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# FROM THE EDITOR

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Dear Readers,

Welcome back to Blacksburg! I am thrilled to be writing to you again as the returning Editor-in-Chief of the Engineers' Forum. This year promises to be one of our best, and we hope you will enjoy all of the things we have put together for this issue.


Fall brings a lot of new opportunities for students, and chances to grow both inside and outside of the classroom. In class, new professors and students await the knowledge that will be learned throughout the semester. Outside of class comes friends and football games, as well as the yearly Engineering Expo, which has a new format that promises to provide more room for talking to employers and getting those connections that can prove to be the most beneficial in the future. Try new things and you never know where you might end up!

This issue of the Forum has a focus on REUs (research experience for undergraduates), written by Sara Lu and Danielle Willgruber. Also, check up on what your friends did this summer through our interviews of engineering students just like you.

We are looking for new members this fall to join our organization. We hope to be able to recruit as many new people as possible to help us expand our horizons. If you are interested in joining us, please feel free to contact me through email at: [forum@vt.edu](mailto:forum@vt.edu).

Go Hokies!

Kari Adkins



Editor-in-Chief

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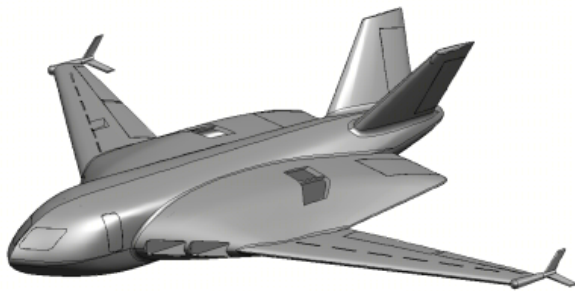
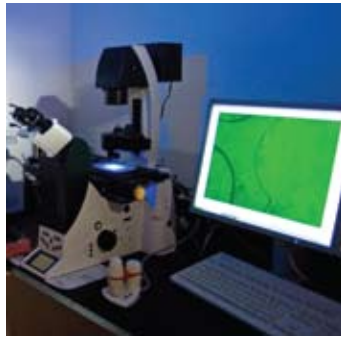
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## INSIDE



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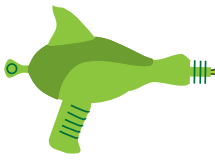
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# Biomedical Foundation Supports Technology Aimed at



**Destroying**



## Cancer Cells

A new technology, using electric pulses to destroy cancer tissue and named by NASA Tech Briefs as one of seven key technological breakthroughs of 2007, is receiving additional support aimed at moving the procedure to the marketplace. One of its lead developers, Rafael V. Davalos, a faculty member of the Virginia Tech–Wake Forest University School of Biomedical Engineering and Sciences (SBES), received a \$240,000 grant from the Wallace H. Coulter Foundation and \$25,000 from the Wake Forest Comprehensive Cancer Center.

Davalos' grant from Coulter is an Early Career Translational Research Award in Biomedical Engineering. This early career awards program provides funding for assistant professors in established biomedical engineering departments within North America. The award seeks to support biomedical research that Coulter considers promising — with the goal of progressing toward commercial development.

The technology, irreversible electroporation (IRE), was invented by

Davalos and Boris Rubinsky, a bio-engineering professor at the University of California, Berkeley.

Electroporation is a phenomenon that increases the permeability of a cell from none to a reversible opening to an irreversible opening. With the latter, the cell will die. For decades, biologists have used reversible electroporation in laboratories to introduce drugs and genes into cells while trying to avoid irreversible electroporation. By contrast, biomedical engineers Davalos and

*Continued on page 7*

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Continued from page 6

Rubinsky are now using irreversible electroporation to target cancer cells in the body.

IRE would be a minimally invasive surgical focal-ablation technique

that could remove the undesirable tissue without the use of heat such as radiation. The IRE procedure involves placing small needles near the targeted region. The needles deliver a series of low energy microsecond electric pulses to the tar-

geted tissue and the area treated can be monitored in real time using ultrasound. In laboratory testing, IRE destroyed targeted tissue with sub-millimeter resolution, and it proved easy to control and to be precise.

Furthermore, “the procedure spares nerves and major blood vessels, enabling treatment in otherwise inoperable areas,” Davalos, the 2006 recipient of the Hispanic Engineer National Achievement Award for Most Promising Engineer, added.

Davalos and his colleagues published the first experiments on using IRE on tumors in the November 2007 issue of *PLoS ONE*. Their optimal parameters achieved complete regression in 92 percent of the



Dr. Davalos with research tools relating to irreversible electroporation.

An advertisement for NiSource Gas Transmission &amp; Storage. The central text reads "YOUR TALENTS HELP FUEL OUR FUTURE". Below this, it states: "NiSource Gas Transmission &amp; Storage (NGT&amp;S) offers challenging and rewarding careers across nearly all facets of the energy business. From a wide range of engineering and other professional fields, to operations, technical, commercial and administrative roles, our NGT&amp;S teams are among the nation's leaders in delivering safe, reliable energy to the customers and communities we serve." The NiSource logo is a blue diamond shape. The website "WWW.NGTS.COM" is at the bottom. The ad is surrounded by four images: top-left shows a person at a computer workstation; top-right shows a worker in a blue shirt and white hard hat operating a large orange valve; middle-right shows two people in an office setting; bottom-right shows a worker in a blue shirt and white hard hat operating a large green pipe with a gauge.



treated tumors in vivo in preclinical mouse models. These results were achieved with a single treatment that lasted less than five minutes. Collaborator Lluís M. Mir, director of the Laboratory of Vectorology and Gene Transfer research of the Institut Gustave Roussy, the leading cancer research center in Europe, and one of the Centre National de la Recherche Scientifique (CNRS), led the study.

In April 2008, Gary Onik, a radiologist with Florida Hospital (<http://www.hopeforprostatecancer.com/>) and Rubinsky conducted a pilot study on five people on soft tissue in the prostate to prove the safety of the procedure on humans.

Davalos' collaborators on the Coulter

Foundation grant are: Mir, John Robertson, professor of biomedical science, and John Rossmeisl, an assistant professor of small animal clinical services, both of whom are in the College of Veterinary Medicine at Virginia Tech; and Waldemar Debinski of Wake Forest.

Davalos' Virginia Tech collaborators on the grant from Wake Forest are Robertson and Nichole Rylander, assistant professor of mechanical engineering and also a member of the SBES. Wake Forest researcher Suzy Torti, of its cancer biology department, is also working with the group.

*Staff Reports.*

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# NASA's Future Aircraft Undergraduate Competition

A team of six undergraduate aerospace engineering students from Virginia Tech earned first place honors with their entry of STINGRAE in the 2008 NASA Aircraft Design Competition sponsored by NASA's Aeronautics Research Mission Directorate's Fundamental Aeronautics Program, part of the agency's Aeronautics Research Mission Directorate.

The six students were: Bakar Bey of Richmond, Va., Michael Fifer of Bristol, Va., Jon Frankenfield of Virginia Beach, Michael Lauire of Chapel Hill, N.C., Stephen Pace of Blacksburg, Va., and Cabin Samuels of Burke, Va. They were advised by Yan-Yee Andy Ko who worked as an adjunct faculty member in the aerospace and ocean engineering department at Virginia Tech.

The students' entry into the competition was part of a two-semester senior aircraft design course for graduating seniors.

"The invention, imagination and engineering exhibited in these college proposals was extraordinary, and in parts superior to the concepts prevalent in the current professional literature. These entries bode well for the future of civilian aeronautics," said Dennis Bushnell, chief scientist at NASA's Langley Research Center in Hampton, Va. Bushnell was one of several NASA experts who judged the competition.

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“The goals of my aircraft design course included showing the students how different engineering disciplines relate, that design requires compromise, and good engineering is a result of solid analysis. I am proud of this team. Their pragmatic, yet visionary solution clearly covered all the components of the course,” Ko said. Ko works as an aircraft design engineer at AVID LLC, an aircraft design services and software company with an office at Virginia Tech’s Corporate Research Center.

AVIS also supported this project with both resources and engineering.

AOE Department Head Christopher Hall, added, “The STINGRAE design combines several novel engineering approaches to address the problems of noise, pollution and efficiency. The team’s success reflects the vehicle design philosophy that is systematically developed throughout the aerospace engineering curriculum. Furthermore, this particular project demonstrates the synergy between the department and AVID Aerospace LLC’s Research Center. Students had the unique opportunity to engage AVID’s engineering staff in discussions and reviews of the design.”

Sixty-one students from 14 colleges and universities around the globe have imagined what the next generation of airliners and cargo planes may look like. Fourteen teams and two individual students submitted their designs in the annual contest.

The highest scoring graduate team was from Georgia Tech in Atlanta.

*Continued on page 11*

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Continued from page 10

The contest asked students to create a future subsonic transport aircraft that could carry up to 50,000 pounds, operate on runways between 1,500 and 3,000 feet and cruise at speeds between 595 and 625 mph - about the average speed of airliners today. The competition also stressed that concept planes should use alternative fuels and be quieter and more environmentally friendly than today's commercial fleet.

"The nation's air transportation system is under tremendous pressure to increase performance and capacity without causing additional damage to the environment," said Juan Alonso, director of the Fundamental Aeronautics Program. "Through competitions such as this, we are nurturing a new generation of engineers who can deliver the solutions we so desperately need."

The judges graded the designs on criteria including creativity and imagination, feasibility and cost analysis, and comprehensive discussion of design concept. A complete list of winners of the college contest can be found at: <http://aero.larc.nasa.gov>. For more information about NASA's Aeronautics Research Mission Directorate, visit: <http://aeronautics.nasa.gov>, and for more information about NASA and agency programs, visit: <http://www.nasa.gov>

Staff Reports.



The Virginia Tech STINGRAE

This image shows STINGRAE, Virginia Tech's first place entry in the NASA aircraft design competition.

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# The Green500 List: Good Things Come in Threes

The Green500 List debuted in November 2007 and ushered in a new era of energy-efficient supercomputing. The Green500 List is intended to serve as a ranking of the most energy-efficient supercomputers in the world and as a complementary view to the Top500 List.

The second edition was released in February 2008. And now, the third edition of the Green500 List arrives on the heels of the recent International Supercomputing Conference, arguably one of the “greenest” conferences to date.

Wu Feng, a member of both the computer science and the electrical and computer engineering departments at Virginia Tech and founder of the Green500, said there were several “notable highlights from this edition of the list.”

First, the first sustained petaflop supercomputer, Roadrunner developed by the U.S. Department of Energy (DOE) Los

Alamos National Laboratory, exhibits extraordinary energy efficiency. Roadrunner, the top-ranked supercomputer in the TOP500, is ranked third on the Green500.

“This achievement provides evidence that energy efficiency is becoming as important as raw performance for modern supercomputers and that energy efficiency and performance can co-exist. For comparison, the last two supercomputers to top the TOP500 are now #43 and #499 on the Green500,” Feng explained.

“Los Alamos National Laboratory recognized the performance opportunities of Cell, and accelerators in general, early on. That’s what made a petaflop possible. IBM is very energy conscious, and their design of the QS22 is the reason that three QS22-based systems, including our own Roadrunner supercomputer, are at the top of The Green500 List,” said Andy White, deputy as-



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sociate director at Los Alamos National Laboratory.

“The Roadrunner supercomputer is akin to having the fastest Formula One race car in the world but with the fuel efficiency of a Toyota Prius,” Feng added.

Second, nearly one in every three supercomputers on the Green500 List now achieves more than 100 megaflops/watt (where megaflops stands for millions of floating-point operations per second), whereas in the previous edition of the Green500, only one in every seven supercomputers did. On a related note, the top-ranked Green500 supercomputer improved by 131 megaflops/watt since November 2007 whereas the bottom-ranked Green500 supercomputer only improved by 0.39 megaflops/watt for a difference of three orders of magnitude in energy efficiency.

Third, exactly three supercomputers surpassed the 400 megaflops/watt milestone for the first time. All three machines are based on IBM’s BladeCenter QS22 chassis with

the Cell processor, the processor that also serves as the basis for the Sony PlayStation 3.

Based on feedback from e-mails to the Green500 and from a recent Birds-of-a-Feather session at the International Supercomputing Conference, the Green500 will evolve to be more inclusive for all high-end computing stakeholders. Additional developments will be posted on the Green500 web site.

Feng said, “The organizers of the Green500 welcome further analysis of the data for additional takeaways and further encourage raising awareness in energy-efficient or green supercomputing. We also encourage fair use of the list rankings to promote energy efficiency in high-end computing systems and discourage use of the list to disparage.”

Comments and suggestions for improvement should be emailed to [info@green500.org](mailto:info@green500.org).

*Staff Reports.*



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REU in HCI:



from Undergraduate

to Graduate Researcher

## Stepping Stone

Research Experiences for Undergraduates, or REUs, are held at universities all over the country in various disciplines. Some are during the semester, but many are held during the summer. These experi-

ences give students the chance to work on a research project with a mentor, and they get to live at another university. It can be a great way for students to determine if graduate study in a field is right for them, and gives them the opportunity to forge relationships with future professors and colleagues. This summer, Virginia Tech hosted an REU in Human Computer Interaction. It was sponsored by Virginia Tech's Center for Human-Computer Interaction, as well as the National Science Foundation, which coordinates the REUs.



Dr. Winchester (right) and another presenter at the REU Symposium this past summer.

Human Computer Interaction, also known as HCI, is defined by Dr. Woodrow Winchester III, one of the program coordinators, as "an interdisciplinary discipline centered on the design, evaluation, and implementation of interactive systems (products and/or services)

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for human use.” HCI represents the region of intersection between psychology and the social sciences, on the one hand, and computer science and technology, on the other. HCI has progressively integrated its scientific concerns with the engineering goal of improving the usability of computer systems and applications, according to the website of the Virginia Tech Center for Human-Computer Interaction. Even disciplines such as architecture and music have a hand in making HCI successful.

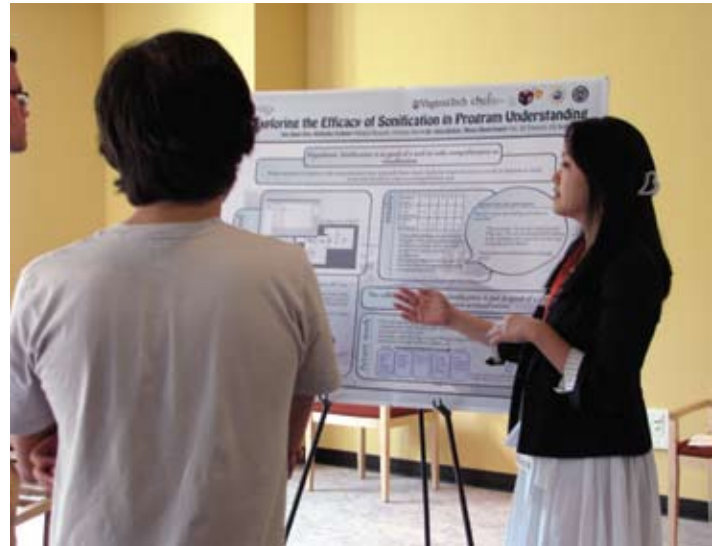
The research projects that students complete during the summer REU range across design, evaluation, and implementation of systems. Below are descriptions of the concepts explored this summer at Virginia Tech:

- *Exploration of design and the development of tools to support HCI systems design:* Participants included Lauren Cairco, a student at Winthrop University, and Ashley Hagmaier, a student at Virginia Tech, and Dr. Scott McCrickard,

a research mentor. This group explored how the technique of storyboarding can facilitate the design process.

- *Evaluation of HCI systems:* Participants included Rykiell Rhea-Turner, a student at Bennett College for Women, and Dr. Tonya Smith-Jackson, a research mentor. These two individuals

*Continued on page 17*



Another student presents her findings to others through a visual display and oral explanation.

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Continued from page 16

evaluated the efficacy of avatars as an educational tool for psychological disorders.

*Deployment and Implementation of HCI systems:* Participants included Hector Raphael Mojica, a student at the College of Charleston, and Joe Gabbard, a research mentor. The research performed in this area resulted in a working prototype of a mobile augmented reality interface to facilitate civic engagement.

Approximately thirty students from across the country interested in HCI came to Virginia Tech for 10 weeks this past summer. Each student worked one-on-one with a professor to complete their research, which was something many of the students really enjoyed. In addition to the research project, the students were given an orientation to life as a graduate researcher. This “boot camp,” as it was called, is unique to the REU in HCI program. Not only do students learn about getting into

graduate school, but also learn how to conduct a literature review, and are exposed to an introduction to scholar activism. As part of the program, a poster session was held at the end of the program, giving the students the opportunity to showcase their work.

According to Winchester and McCrickard, the program coordinators, the program has helped to recruit students to graduate studies in HCI, which has helped increase diversity within the field. Winchester said, “It is Dr. McCrickard’s and my belief that in order to bring this vision to fruition, not only is the continued involvement of a diversity of disciplines is needed but differing and often underrepresented viewpoints/perspectives within those discipline are also required. We hope to begin to fill this gap through the active recruitment of a diverse set of undergraduate students from local colleges and universities, particularly ones that cater to women and minorities... and lacking in the mid-Atlantic and Southeast regions of the United States. In filling this need, we are providing the next generation of HCI research leaders a rigorous research exposure that fosters innovation through embracing and leveraging diversity.”

Formal and informal recruitment relationships have been formed with such institutions as NC A&T State University, Bennett College for Women, Norfolk State University, and Hollins University. Participation in the



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A student in REU presenting her findings through a visual display.

HCI REU gives students a chance to see not only what graduate school is like, but also what Virginia Tech is like. At least one of the students that I talked to expressed interest in coming to Tech to pursue a graduate degree.

Outside of the lab, students had the opportunity to have some fun. Students attended lunches with HCI researchers at Virginia Tech, and got to explore Blacksburg in the summer. Winchester commented jokingly that the students have learned more about Blacksburg and Tech in the ten weeks they were here than he has after working at Tech for several years.

*Danielle Willgruber is a May 2008 graduate of the Materials Science Engineering department at Virginia Tech.*



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# Engineering Professor Earns VT's Sixth NSF CAREER Award

Leyla Nazhandali, an assistant professor in the Bradley Department of Electrical and Computer Engineering (ECE) at Virginia Tech, is the recipient of a 2008 National Science Foundation (NSF) Faculty Early Career Development (CAREER) award for her proposed work entitled, "Overcoming Power Challenges in Embedded System Design with Subthreshold-Voltage Technology." She is the sixth Virginia Tech engineering faculty member this year to receive this prestigious award.

An embedded system is essentially any system that contains a microprocessor but does not have a usual computer interface. Examples include a car, a cell phone, an airplane, etc.

The subthreshold-voltage technology drastically reduces the power consumption of the microprocessor, and has the potential to protect the microprocessor from security threats. More specifically, the technology shields the microprocessor from hacker attacks that attempt to exploit the variability of its power to infer secret properties of the system. Hacker attacks can decode the power consumption of the microprocessor and unveil properties that are not supposed to be discovered.

The applications of subthreshold-voltage technology are numerous. "This CAREER award will allow me to explore new avenues that this technology can offer in order to improve our



**Dr. Leyla Nazhandali, the 2008 recipient of a NSF CAREER award.**

lives. Examples include enhancing the security of embedded designs such as electronic passports and credit cards, as well as significantly reducing the energy consumption of highly parallel applications such as image processing employed in security cameras and handheld landmine detectors," said Nazhandali.

"The CAREER award, by providing funding for five years and a high recognition, will also allow me to introduce the benefits of computer engineering for society to pre-college students in an educational program that I have named "embedded for life". Embedded designs are everywhere in our lives from refrigerators and coffee makers to cars to cell phones and ipods to advance medical equipments. Research has shown that women and

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minorities show more interest in fields that positively impact our lives. My hope for this program, which will be implemented in a national and local level, is to attract more women and minorities to pursue their studies in computer engineering,” Nazhandali added.

Nazhandali received her bachelor’s degree in electrical engineering from Sharif University of Technology, Iran, in 2000 as an honor student. Then, she joined Advanced

Computer Architecture Laboratory (ACAL) at the University of Michigan, Ann Arbor, where she pursued her graduate studies in computer engineering, receiving her master’s and Ph.D. degrees in 2002 and in 2006, respectively.

Nazhandali is also the winner of IEEE Real World Engineering Projects Contest, for her project “smart vehicles,” where she has developed a hands-on project for freshman students in order to introduce the benefits of computer engineering for the society using the example of automatic vehicles. Among her other awards, she received a Riethmiller Fellowship Award for 2005-2006 to conduct research with applications in biomedicine.

In 2005, she won the first place in the Computer Science and Engineering Honors competition at the University of Michigan. In 1996, she was ranked 44th in Iran’s National College Entrance Exam in a field of more than

150,000 applicants.


According to NSF, the CAREER program is a foundation-wide activity that offers its most prestigious awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission of their organization. Such activities should build a firm foundation for a lifetime of integrated contributions to research and education.

To learn more about Nazhandali’s research, visit: <http://www.ece.vt.edu/faculty/nazhandali.html>



Nazhandali was notified recently of her award, after five other Virginia Tech engineering professors had learned earlier this year they had received similar awards. The others are: Masoud Agah and Jung-Min Park, also of ECE; Ali Butt of computer science; Leigh McCue of aerospace and ocean engineering; and Mark Paul of mechanical engineering.

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# AEROSPACE ENGINEER PHILEN EARNS ORAU RALPH POWE JUNIOR FACULTY AWARD

Michael Philen, assistant professor of aerospace and ocean engineering (AOE) at Virginia Tech, has recently received the Oak Ridge Associated Universities (ORAU) Ralph E. Powe Junior Faculty Award.



Michael Philen is involved in research relating to adaptive structures and smart materials.

“It is a great honor to have been selected as a recipient of the Ralph E. Powe Junior Faculty Enhancement Award. This award will be instrumental in my devel-

opment of fluidic flexible matrix composites, which are new material and structural systems that have the unique ability to change modulus on demand. I believe these innovative materials will lead to new and exciting opportunities for both government and commercial applications,” Philen said.

According to the ORAU website, the Ralph E. Powe Junior Faculty Enhancement Awards provide seed money for research by junior faculty at ORAU member institutions. These awards are intended to enrich the research and professional growth of young faculty and result in new funding opportunities. In 2008, ORAU received 107 applications and awarded 30 grants.

Philen’s general research interests are in adaptive structures, smart materials, bio-inspired systems and materials, and structural dynamics and control.



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He aspires to create state-of-the-art intelligent structures that can adapt to better improve the performance of the system (e.g. reduced vibration, increased stability, improved surface control). His work involves exploring novel control methodologies and the development/application of smart materials to provide actuation, adaptability, robustness, and intelligence to the system. He is a member of the American Institute of Aeronautics and Astronautics (AIAA), American Society of Mechanical Engineers (ASME), and the American Society for Engineering Education (ASEE).

Oak Ridge Associated Universities (ORAU) is a university consortium leveraging the scientific strength of 99 research institutions to advance science and education by partnering with national laboratories, government agencies, and private industry.

The AOE department at Virginia Tech is a unique blend of two disciplines that takes advantage of commonality in the analysis and design of AOE vehicles. Undergraduate and graduate degrees are offered in both disciplines. The department has 17 faculty working in aerodynamics, hydrodynamics, structural mechanics, dynamics and control, and multidisciplinary design optimization.

The department also has a yearly graduation rate of some 100 bachelor's, 25 master's and 15 doctorate degrees. All faculty are actively engaged in its broad research program, which has annual expenditures of \$3.5 million, and all teach at the undergraduate and graduate levels. The department has extensive facilities including world class wind-tunnels, water tunnels, structural test equipment, high-performance computer systems, and state-of-the-art spacecraft simulators.

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A summer REU (Research Experience for Undergraduates) is intended to involve students with current ongoing research at various institutions around the nation and abroad. Participating in an REU is an excellent way to get a taste of what is expected out of graduate school. During the summer prior to this year I had an internship at a large corporation and this past summer I was part of an REU. Having tested the waters on both sides, here are some personal assessments noting some similarities and differences between an internship and an REU:

1. *Time spent in the office.* Like most jobs, you are expected to be at work during a specific time for instance Monday through Friday, 8AM to 5PM. However during my REU, my hours spent at the lab were a lot more flexible. Since my work



was done primarily with MATLAB and Excel, I could use my own personal laptop and was not required to come into the lab every day. My advisor was understanding and even encouraged me to work outside on a nice day! Please note that this cannot be said of every REU, as some students are required to come to their labs daily depending on the characteristics of their research.

2. *Salary.* If making money is a necessity, then an REU may not be suited for you. For instance, if I was to return as an intern to the same company again this summer, I would be making nearly double that from an REU. The internship salary does not include various underlying costs that are included in an REU. The majority of the REUs available offer free housing, free ameni-



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ties (water, air-conditioning, cable), and a dining plan—all of these costs would normally be deducted from an intern's salary.

3. *Time to complete projects.* During the internship I was assigned projects in addition to the items that I needed to tend to daily. However, most of my projects were small in scale and could be easily completed during my time with the company. As a result, I gained knowledge from many different aspects of the company by not just focusing on one project—the complete opposite of what is expected from an REU. For a typical REU you spend your entire summer working on one problem. So if you are “gung ho” about healthcare or automated robots, for example, you can denote this in your application. That way you can be assigned to a project related to your interests.

4. *Control over the solution.* The projects I had as an intern were guided heavily by my boss.

*Continued on page 27*

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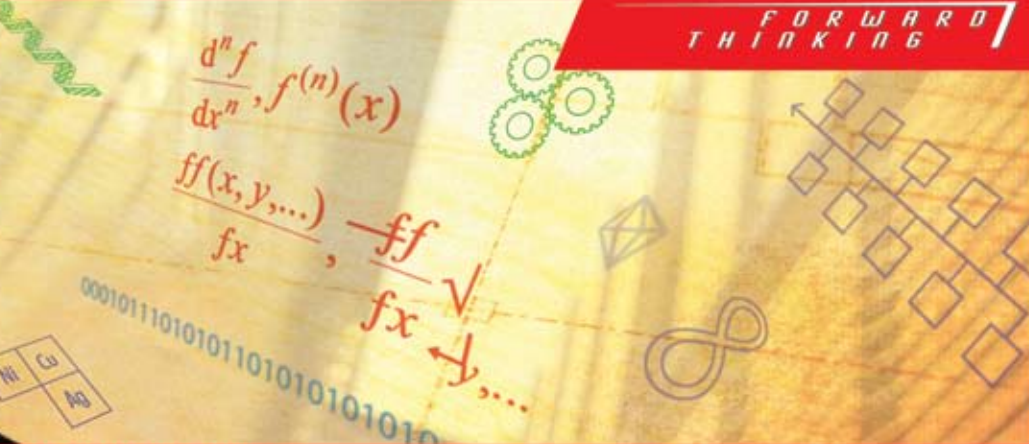
He clearly had an expectation of what the outcome should be and how it should be implemented. As a result I had to find a solution which would meet his criteria. Similarly for an REU, my advisor provided me the problem I was to solve along with a given set of information and assumptions that set the foundation for my re-

search. My advisor did not know the solution to the problem and looked to me to make the best decisions, putting me in control of how I solved the problem and what the solution looked like. You also get a sense of satisfaction that your work is being directly used to solve a real-life problem.

5. *Interaction with others.* For both an internship and REU there are plenty of opportunities to interact with your peers. During my internship there was time spent at lunch in addition to the various activities and events that were planned throughout the summer. Likewise, the students at my REU all lived in same dorm, easily allowing everyone to see each other frequently and coordinate plans. In regards to interactions with your superiors, I was lucky enough that both my boss and my advisor were readily available to meet with me and provide feedback for my work.



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6. *Dress code.* One aspect that I especially appreciated about the REU is the fact that you could wear what you would normally wear to class. During my internship formal work attire was expected every day—which did not fare well with my wardrobe that normally consisted of t-shirts and jeans.
7. *Prerequisites.* Whether you get an internship depends primarily on your resume and interview while for an REU looks at an application along with a transcript, letters of recommendation, and personal statement. Both an internship and REU can be equally competitive and selective by instating a minimum grade point average. Also all engineering majors can easily find at least one internship or REU suited towards his or her major. However, a large number of the engineering REU programs look specifically for biomedical, chemical, civil, electrical/computer, or materials engineering students. If you are interested in an REU for next summer, visit

<http://www.nsf.gov> to get a full listing of all the REUs sponsored by the National Science Foundation (NSF). Various REUs are hosted here at Virginia Tech as well, which is convenient if you are already paying rent for an apartment off-campus. Be sure to read the article about the Human-Computer Interaction REU found in this issue of the Engineers' Forum as well.

Overall an internship and an REU is a great way to gain experience and knowledge about what is expected from a job after graduation or graduate school. Taking part in both programs is definitely recommended. Looking back from the experience I gained from the past two summers has helped me ultimately decide what I would like to pursue after college and it could help do the same for you.

*Sara Lu is a senior in Industrial and Systems Engineering and Economics.*



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# Virginia Tech Engineer Shares *Cutting Edge* Education Tools with Scholars From India

Joseph Tront, professor of electrical and computer engineering at Virginia Tech, was one of the lead presenters at the “2008 Indo–U.S. Engineering Faculty Leadership Institute” held in Mysore, India in June.

Tront taught “Selected Topics in Com-

puter Engineering” for the Indo U.S. Collaboration for Engineering Education (IUCEE). Tront focused his faculty development workshop on matching instructor teaching styles to student learning styles and on the use of computers in teaching engineering, — specifically, the tablet PC.

Virginia Tech is known for its cutting edge work in the use of technology in the classroom. In 2007 it garnered a 2007 Laureate Medal at Computerworld’s Honors Program for the development of its Tablet PC-based learning environment. In 2006, the college became the first and largest public college of engineering to require all of its 1400 incoming freshmen to purchase tablet PCs.

After the announcement was made, the American Society of Engineering Education published an article in its December issue of *Prism* about the Virginia Tech decision, saying “tablet

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computers have the potential to redefine the way engineering is taught.”

Formed in January 2007 IUCEE hopes to improve the quality and global relevance of engineering education in the U.S. and in India through collaborations. The American Society for Engineering Education (ASEE), Indian Society for Technical Education (ISTE), International Federation for Engineering Education Societies (IFEES), Pan IIT and Indo US Science and Technology Forum (IUSSTF) are the primary partners in this endeavor.

Tront said this collaboration is expected to increase the pool of better prepared engineering faculty and students with global experiences. It will also lead to more collaborative research relevant

to the global as well local economies, including the development of entrepreneurship and business opportunities in emerging technologies. A third goal, he said, is to expand new markets for technological innovations in education.

Tront was among 21 U.S. faculty experts conducting individual week-long workshops, and the only one from Virginia Tech.

*Staff Reports.*



**“Indo US Engineering Faculty Leadership Institute” Teaching Computer Engineering conference group picture, 09-13 June 2008**



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# New Computer Science Department Head, Barbara G. Ryder

Barbara G. Ryder, professor of computer science (CS) at Rutgers, The State University of New Jersey, will become the CS Department Head at Virginia Tech, starting in fall 2008. She is the first woman to

serve as a department head in the history of the nationally ranked College of Engineering.

“We are extremely pleased Dr. Ryder has accepted the position here at Virginia Tech. She emerged as the top candidate for this position out of a very strong pool, and we at Virginia Tech feel very fortunate to be able to recruit her to our campus. Our CS Department continues to gain in its stature, due to its pre-eminent work in high-end computing, computational biology and bioinformatics, software engineering and human-computer interaction. Dr Ryder’s experience will be a great asset to finding additional opportunities to increase the strength and breadth of its interdisciplinary research,” said Richard C. Benson, dean of the College of Engineering.



**Dr. Brenda Ryder is the first female department head for the College of Engineering.**

Ryder received her Ph.D. degree in CS at Rutgers in 1982. She previously worked in the 1970s at AT&T Bell Laboratories in Murray Hill, N.J. Ryder’s research interests focus on static and dynamic program analyses to improve the software quality of industrial-strength object-oriented systems, for use in practical software tools.

“I am excited to join Virginia Tech as head of the Department of Computer Science and a member of the leadership team in the College of Engineering. The faculty in our department are young, vigorous, collegial, and accomplished. I look forward to working with them to strengthen excellence in research and teaching. In addition, increasing the diversity of students and faculty in the STEM fields (science, technology, engineering and mathematics), is an important goal for the nation, Virginia Tech, and me personally,” said Ryder.



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*Continued on page 33*



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Continued from page 31

Ryder became a Fellow of the Association for Computing Machinery (ACM), the premier CS professional society, in 1998. She was selected as a Computing Research Association Committee on the Status of Women's *Distinguished Professor* in 2004 and received the ACM Special Interest Group on Programming Languages (SIGPLAN) *Distinguished Service Award* in 2001. She also was voted *Professor of the Year for Excellence in Teaching* by the Rutgers CS Graduate



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Student Society in 2003, received a *Leader in Diversity Award* at Rutgers in 2006, and a *Graduate Teaching Award* from Rutgers Graduate School in 2007.

Ryder has been an active leader in ACM (ACM Council Member 2000-2008; Chair, FCRC, (Federated Computing Research Conference) 2003; Chair, ACM SIGPLAN 1995-1997). She has served as a member of the Board of Directors of the Computer Research Association (1998-2001). She is an editorial board member of the *Institute of Electrical and Electronics Engineers' Transactions on Software Engineering*, and *Software, Practice and Experience*.

Ryder has also served on many program and conference committees, especially those sponsored by ACM SIGPLAN and ACM Special Interest Group on Software Engineering. She has been a panelist in the *CRA Workshops on Academic Careers for Women*, and the *New Software Engineering Faculty Symposia* held at the International Conference on Software Engineering.

*Staff Reports.*

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# All about summer internships!

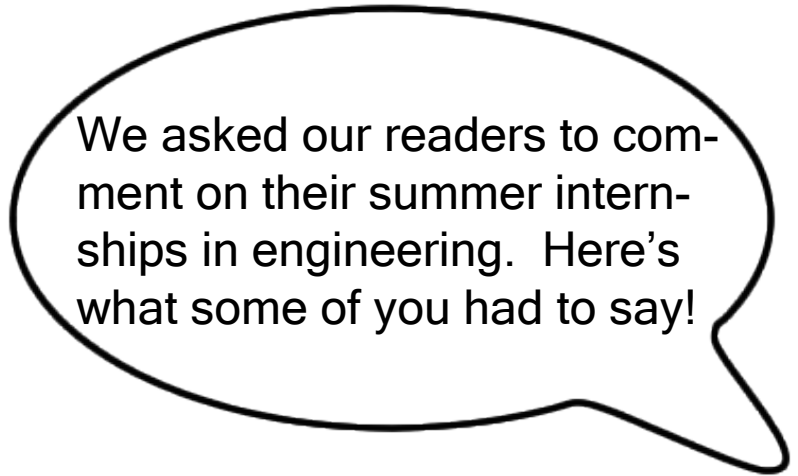
## Michael Miracle, Junior in Computer Science



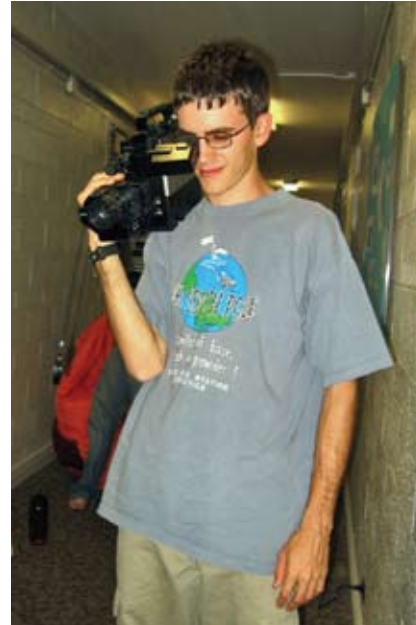
National Instruments / Austin TX

### What advice can you give to people seeking internships or trying to get the most out of the experience?

Look at company websites before going to information sessions, and prepare intelligent questions so that employers know you're genuinely interested.



We asked our readers to comment on their summer internships in engineering. Here's what some of you had to say!



**Peter Kauffmann**  
Senior in Civil Engineering

Wiley & Wilson; architecture/engineering firm, Richmond, VA

### What particular part of your engineering education proved most useful during your internship?

It was really interesting to see how the things I learned in my Water Resources Engineering class applied to the real world. In class, you're given a problem with concrete numbers and a definitive answer. Out there, they give you survey data and say "go." It's really a vastly different experience.



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## Gary Riggins, Junior in Civil Engineering



Parsons/New York City

### How did you find out about the company by whom you were employed?

I initiated an email correspondence with a representative from Parsons regarding their bridge projects. They needed a French-English translator with technical expertise for a cable stay bridge project in Montreal, Quebec. Since I had just returned from a study abroad in France, it seemed like a good fit all around!

## Mitchell Daniels, Junior in Industrial and Systems Engineering



Logistics Management Institute (LMI) in McLean, Virginia

### How were you selected for this internship?

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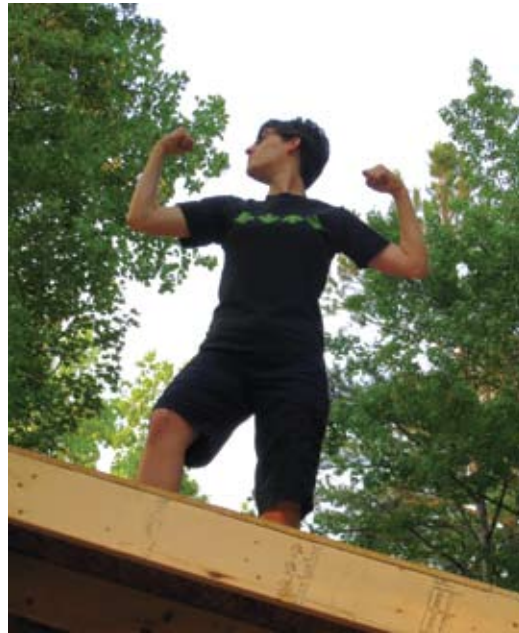
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**Julia Alspaugh, Junior in Mechanical Engineering & French**

Michelin North America tire production plant in Greenville, SC

**What kind of projects did you complete?**

My main project dealt with using mechanical design to make the tire production process more efficient. My goals were to speed up the process, reduce scrap tire numbers, as well as reduce the wear and tear on the machinery.



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**Alek Duerksen, Senior in Mining & Minerals Engineering**

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**What was the most useful thing you learned from your summer internship?**

I felt like a real employee and not just an intern, which significantly broadened my perception of the "real world" and the working environment which I will be going into. My previous internship did nothing of the sort.

**Nathaniel Lynch, Junior in Aerospace Engineering**



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**What kind of work or projects did you complete?**

A level D, full motion flight simulator, managing variables and working on the FAA Qualification Testing Guide.



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# Virginia Tech's Bevlee Watford Receives WEPAN's Award

**B**evlee Watford, associate dean for academic affairs, College of Engineering, Virginia Tech, is the recipient of the 2008 Founders Award from the Women in Engineering ProActive Network (WEPAN).

Watford, also the director of the Center for the Enhancement of Engineering Diversity (CEED) at Virginia Tech, exemplifies the WEPAN mission. CEED provides encouragement and support to engineering students, focusing on the under-represented population. Watford is "a catalyst, an advocate, and a leading resource for institutional and national change that enables the success of all women in engineering," according to her successful nomination packet.

The WEPAN Founders Award is named for Suzanne G. Brainard, Jane Zimmer Daniels and Susan Staffin

Metz, the original founders of WEPAN, Inc. It honors a WEPAN member who exemplifies the spirit of the WEPAN founders through extraordinary long-term service to the organization. As this award is reserved for individuals who have truly advanced the goals of the organization, it is not awarded



**Dean Bevlee Watford is a recent recipient of the WEPAN Founder's Award.**

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every year. The award was presented to Watford recently at the WEPAN national conference in St. Louis, Mo.

Award for Outstanding Minority Engineering Program Director. In 1998, she was selected as one of the Top

*Continued on page 41*

Watford has directed CEED since its inception in 1992. In 1997 Watford became the associate dean for academic affairs. From 2005-07, she was on leave from Virginia Tech, serving as a program manager in the Division of Undergraduate Education for the National Science Foundation (NSF).

This award comes after a long list of honors. She received the 1989 Young Engineer of the Year by the State of South Carolina Chapter of the Society of Professional Engineers. She also earned the 1996 Virginia Tech Affirmative Action Award for her work in support of women and other minorities in engineering. In 1997 she accepted the Charles E. Tunstall

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*Continued from page 40*

Minority Women in Science and Engineering by the National Technical Association.

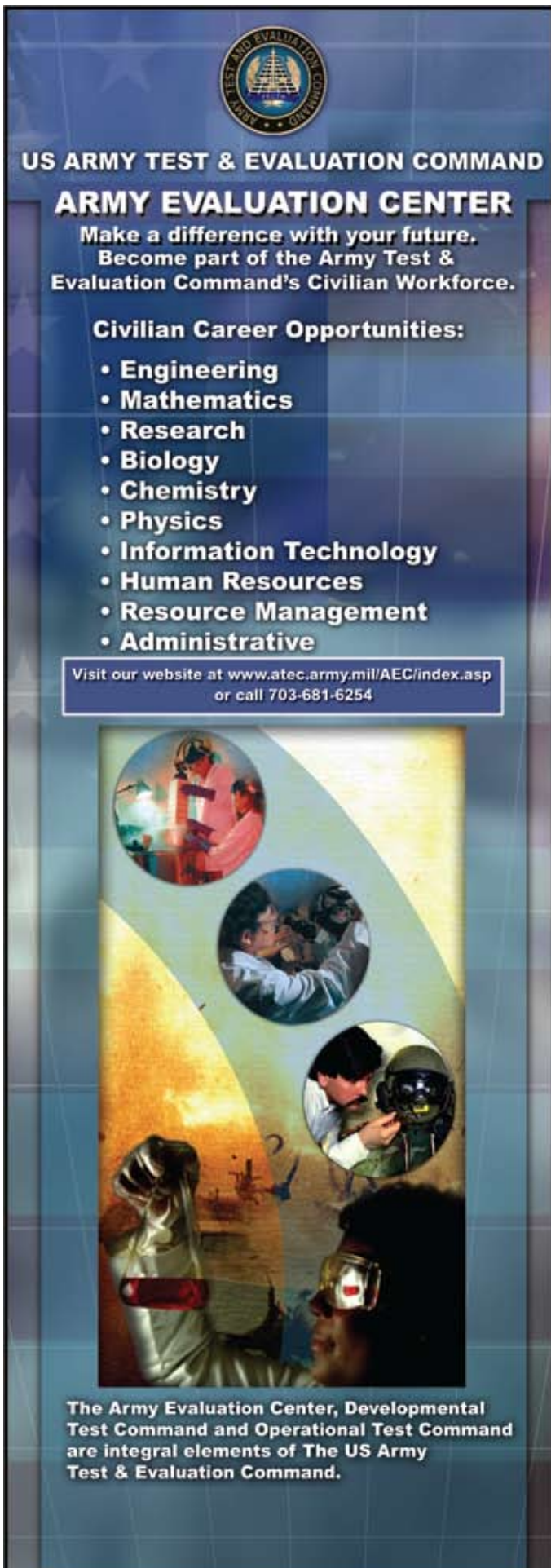
More recently, Watford garnered the 2002 Black Engineer of the Year award in the category of college level educators, a 2002 Advancing Women Award from the Virginia Tech Women's Center and the 2003 Minorities in Engineering Award from the American Society for Engineering Education (ASEE). In 2004 she was the first recipient of the Outstanding Commitment to Professional Development Award from the Council for Advancement and Support of Education (CASE) Region III.

Watford was the 2004-5 president of WEPAN, and has served on the board of directors of the National Association of Minority Engineering Program Administrators (NAMEPA). She is currently a member of the National Academy of Engineering's EngineerGirl Website Committee. Watford also served as the 2006-08 program chair for the ASEE's Women in Engineering Division and is now serving as division chair for 2008-10. This position has allowed her to further efforts to increase the recruitment and retention of women students in engineering as well as the re-entry of women into the engineering profession.

In all, Watford has secured more than \$4.5 million dollars in funding and support for CEED and other undergraduate programs from a variety of sources including NSF, the State Council of Higher Education in Virginia, General Electric Foundation, Intel, Sloan Foundation, Corning Foundation, Honeywell International, Ingersol Rand, and Microsoft.

WEPAN is the nation's leading organization and catalyst for transforming culture in engineering education to promote the success of all women.

*Staff Reports.*



The advertisement features a blue background with a circular logo at the top center containing a stylized tree and the text 'TEST AND EVALUATION COMMAND'. Below the logo, the text reads 'US ARMY TEST & EVALUATION COMMAND' and 'ARMY EVALUATION CENTER'. A central message states: 'Make a difference with your future. Become part of the Army Test & Evaluation Command's Civilian Workforce.' A list of 'Civilian Career Opportunities' includes Engineering, Mathematics, Research, Biology, Chemistry, Physics, Information Technology, Human Resources, Resource Management, and Administrative. A box at the bottom left provides the website 'www.atec.army.mil/AEC/index.asp' and phone number '703-681-6254'. The bottom half of the ad is a vertical collage of images: a person in a lab coat, a person in a white lab coat, a person in a white lab coat, a person in a white lab coat, and a person in a white lab coat. At the bottom of the collage, text reads: 'The Army Evaluation Center, Developmental Test Command and Operational Test Command are integral elements of The US Army Test & Evaluation Command.'



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*SDI metallurgical engineers Jeremy Cronkhite (left) and Doug Rees-Evans, manager of technical services at the structural and rail mill*

This steel mill was one of Jeremy Cronkhite's classrooms while studying undergraduate metallurgy: the Steel Dynamics structural and rail mill at Columbia City, Indiana. During two summer internships at SDI, Jeremy learned a good deal about steelmaking. Working with veteran SDI engineers, such as Doug Rees-Evans, Jeremy gained valuable hands-on manufacturing experience.

After earning a degree in Materials Science Engineering from Purdue University in 2005, Jeremy joined SDI full time as a rolling mill process metallurgist. Today, Jeremy continues his learning in this big classroom,

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