buildings to building bio-safety containment facilities that can store biomaterials that range every threat level, from minor contaminants to infectious agents that are lethal.

Engineering alumna named as DARPA director

Regina Dugan is the new director of the Defense Advanced Research Projects Agency (DARPA), ap- pointed in 2009. She earned her bachelor’s and master’s degrees in mechanical engineering from Virginia Tech and is the sole inventor on a patent for refueling satellites in orbit, and she has several additional patents pending. Dugan (who also earned a doctoral degree from Cal Tech) previously worked at DARPA from 1996 to 2000 before co-founding RedXDefense in 2005. The company specializes in developing technologies to detect and counter explosives. She is also founder of Dugan Ventures, an investment firm focusing on early technology opportunities.

Dugan is well-known for her leadership in technology development. She has appeared on the Discovery Channel, National Public Radio, and the AAAS Science Report and her projects have been the subject of articles in the New York Times, Forbes, the Wall Street Journal, Chemical and Engineering News, and Science News, among others. Among her many awards: DARPA Program Manager of the Year Award; the deFleury Medal, the most prestigious award of the U.S. Army Engineer Regiment; and the Office of the Secretary of Defense Medal for Exceptional Service. She is co-author of Engineering Thermodynamics with J.B. Jones, a retired director of the mechanical engineering department.

College inducts 10 into Academy of Engineering, honors Air Force captain

The College of Engineering in 2009 inducted 10 new members into its Academy of Engineering Excellence, an elite group of 56,000 living alumni. It marked the 10th anniversary of the first induction, and the college produced a book on the first 90 inductees, called in the Land Grant Tradition: Reaching the Pinnacles.

The 2009 inductees were:

Jerry Ballengee, a 1962 mechanical engineering graduate, worked in the paper industry, retiring as president and chief operating officer of Union Camp Corp.

Storie Barker, a 1951 mining engineer graduate, spent his career in the coal industry, retiring as president of Island Creek Coal Co.

Thomas Cox earned bachelor’s and master’s degrees in metallurgical engineering from Virginia Tech in 1966 and in 1968, respectively. He established General Electric research laboratories in China and India.

Robert Epperly earned bachelor’s and master’s degrees in chemical engineering in 1956 and 1958, respectively. He served as general manager of Exxon’s $120 million corporate research.

Salish Kulkarni, a 1973 doctoral graduate in engineering science and mechanics, served with the U.S. Embassy in New Delhi, India, before joining George-town University.

Joe May, earned his bachelor’s degree in electrical engineering before founding Electronic Instrumentation and Technology. He now serves on the Virginia’s House of Delegates.

A. Ross Myers, a 1972 civil engineering graduate, is president and CEO of Allan A. Myers Inc. and American Infrastructure.

Don Sage, a 1956 industrial engineering graduate, spent his career with the communications industry, joining Western Electric, the manufacturing arm of AT&T, the owners of Bell Labs.

Leo Vecello Jr., a 1969 civil engineering alumnus, is now the third generation patriarch of Vecello and Grogan Inc. He also spearheads The Vecello Group.

Joseph Vipperman, a 1962 electrical engineering graduate, has had a long career with American Electric Power, retiring as an executive vice-president.

Honored as an Outstanding Young Engineering Alumna was Air Force Capt. Kelley Jesse, who graduated in 2002 with a degree in aerospace and ocean engineering.

Boeing’s Marc Sheffler receives Service Award

Marc Sheffler, a 1973 aerospace engineering graduate with a long career at Boeing, was awarded the College of Engineering’s 2009 Distinguished Service Award for his work on the college advisory board and for enhancing Boeing’s relationship with his alma mater.

In 2007, Sheffler arranged for Boeing to present $50,000 to the Design Team Endowment Fund, founded by the Student Engineers’ Council. Months later, he supplement-ed that gift with another $15,000 donation for the same cause. In 2009, he presented another $20,000.

He also directed $5,000 to area public schools to support Virginia Tech’s FIRST Robotics Partnership, where engineering students collaborate with grade school students in building robotics for competition. Sheffler also has coordinated Boeing’s support for the Virginia Tech’s aerospace and ocean engineering departments.

Sheffler joined Boeing in 1973, the same year he graduated from Virginia Tech. He has worked in a variety of positions including the Comanche Air Vehicle Design project. Sheffler later was named as an Honorary Fellow of the American Helicopter Society. He now works as Boeing’s senior manager of the Engineer-ing Phantom Works, located in Philadelphia. He serves on the College of Engineering Advisory Board, as well as other organizations closer to home such as the Delaware Branch of the Juvenile Diabetes Research Foundation International.

KSU names Schulz as President

Kansas State University in 2009 named Kirk Schulz, a Virginia Tech chemical engineering graduate, as its 13th president. Schulz earned a bachelor’s degree in 1986 and a doctoral degree in 1991. Pictured, left to right, at Schulz’ Inauguration in Manhattan, Kan., are David Cox, professor of chemical engineering and Schulz’s doctoral adviser; Schulz; and Paul Thorsen, dean of the College of Engineering from 1970 to 1990, and president of Virginia Tech from 1993 until 2009.
A student team at the Robotics & Mechatronics, Laboratory (RoMeLa) made history in 2009: Creating the world’s first and only vehicle that allows a blind or low-vision person to independently operate a motor vehicle without passenger assistance. Blind advocates have likened this feat to reaching the moon.

The Blind Driver Challenge (BDC) team of 12 undergraduate seniors designed, built, and tested numerous non-visual driver interfaces to achieve this goal, set by a 2004 initiative from the National Federation of the Blind’s Jernigan Institute. Overseen by faculty adviser and RoMeLa director Danex Hong, the student team recognized throughout the design process the philosophy of the Jernigan Institute to "revolutionize attitudes about blindness and promote independence."

The high-tech buggy, which "sees" via lasers much like sonar, was unveiled during the summer of 2009 in the parking lot obstacle course. "It was great!" said Wes Majerus, the first blind person to drive the buggy. Majerus is an access technology specialist with Jernigan. Also driving the vehicle was Mark Riccobono, executive director at Jernigan. "This is sort of our going to the moon project," he said.

In late July, the real test came as the vehicle underwent its public debut with nearly 20 youth driving the car at a National Federation of the Blind’s Youth Slam camp. On a closed parking lot course at the University of Maryland, youth after youth, followed by camp counselors – all blind or low-vision – took a turn behind the wheel. Among the dozens of responses: "It was an amazing experience," said Ishaan Rostogi, 15, from New Jersey. He said the drive now gives him hope that one day he could earn his driver’s license.

Major news media outlets caught the action for print, Web and television. Media included CBS News Early Show, Discovery News and the Washington Post. This coverage was just part of a wide net of positive attention concerning the vehicle cast on Virginia Tech by USA Today, New York Times, ABC News, Fox News, Wired magazine, BBC Arabic and Central China Television. An example, by Web site Thinkdigit.com: "Every once in a while, we come across a new piece of technological research that just blows us away. And the Blind Driver Challenge project... has to rank right up there."

"We’re showing the world the extreme level of capability that the blind already have," said Greg Jannaman, who led the BDC student team during the 2008-2009 academic year and since has graduated, now working for National instruments.

More than six months from its public debut, the project still is garnering excited responses from blind and low-vision people across the globe. "I thought that what I was reading was a dream, which I have had many times: to drive," wrote a blind woman in an e-mail.

Then there was this note: "As the husband of a legally blind wife, I fully understand the impact that the inability to drive has on the blind. My wife has expressed to me how helpless it feels to be dependent on others for transportation... Her dream is to someday be able to drive."

The red buggy was the prototype choice for the team BDC and is now "retired," as team members will adopt the technology to two road-ready cars. Novel driver interfaces, such as Drive Grip and AirPix, already are in development by students to further advance the car. Hong also is excited about spin-off technologies: crash avoidance hardware for everyday automobiles and improved home appliances that the blind can use more easily.

As part of its 2011 Blind Driver Challenge initiative, the National Federation of the Blind has proposed that a car be driven by a blind person from its home base in Baltimore to Orlando, Fla., the location of the 2011 NFB National Convention. Hong and his students plan to meet that challenge. "This new goal has presented exciting challenges and opportunities to the Virginia Tech BDC Team, the National Federation of the Blind and the entire blind community," Hong said.

Awards, Honors, Notables:

Jacqueline Addesa, a junior from Lynchburg, Va., and Gabriel Martinez, a senior from Ashburn, Va., received honorable mentions from the Computing Research Association’s Outstanding Undergraduate Research Award competition for 2010. Both are computer science majors.

A team of electrical and computer engineering students took first in a Texas Instrument (TI) competition, winning the 2009 Engibous Prize for their senior design project – a 200 W Class D subwoofer amplifier. Winning students were Thomas LaBella, John Caldwell, Alex Kim, and Preston Taylor. Jason Lai, professor, served as their faculty adviser.

Teens Ishaan Rostogi, who is blind, drives the Blind Driver Challenge at a youth camp in College Park, Md. In the passenger seat is Greg Jannaman, then leader of the student team overseeing the project.

Kimberly Wenger, the 2009-2010 leader for the Blind Driver Challenge team, explains the operation of the unique vehicle to a blind youth.

AWARDS • HONORS • NOTABLES

Cara Buchanan, of New Bern, N.C., received a National Science Foundation graduate study fellowship that provides three years of funding, including a tuition supplement and a stipend of $30,000 per year. She is a doctoral student with the Virginia Tech - Wake Forest University School of Biomedical Engineering and Sciences.

Kara Dodson and Chase Siuta will represent Virginia Tech at the 6th Annual ACC Meeting of the Minds Undergraduate Research Conference at Georgia Tech’s Global Learning Center. Dodson is a sophomore from Lynchburg, Va., majoring in civil engineering. Siuta is a senior from Virginia Beach in engineering science and mechanics.

Alex Duerksen, a senior from Waynesboro, Va., majoring in mining and minerals engineering, received a National Science Foundation graduate study fellowship that provides three years of funding, including a tuition supplement and a stipend of $30,000 per year. He also was named the 2008-2009 Outstanding Senior for the College of Engineering.

John Pagliaro, a senior from Bowie, Md., was selected as a research associate at the National Energy Technology Laboratory under the U.S. Department of Energy’s Oak Ridge Institute for Science & Education program. He is pursuing dual degrees in engineering science and mechanics and mechanical engineering.

Thomas Scogland, a doctoral candidate, received a three-year National Defense Science and Engineering Graduate fellowship through the U.S. Department of Defense.

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Students receive donated car, parts for EcoCAR challenge

When a college student receives a new car, his or her first typical thought isn’t how to dismantle the vehicle’s engine and re-engineer it for maximum fuel efficiency and lowest possible emissions. But that’s exactly what members of the Hybrid Electric Vehicle Team of Virginia Tech (HEVT) are doing with a 2009 crossover SUV donated by General Motors. Among those in the background is Doug Nelson, professor of mechanical engineering.

The donated prismatic lithium ion battery modules and control systems will help increase the vehicle’s efficiency. The HEVT team, with its main enthusiasts all being student from the College of Engineering. In October 2009, the team took gold in the four-way-intermediate contest at the U.S. Parachute Association National Championship in Texas. In December, they won gold at the USPA Collegiate Nationals, where members set a record for the highest score in a single round of diving, 34 points. Left to right, Jamie Sides from Annapolis, Md., a 2008 graduate student of civil engineering; Ben Worrall from Marshall, Va., a 2007 graduate student of aerospace engineering; Andrew Happick from Bel Air, Md., a senior in mechanical engineering; and Doug Barron Happick from Bel Air, Md., a senior in mechanical engineering.

Students display LabVIEW know how

Mechanical engineering student James Yarrington (at laptop) shows James Truchard (left) how he has used National Instrument’s LabVIEW, a graphical programming environment program. Founder and CEO of National Instruments, Truchard visited campus as a guest of the College of Engineering. Several engineering classes and design teams, including members of the RoMeLa, where the Blind Driver Challenge vehicle was developed. In December, they won gold at the USPA Collegiate Nationals, where members set a record for the highest score in a single round of diving, 34 points. Left to right, Jamie Sides from Annapolis, Md., a 2008 graduate student of civil engineering; Ben Worrall from Marshall, Va., a 2007 graduate student of aerospace engineering; Andrew Happick from Bel Air, Md., a senior in mechanical engineering; and Doug Barron Happick from Bel Air, Md., a senior in mechanical engineering. Photos courtesy of Worrall.
### Faculty Achievements

**Hong honored among Popular Science’s Brilliant 10**

Dennis Hong, associate professor and director of the award-winning Robotics & Mechanisms Laboratory (RoMeLa), was named to Popular Science’s 8th annual Brilliant 10.

The honor capped off a year in which Hong was awarded the SAE International’s Ralph R. Teetor Educational Award, named as a 2009 Forward Under 40 honoree by the University of Wisconsin–Madison Alumni Association, and selected to appear in the Purdue University Alumni Association’s 40 Under 40 listing, scheduled to publish in July 2010.

He also garnered scores of national headlines and television coverage with the Blind Driver Challenge, a study in 2009 of the feasibility of building a drivable car for the blind and low-vision population. Among the media outlets to cover Hong and his team: The Washington Post, USA Today, New York Times, CBS News.

**ABC News, Fox News, Wired magazine, BBC Arabic and Central China Television.** (See Page 4 for more details.)

As well, Hong gave a presentation on robotics at the November regional TEDxNASA event, which garnered him an invitation to speak at an upcoming international TED event. TED is an annual conference held concurrently in Long Beach, Calif., and Oxford, England, that brings together the world’s “most fascinating thinkers and doers,” each challenged to give the talk of their lives … in 18 minutes. His company’s stand: Past speakers include former U.S. Vice President Al Gore and James Cameron, director of the films “Titanic” and “Avatar.”

The annual Popular Science listing honors top scientists younger than 40 years of age from across the United States. The November 2009 issue article detailed Hong’s work in robotics engineering, including robot locomotion and manipulation, autonomous vehicles and humanoid robots.

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### College receives $850,000 from Nuclear Regulatory Commission

The U.S. Nuclear Regulatory Commission (NRC) awarded the college’s burgeoning nuclear engineering program an estimated $850,000 for faculty development and for fellowships.

NRC awarded a total $20 million to 70 institutions to boost nuclear education and expand the workforce in nuclear and nuclear-related disciplines. Of the full amount received by Virginia Tech, $450,000 will be used for faculty development, and $400,000 for fellowships.

The college revived its nuclear engineering program in 2007, offering graduate coursework that leads to a graduate certificate in nuclear engineering. Final certificate approval is pending.

Development of a master’s and Ph.D. in nuclear engineering is in progress. Final certificate approval is pending.

**ABC News, Fox News, Wired magazine, BBC Arabic and Central China Television.** (See Page 4 for more details.)

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### NSF awards $2M to Space@VT

Members of the Space@VT research group were awarded a $2 million grant from the National Science Foundation to build a chain of space weather instrument stations in Antarctica. Space weather affects a variety of everyday consumer technologies including global positioning systems (GPS), satellites for television reception, and cellular phones. The understanding of space weather also is critical to space programs.

Robert Clauser, professor of electrical and computer engineering (ECE), will lead the research project, which includes: Joseph Baker, assistant professor of ECE; Tamal Bose, professor of ECE; Brent Ledvina of Coherent Navigation, but who continues to hold an adjunct assistant professor of ECE position; and Majeid Manteghi, assistant professor of ECE. Bose also is associate director of Wireless@Virginia Tech, a second university research group collaborating on this project.

Clauser’s office is located at the National Institute of Aerospace (NIA), a consortium of universities established in 2002 in Hampton, Va., to develop excellence in research and education in a spectrum of aerospace-related areas of study, including space science.

Earlier in 2009, Space@VT received a $6 million grant to build radar units. J. Michael Rhusionen, ECE associate professor, is leading this effort of which nearly $2 million of the award went to Virginia Tech and Space@VT, directed by Wayne Scales, also of ECE. The remaining $4 million went to partner universities.

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### Six faculty members snag NSF CAREER awards

Several College of Engineering assistant professors received the National Science Foundation’s Faculty Early Career Development Program (CAREER) award during the past year. The grants are the NSF’s most prestigious award for creative junior faculty considered as future leaders in their respective academic fields.

Yang Cao of computer science won $550,000 to develop computer simulation methods that will better understand the complex, discrete and stochastic cell cycle model. The five-year grant funds a research project that will involve a multi-disciplinary tract from the computer science department, as well as those from the departments of mathematics and biology — both part of the College of Science.

Modeling the mechanisms of a cell cycle is infinitely challenging, but Cao’s research seeks to correct this by developing computational methods and rigorous mathematical theories to integrate the full gamut of continuous, discrete, deterministic and stochastic models.

**Aditya Johri**

of engineering education will use his $400,000 grant to study work practices of global engineering professionals. It is his hope that the research will advance the understanding of how engineers work on teams spread across the world using information technology, and lead to insights that can help educators prepare future engineers. Such international collaboration in the classroom can transform how engineering students are educated. Johri said.

He was inspired to research how global information technology is used by engineering professionals after working for two companies in India, a Honda subsidiary and a company linked to General Electric.

Nichole Rylander will use her $400,000 award for preliminary research on how a cancerous tumor responds to photothermal and photochemical therapies in combination with nanotechnology. The grant, in part, is a continuation of her Ph.D. and post-doctoral work at the University of Texas at Austin on characterization of injury and heat shock protein (HSP) expression in prostate cancer cells and tumors in response to elevated temperatures associated with water bath and laser heating.

Rylander seeks to develop and use a novel sensing system she co-invented called the “holey scaffold,” the first system capable of minimally invasive and non-destructive light sensitive, molecular sensing and control of biological and transport processes. Rylander said the “holey scaffold” can be visualized as a miniature microscope used in conjunction with a living system.

**Cornel Sultan**

of aerospace and ocean engineering will use his $400,000 grant to develop new biological-based controllable structures that have “tensional integrity” or tensegrity. When the biology is applied to engineering principles, Sultan believes the resulting mathematical models and control strategies will be “critical in validating tensegtry applications such as space telescopes, antennas, and robots, thus enabling the jump from feasibility to implementation.”

His findings could further the understanding of the connection between heart disease and a cell’s structure, aid tissue and organ reconstruction research, and explain how nature controls motion in a fast and energy efficient manner.

Anil Vullikanti of computer science and a member of the Virginia Bioinformatics Institute, received $450,000 for a five-year research project focusing on theoretical foundations of Cognitive Radio Networks (CRNs). This technology increases the spectrum utilization by opportunistically allowing unlicensed See CAREER, page 8
Jeremiah Ablide, assistant professor in materials science and engineering and in mechanical engineering, received a Ralph E. Powe Junior Faculty Enhancement Award from Oak Ridge Associated Universities.

Donald Baird, professor of chemical engineering, received the 2009 Society of Plastics Engineers (SPE) International Award, the highest honor SPE bestows upon a member. Also in 2009, Baird was named the Alexander F. Giacco Professor of Chemical Engineering. Funding for the position comes from Hercules Inc., honoring Giacco, former president of Hercules and a 1942 Virginia Tech alumnus.

Ramesh Batra, the Clifton C. Garvin Professor of Engineering Science and Mechanics, was awarded the Engineering Science Medal of the Society of Engineering Science. He also was 2010 recipient of the Virginia Outstanding Faculty Award sponsored by the State Council of Higher Education for Virginia (SCHEV) and Dominion, a Richmond-based energy company.

Jan Helge Behn, associate professor of mechanical engineering, received the 2009 Virginia Tech Alumni Award for Excellence in International Education. Behn’s partnership with Technische Universität Darmstadt (TUD) in Germany has provided new opportunities for Virginia Tech students.

Maura Borrego, assistant professor of engineering education, received a 2010 Virginia Outstanding Faculty Rising Star Award, sponsored by the State Council of Higher Education for Virginia (SCHBEV) and Dominion, an energy company based in Richmond, Va.

Ali Butt, assistant professor of computer science, was among 88 U.S. engineers to participate in the National Academy of Engineering’s 15th annual U.S. Frontiers of Engineering symposium. Participants—from industry, academia and government—were chosen by peers from approximately 240 applicants.

John Casali, the John Grado Professor of Industrial and Systems Engineering, was awarded the 2009 Outstanding Hearing Conservationist Award from the National Hearing Conservation Association (NHCA). Casali also helped secure a $300,000 National Science Foundation grant to study knee ligament sprains at the micro-mechanical level. His team includes assistant professors Joseph Freeman of engineering and Jennifer Barrett of Virginia Tech’s Marion duPont Scott Equine Medical Center.

W. Samuel Easterling, professor and head of the Charles Edward Via Jr. Department of Civil and Environmental Engineering, was named the Montague-Betts Professor of Structural Steel Design. The title was endowed by alumni William Betts Jr., who co-founded structural steel fabricator Montague-Betts Co. Based in Richmond, Va., the company has manufactured steel scaffolding to continue outreach efforts with inner-city school children from Newark, N.J.

Marc Edwards, the Charles Lunsford Professor of Civil Engineering, was awarded the Praxis Award in Professional Ethics from the Villanova University Ethics Program of the College of Liberal Arts & Sciences for his efforts in uncovering untrue claims by Washington D.C., officials about the safety of drinking water. Additionally, Edwards’ report won the Top Science Paper Award by Environmental Science & Technology magazine.

Rajagopalan,

Kray Luxbacher, assistant professor of mine engineering, is spearheading a $1.24 million, five-year contract by the National Institute for Occupational Safety and Health to study the effects of roof falls, bumps, or explosions on underground mine ventilation systems. She will be supported by several Virginia Tech faculty members and researches.

Leigh McCue-Well, assistant professor of aerospace and ocean engineering, was honored with a 2009 Presidential Early Career Award for Scientists and Engineers (PECASE). Announced by the White House, the PECASE award is the highest honor bestowed by the U.S. government on scientists and engineers beginning their independent careers.

Doug Nelson, professor of mechanical engineering, won the 2009 National Science Foundation Outstanding Long-Term Faculty Advisor Award for the EcoCAR Challenge competition. His $10,000 cash prize went toward the EcoCAR project (see page 5).

The two projects total $2.6 million, focusing on the exchange of synchrotron data among electric utility companies and other electricity entities.

Ted Oyama, the Fred W. Bull Chaired Professorship of Chemical Engineering, won the 2009 American Chemical Society Philadelphia Award. Oyama’s current research focuses on the oxidative transformation of hydrocarbons to high-value products.

Padma Rajagopalan, assistant professor of chemical engineering, is part of a team using more than $1 million in grant funding to study engineered tissues that mimic the human liver. Combined funding comes from three federal grants.

Richey Davis, professor of chemical engineering, and T.M. Murali, associate professor of computer science, are collaborators.

Naren Ramakrishnan, professor of computer science, was one of 84 professionals worldwide recognized as a 2009 Distinguished Member by the Association for Computing Machinery. He also received a 2009 Hewlett Packard Labs Innovation award.

Harif Sherali, a University Distinguished Professor and the W. Thomas Rice Chair of Engineering in the Grado Department of Industrial and Systems Engineering, received the university’s 2009 Alumni Award for Excellence in Graduate Academic Advising.

Sandeep Shukla, associate professor in Bradley Department of Electrical and Computer Engineering, was one of 60 U.S. and German engineers invited to attend the 2010 German-American Frontiers of Engineering Symposium, overviewed by the National Academy of Engineering and the Alexander von Humboldt Foundation of Germany.

Sunit Sinha, associate professor in the Vla Department of Civil and Environmental Engineering, was featured as an expert in the History Channel documentary “The Crumbling of America.” The film focuses on falling water and sewer system infrastructure. Sinha earlier appeared in the Public Broadcasting System film “Liquid Assets: The Story of Our Water Infrastructure,” which he helped spearhead.

Jake Socha, assistant professor of engineering science and mechanics, is heading a study of insects with several potential outcomes: better pest control, improved artificial tissues and organs, and new medical microdevices. The project is funded by the National Science Foundation with a $2 million grant, and See Faculty, page 8
Faculty

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an additional $300,000 from the university’s Institute for Critical Technology and Applied Science.

**Danesh Tafti** of mechanical engineering was named the William S. Cross Jr. Professor of Engineering. The professorship was created by Cross Sales and Engineering Company as a tribute to Cross, a member of the Virginia Tech Class of 1941, on his retirement.

**Yue Joseph Wang** was named the Grant A. Dove Professor of Electrical and Computer Engineering. The posting recognizes the contributions of the late Dove, a former member of its board of directors and 1951 Virginia Tech alum.

**Beverly Watford**, associate dean of the College of Engineering, received the 2009 Distinguished Alumni Award from the college’s mining and minerals engineering department. The award recognized her accomplishments as an educator and administrator, and her efforts to increase diversity in engineering.

**Roe-Hoan Yoon**, the Nicholas T. Camicia Professor in the mining and minerals engineering department, was awarded the Pittsburgh Coal Mining Institute of America’s 2009 Stephen McCann Memorial Award for Educational Excellence.

**Deborah Young-Corbett**, assistant professor of civil and environmental engineering, was awarded a $174,000 National Science Foundation grant to research improved management practices for public school infrastructure, found to be in dire shape after a federal study.

CAREER

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users to transmit on licensed bands without intruding on the users who are licensed.

He also won a five-year, $750,000 Early Career Principal Investigator grant from the U.S. Department of Energy to formulate a mathematical framework that can track the spread of pandemics among populations and malware across wireless computer networks, as well as how a blackout occurring on one major power grid can cause a cascade of additional neighboring networks to fail.

**Danfeng Yao**, a new hire in the computer science department, will use her $350,000 grant to build a new detection system for malicious software affecting personal computers that will be able to accurately differentiate network behaviors of a legitimate human user from a malware program.

The new program will do this by identifying and enforcing unique properties of human computer usage. She will focus on identifying characteristic human user behaviors, developing protocols for fine-grained traffic-input analysis, and preventing forgeries and attacks by malware. She will design and apply a combination of cryptographic techniques, correlation analysis and hardware-based integrity measures to carry out these tasks. “The proliferation and sophistication of malware...”

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