

**Closing Out the Year:
Tips for Graduate School Visits
New ECE Department Head
Engineering in Bloom**



Engineers' Forum
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Editor-in-Chief

Kari Adkins

Layout and Design

Julia Alspaugh, Darius Emrani

Business Manager

Connor Fournier

Webmaster

Mark Everett

Copy Editor

Laura Dicker

Photographers

Julia Alspaugh, Andrew Mussey

Writers

Kari Adkins, Sara Lu

Special Contributors

Nikunj Jain, Brett Sherfy

Editorial Adviser

Lynn Nystrom

Director of News and External Relations for
the College of Engineering

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223 Femoyer Hall Virginia Tech
Blacksburg, VA 24061
Phone: 540-231-7738
Email: forum@vt.edu

URL: <http://www.ef.org.vt.edu/>

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FROM THE EDITOR

Dear Reader:

It is with great happiness and sorrow that I announce that I am graduating this May and will no longer be the editor-in-chief of the *Engineers' Forum*. Having started in this organization as a freshman, it is as much a part of me as VT football or any of the other activities that I have been involved in since my freshman year. In May I am starting full time as a transportation engineer for Science Applications International Corporation, SAIC. I will be using the skills that I have learned both inside the classroom as an Industrial and Systems Engineering student as well as many of the skills that I have acquired writing for the EF to facilitate outreach and knowledge transfer activities for government agencies.

As my last issue comes to a close, let me offer you a few tidbits of advice that I have learned through four years of engineering school:

Value your time at VT. Four years flies by! You really do not notice it until you are a month out from graduation and realize that this time next year you will be in the real world working in a real job. The real world seems very tempting, but you will never have a week off in March, a month off in December, and three months off in the summer. Use these breaks to do what really makes you happy.

Take time to enjoy all that Blacksburg has to offer. The engineering curriculum is a very grueling one at times, but I have found that Blacksburg, when the weather is cooperating, makes the work much more bearable. Enjoy the sunshine, play in the snow, sit on the Drillfield and do homework, go hiking.

Get involved in organizations that you are deeply interested in. Whether your involvement is in an engineering organization or in the racquetball club, making connections with people who are interested in the same things as you are is invaluable. You never know when you might need a favor from your friends in the organization.

Do what you like. Finding the right major for you will make your years here at VT wonderful. Having switched majors myself, I know that if you find something you are passionate about, everything else comes together.

I wish you all the best in your future endeavors.

Go Hokies!



Kari Adkins
Editor-in-Chief

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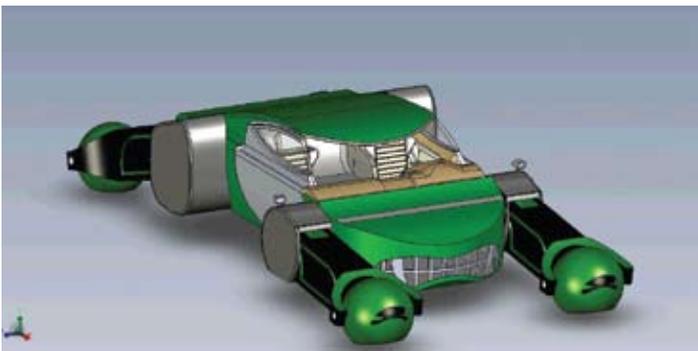
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Considerations for a Graduate School Visitation

After long deliberation on what I was going to do upon graduation, I finally choose the graduate school route. I came upon this conclusion at the start of the school year and naturally I asked myself next, “Now what?” I knew I needed to research various graduate programs, take the GREs, fill out applications, and ask for recommendations from my professors. After all this was said and done and after various admissions committees had reviewed my applications, the question came up again, “Now what?” I would say at this point, if a school has shown some interest in you, the next step would be to visit the respective programs you have applied to.



A lecture given by a computer science professor at Carnegie Mellon helped me prepare for my visits. He has been involved with graduate admissions at Carnegie Mellon, Berkeley, and MIT. The article, whose full text can be found at www.cs.cmu.edu/~harchol/gradschool-talk.pdf, provided me with some direction to prepare and make the best use of my graduate school visits. Although the article was geared for students considering a Ph.D, the points below can be applied to any potential graduate student planning to visit a school.

- Assess the department’s atmosphere. Do people within the different areas of the department mix? A lot of hints can be gleaned by looking at the seating arrangements: Are areas separated by floor, or mixed up? Are the students within an office all working in the same area, or are students mixed up? Are the faculty offices separated in floors from the student offices, or are faculty offices side-by-side with student offices?



- Talk to the current graduate students. Probably the most important question to ask is: how frequently do the graduate students meet with their advisors? The best way to gauge this is to talk with students of professors with whom you are considering working with. What are the students working on and are they excited by their research? Do they find their advisor helpful? How are graduate students treated by the department overall? What is the equipment and office space given to students?
- Determine how funding works. Ph.D students are usually supported by the department, but if you are interested in a Masters degree, determine if a program can provide you funding too. Other questions that Ph.D students may want to ask include: Are you restricted to choosing an advisor who has funding? Will you have to then become a teaching assistant at some point in time during your time there?
- Determine the hurdles associated with completing a degree. What are the course requirements? What exams will you have to pass? When are you expected to take these exams? What are the teaching requirements, if any?
- Determine the expected time to graduation. I have been referred by multiple people including graduate students and faculty members to ask this question. Although a great deal depends on your advisor, the coursework and other expectations such as a teaching assistant position may ultimately prolong your graduate studies.
- Consider the overall ranking of department. This is



During Virginia Tech’s recruitment weekend, prospective graduate students visited Taubman’s Museum of Art in Roanoke, Va.

important only because it determines the average quality of the other graduate students. The article mentions that your peers are the people who will teach you the most in graduate school.

- Determine the cost of living. At almost every graduate school, you can expect a stipend of around \$1700 per month. In some small towns like Blacksburg, you will live like a king off of this amount while in large metropolitan areas you may find yourself hovering above bankruptcy. Although this may not bother you at first, it can grow old after four to five years especially if in for the long haul.
- Other considerations to take into account. What is the social scene around the campus? For instance one of my preferences was the availability of outdoor activities and this was a major factor in helping me decide where I wanted to go for graduate school. Another consideration is the weather, especially if you are prone to seasonal affective disorder.

You will need to decide for yourself which of the following points are most important to you. If you are invited to visit a campus, please by all means make that visit. I cannot emphasize enough the importance of visiting a campus. Be proactive and make a visit to get to know the students, the faculty, and the surrounding



While touring the University of Michigan, Sara saw the New York Philharmonic in Hill Auditorium (above).

areas because who know? You may be there on upwards of five years. There is a great deal of information that the online sources cannot reveal about a program so take all the measures to ensure you choose the right graduate school for you.

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



A piece by Devorah Sperber at the Taubman's Museum of Art in Roanoke, VA



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Project MANTiS Nears Completion

Project MANTiS is still proceeding towards completing their project by the end of the spring 2009 semester. As mentioned in last month's Engineers' Forum, the team has been working to integrate on-road and off-road capabilities into a vehicle while utilizing the most up-to-date technology to create an award-winning design. Since the last issue, the design of the car has changed slightly, and progress has been made towards achieving the project's original goals.

Some of the main design changes were in the field of safety and steering. The initial design used side-to-side variable rotational speeds of the wheels as a form of steering which did not suit wet or slippery road conditions. To solve this issue the concept car group introduced an idea of having the wheel

sit in the middle of a ring and rotate a complete 360 degrees inside the ring. This idea opened up a number of opportunities for the group as it allowed for a faster turn (using four-wheel steering) and a turning radius which is unmatched by any other vehicle. As shown in the picture, the vehicle would be able to parallel park with ease by turning the wheels 90 degrees as well as take a U-turn while standing in the same spot. This turning action was achieved by using high torque servo motors placed equally around the wheel and controlled by a central processing unit.

The initial concept for the seating used a plane cockpit design which maximized the visibility of the driver, but due to safety issue of front collision the car was redesigned to have a front bumper. Since this vehicle does not have a combustion engine, the front is empty and has been used as a crumple zone, which will absorb all the force from an impact. This allowed us to install



Turning angle for the vehicle.

airbags into the dash as well. The battery which is the "heart of the car" is a lithium ion ANR26650 which is packed together to produce 300V and is housed at the bottom of the car and extends the entire length and width of the cabin. The battery is cooled using the same liquid used in current automobile radiators.

Another innovative idea implemented in the car is the power regeneration using wind. Since the battery cooling requires a fan for the radiator, after 40 mph the fan switches off and acts as a wind turbine, returning power back to the battery. Since this vehicle is all electric the group has to design each system to conserve and use minimum amount of power.

The suspension for the vehicle attaches directly from the chassis to inside the arm. The suspension consists of an airbag and damper. The airbag is used to lift the entire car depending on the terrain the customer would like to drive in. If the driver decides to drive off-road he/she can raise the car up by 9 inches and switch to 4 wheel drive. Each airbag is designed to lift 1000 pounds and is powered by an electric compressor located in the back of the car. Since the wheel is at a distance from the main body the arm structure would be able to absorb some of the minor vibrations as well.

By the end of this semester the group will build and test key components of the vehicle and provide you with updates on each of the sub-groups and their work in this innovative concept car. For more information please visit our project website at www.me.vt.edu/mantis.

Nikunj Jain is a senior in Mechanical Engineering.

Scott Midkiff Accepts Engineering Department Headship

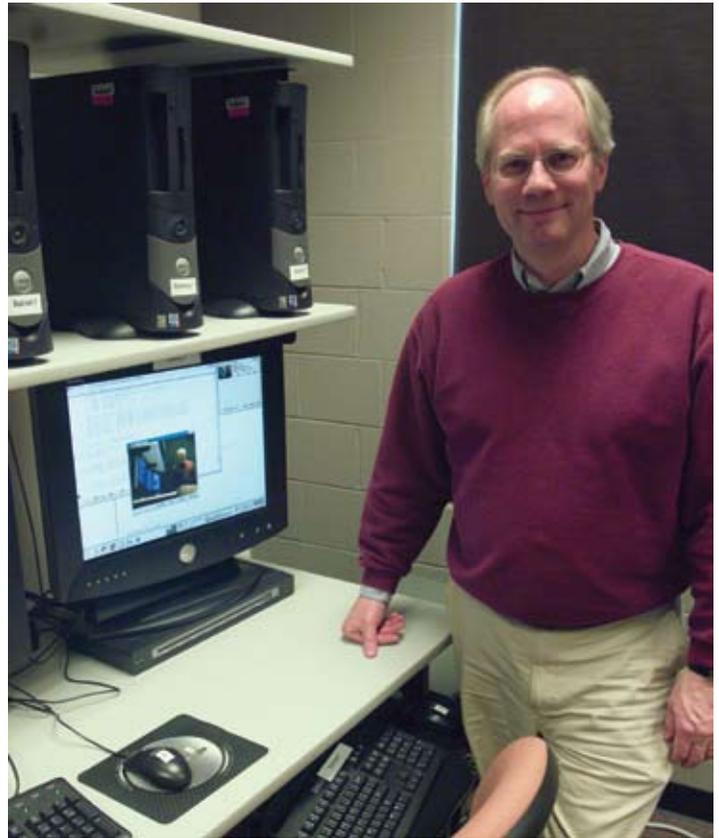
Scott F. Midkiff, a professor of electrical and computer engineering (ECE) at Virginia Tech, will become the new ECE department head, effective August 10.

“I am delighted to receive Dr. Midkiff’s acceptance. He emerged from a pool of outstanding candidates and is ideally suited to the position. I am confident that the ECE department will continue to grow in stature and achievement under his leadership,” said Richard C. Benson, dean of Virginia Tech’s College of Engineering and the Paul and Dorothea Torgersen Chair of Engineering.

“I look forward to working with faculty, staff, and students to further increase the department’s quality, impact, and reputation. I welcome the opportunity to work with others beyond the ECE department in collaborative programs in Blacksburg and the National Capital Region,” Midkiff said.

Midkiff joined the Virginia Tech faculty as an assistant professor in 1986 and was promoted to associate professor in 1992 and full professor in 2000. He spent 1998 to 1999 and 2004 to 2006 with Virginia Tech in northern Virginia. In 2006, Midkiff began an assignment at the National Science Foundation as a Program Director in the Electrical, Communications, and Cyber Systems Division, a position where he currently remains.

Among his awards, Midkiff has a NSF Director’s Award for Collaborative Integration and a Dean’s Award for Excellence in Teaching Innovation. He was the principal investigator for Virginia Tech’s first Integrative Graduate Education and Research Training (IGERT) grant from the NSF. This grant led to the creation of the Integrated Research and Education in Advanced Net-



Scott Midriff will be the ECE deparment head starting August 10th.

working (IREAN) program. Midkiff’s research focuses on wireless networking and network support for mobile and pervasive computing.

Midkiff was a key contributor to the ECE department’s development of the master’s and Ph.D. degrees in computer engineering, and coordinated a major revision of the bachelor’s in computer engineering degree program at Virginia Tech. He is also credited with assisting in the development of the multi-college Master of Information Technology degree and certificate program.

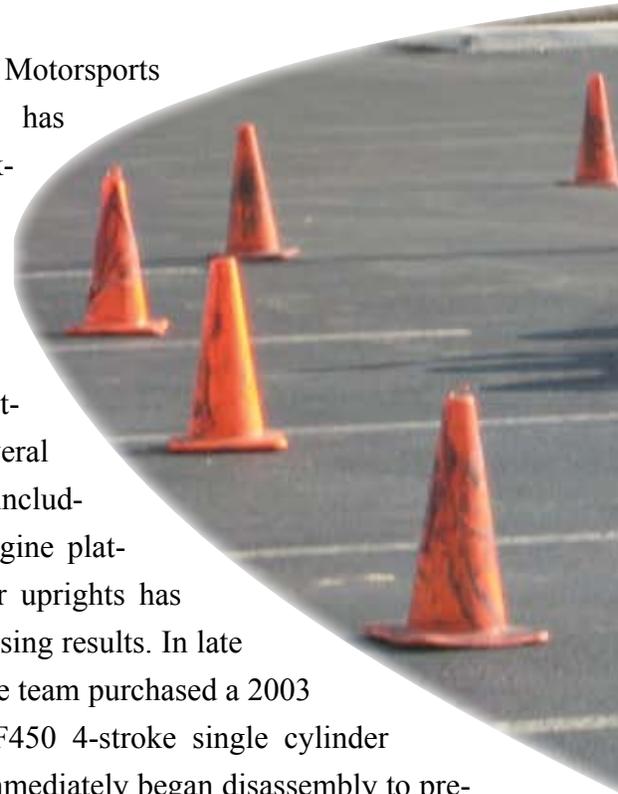
Midkiff succeeds James Thorp, a member of the National Academy of Engineering, who has led the department since 2004.

Staff Reports.

VT Motorsports: Off to the International Races

Time's winding down for seniors on the 2009 VT Motorsports Maroon team to make final changes to the car before their first competition at VIR (Virginia International Raceway) in late April. The VIR competition will serve as dry run for the team to identify any potential problems prior to their main competition at Michigan International Speedway in mid-May. The team will compete against over 120 teams from all over the world in both static and dynamic events to determine the overall winner. Static events are comprised of cost, presentation, and design and dynamic events include skid pad, acceleration, autocross and most importantly endurance; these events total to a possible 1000 points. Juniors, the Orange team, gain valuable experience and knowledge by attending these competitions and learning about the team's dynamics at competition and what to anticipate during their senior year.

The 2010 VT Motorsports Orange team has been working hard this spring finalizing their designs for next year. Testing on several components including a new engine platform and rear uprights has yielded promising results. In late November, the team purchased a 2003 Yamaha WRF450 4-stroke single cylinder engine and immediately began disassembly to prepare the engine to be tested on a dynamometer. The team completed several dyno runs both unrestricted and re-



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stricted and record-ed promising numbers of 34 ft-lb of torque, and 51hp unrestricted. Another area of testing has been on an aluminum rear upright which is a critical suspension component that connects the upper and lower control arms and allows the hub and halfshaft to pass through. Typically the rear upright has been manufactured out of sheet steel and heat treated after welding. The aluminum upright could provide possible weight savings as well as ease of manufacturing. The prototype aluminum upright has been tested on an Instron machine and will provide future teams with valuable research into incorporating it into their design.

Although the formula team is a department sponsored senior design project for mechanical engineers, the team is responsible for raising the majority of their budget

Driving day in the Bioinformatics Parking lot. Gathering data from driving days is essential to helping the team understand how the car is performing.

each year. The team is getting close to their fundraising goal of \$60,000. A marketing sub-team has worked diligently all year soliciting donations from local companies and organizations, and would like to thank the SEC for their support in helping us attain this goal. The team is always looking to bring on young members as volunteers to develop the program. Check the website www.vtmotorsports.com for more information on upcoming recruiting events and an open house.

Brett Sherfy is a senior in Mechanical Engineering.

Student Team Wins National Mining Competition

A team of students recently won first place at the Society for Mining, Metallurgy and Exploration (SME)/National Stone, Sand and Gravel Association (NSSGA) Student Design Competition. The team won a \$2,000 cash prize, as well as products donated by InfoMine USA Inc.

A second team of students, also from the Department of Mining and Minerals Engineering (MME), earned fifth place. The February 22 competition was part of SME's 2009 Annual Meeting and Exhibit in Denver. It marks the second consecutive year that the College of Engineering placed two teams in the finals, as well as the second year in a row that Virginia Tech has captured the top spot at the competition.

"The event is very competitive and the judging very tough," said Erik Westman, an MEE associate professor and the teams' adviser. The Virginia Tech teams faced off against the nation's top mining engineering schools, including South Dakota School of Mines and Technology, the University of Reno-Nevada and the Missouri University of Science and Technology.

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Mining and Minerals students won first and fifth place at the NSSGA Design Competition.

comprised of aggregate industry professionals evaluates both phases of the event.

Phase one involves writing and submitting a comprehensive mine design based on real data. Submitted reports are judged by a group of industry professionals who choose the top six teams to participate in the final round held at the SME's annual meeting. At the second-phase meeting, finalists are presented with an additional design problem to be solved within 48 hours. This result is then presented in an oral report to the judges and a larger audience at the SME meeting.

The first place team, "Old Dominion Mining," consisted of:

- Alek Duerksen, a senior from Waynesboro, Va..
- Andrew Storey, a senior from Richmond, Va..
- Aaron Noble, a senior from Lenoir City, Tenn.
- Caroline Relyea, a senior from Columbus, Ohio
- Ricky Rose, a junior from Mechanicsville, Va..
- Robert Stieber, a junior from Harrisonburg, Va..

The fifth place team, "Mischief Mining," consisted of:

- John Bowling, a senior from Linden, Va..
- Bridget Mead, a senior from Fairfax, Va..
- Holly Fitz, a senior from Richmond, Va..
- Nick Sprague, a senior from Blacksburg, Va..

- Dan Sadtler, a junior from Damascus, Md.
- Scott Hutchins, a junior from Wirtz, Va..

The Old Dominion Mining team said it won based on planning and anticipating possible problems. “We had a definite leg up on the competition when Phase II started,” said Duerksen, who recently was named Outstanding Senior for the College of Engineering. “Not only were we able to work efficiently and cover all the bases we wanted to, we actually got some sleep.”

In addition to the cash prize and equipment, the first-place team was invited to present a technical session to industry professionals, university faculty and student peers attending the conference.

“I thought our team did an outstanding job,” said Greg Adel, MME professor and interim head of the department, who also served as a team adviser in previous competitions. “I have been involved in this competition since its inception and it is no easy task to win, let

alone win two years in a row. The schools involved are all very competitive and they continue to raise the bar each year.”

Student team members said the competition, though challenging, was a positive experience that enabled them to practice mining engineering as if they were on the job. “As students, we rarely have to work on something so open-ended and turn in a report knowing that there was no way we could have addressed everything we wanted to,” said Duerksen.

Since its inception in 2005, the student competition has grown from four teams to more than 15. Virginia Tech’s mining students have had strong success: They won second place in each of the first three years, and in 2008, two teams made the finals at the SME Annual Meeting in Salt Lake City, walking away with first and fourth places.

Staff Reports.

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Institute of Industrial Engineers Attends Regional Conference

Members from IIE pose for a picture as they leave for Clemson, SC.

On February 5 – 7, 2009, Virginia Tech's chapter of the Institute of Industrial Engineers (IIE) attended regional conference, held at Clemson University in Clemson, South Carolina. This conference provides IIE members from around the southeast region the opportunity to network with other industrial engineers, build relationships with members of IIE from their own chapter, visit manufacturing facilities in the area where conference is held, and showcase their talents through various competitions.

The participating schools included Clemson University, East Carolina University, Morgan State University, North Carolina A&T, North Carolina State University, South Carolina State University, Tennessee Tech University, University of Tennessee-Chattanooga, University of Tennessee-Knoxville, Virginia Tech, and West Virginia University.

While in Clemson, members took part in many activities planned by the host, IIE of Clemson. Upon arrival on Thursday, February 5, the team participated in open-

ing activities, which included ice breakers and bowling.

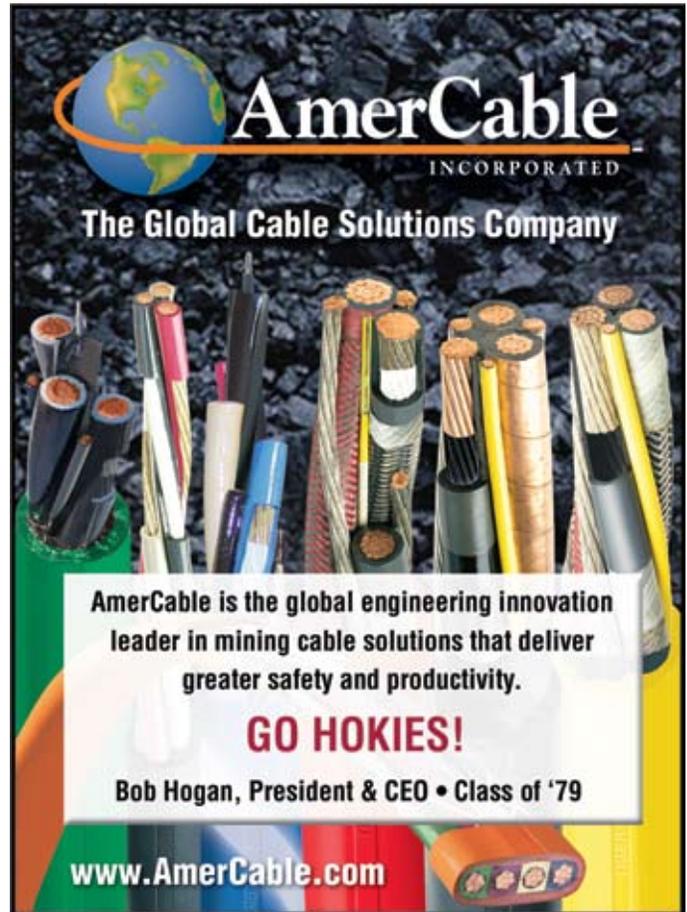
On Friday, the team went on tours of several manufacturing facilities in the general vicinity of Clemson University, including TaylorMade, Thomas Creek Brewery, BMW, and Walgreens. TaylorMade manufactures golf clubs and other equipment used by golfers around the world. At Thomas Creek Brewery, a portion of the club members were given the opportunity to see how beer is mass-produced at a large-scale brewery. In contrast, at the Walgreens facility, participating members witnessed a distribution center in full production. This facility uses human factors, ergonomics, and systems engineering to design a workspace for its mentally or physically disabled workers. Also on Friday, many of the club's members participated in the career fair. While there, the members made valuable connections with professionals from various companies in the region, hopefully enabling them to find co-operative education experiences, internships, or full-time positions.

Saturday brought more events, including team building activities, a technical paper competition, a banquet, and more social gatherings. During the technical paper competition, Sara Lu, a staff writer for the Engineers' Forum, presented her paper on "The Medical Distribution Problem," a research project that she worked on at her summer Research Experience for Undergraduates (REU) at the University of Maryland. Lu won the competition, which resulted in a cash prize of \$100 and a chance to win the international technical paper competition, to be held at the 2009 IIE Annual Conference. The banquet gave the club members from around the region one last chance to socialize and reflect on their experience at Regional Conference.

The participating club members travelled back to Blacksburg on Sunday, February 7, and shared their experience with others who did not attend the conference. IIE Regional Conference gave members of the organization a unique opportunity to interact with IIE members from around the region and showcase all that makes Industrial and Systems Engineering at Virginia Tech the best program around!

For more information concerning IIE, please contact Kari Adkins, 2008-2009 Secretary for IIE at kdadkins@vt.edu or Michelle Desiderio, 2008-2009 President for IIE, at mdesider@vt.edu. For additional information about this distribution, please see the last issue of the *Engineers' Forum*.

Kari Adkins is a senior in Industrial and Systems Engineering.



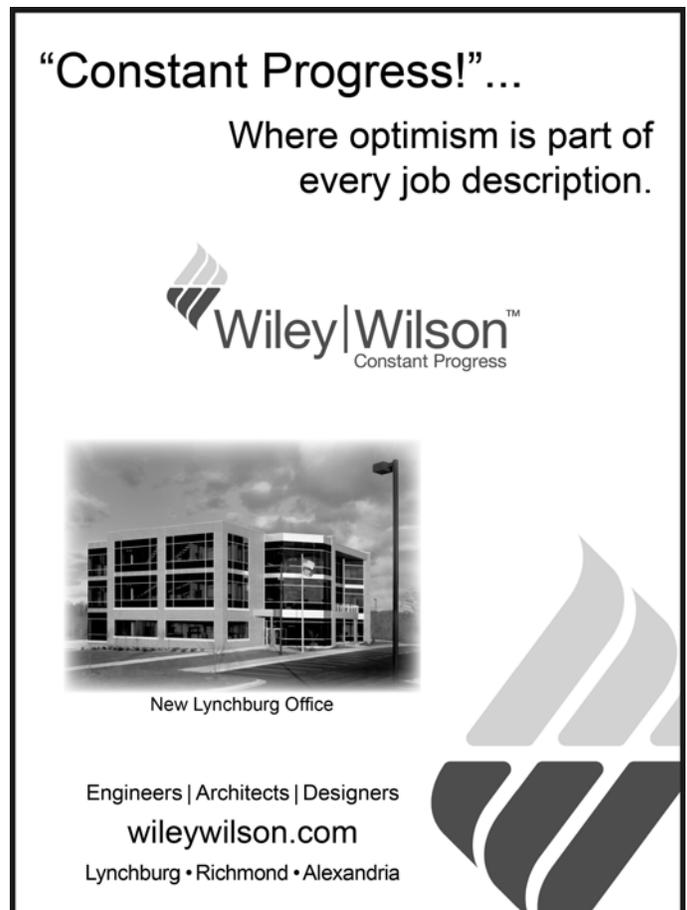
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