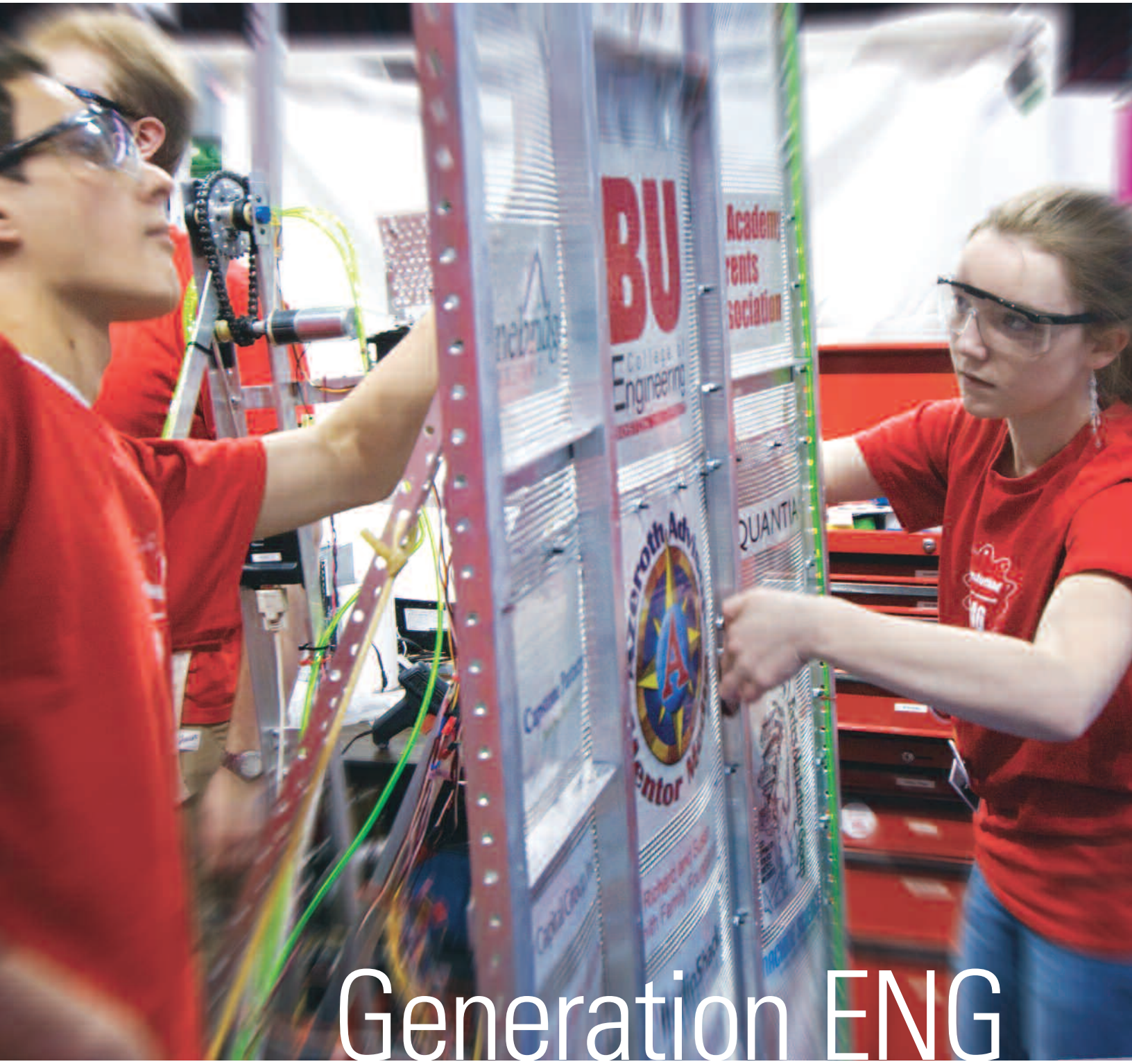
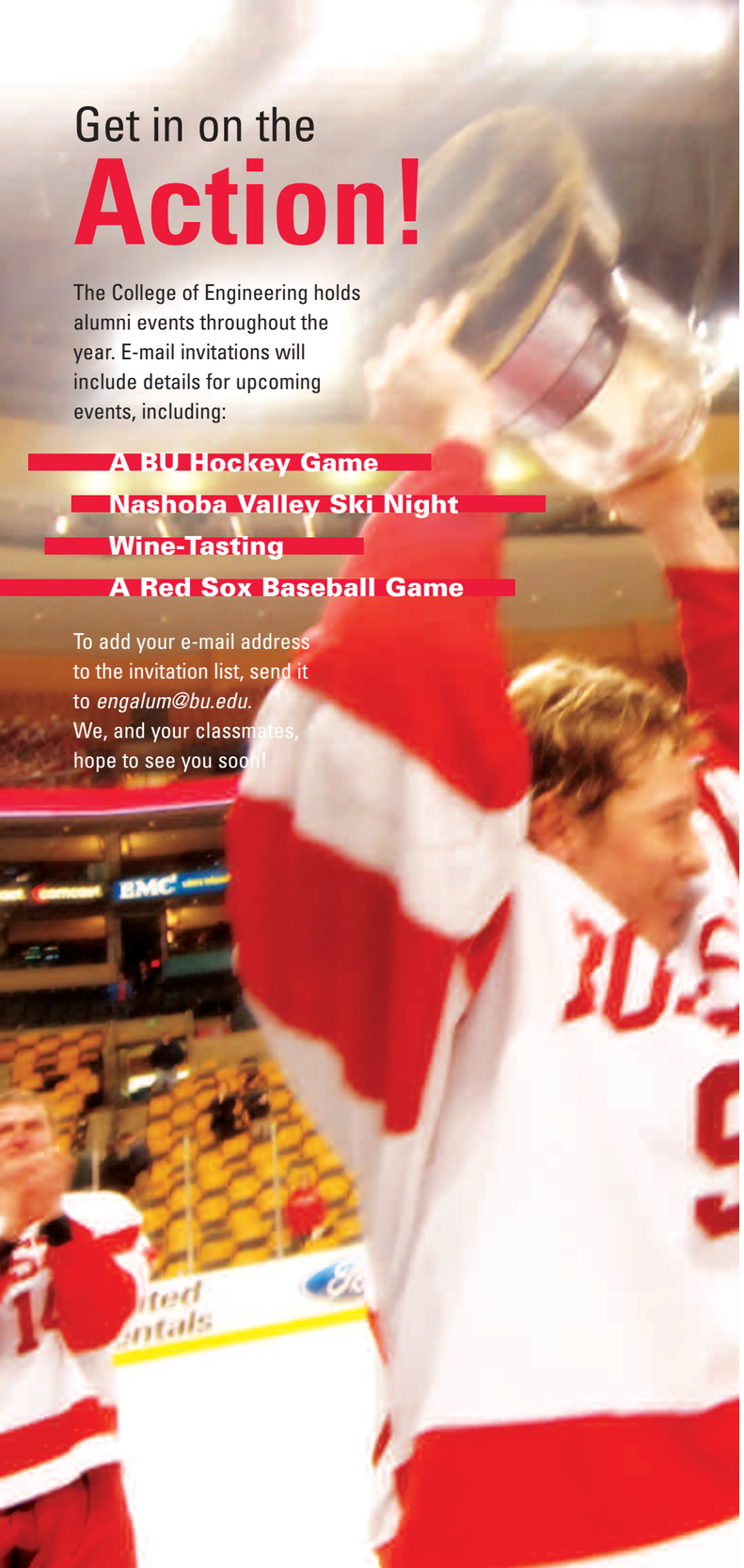
FALL 2007

BU College of Engineering MAGAZINE



Generation ENG

Seeing Fun in the Future



Get in on the Action!

The College of Engineering holds alumni events throughout the year. E-mail invitations will include details for upcoming events, including:

A BU Hockey Game

Nashoba Valley Ski Night

Wine-Tasting

A Red Sox Baseball Game

To add your e-mail address to the invitation list, send it to *engalum@bu.edu.* We, and your classmates, hope to see you soon!

BU College of Engineering
BOSTON UNIVERSITY

MAGAZINE FALL 2007

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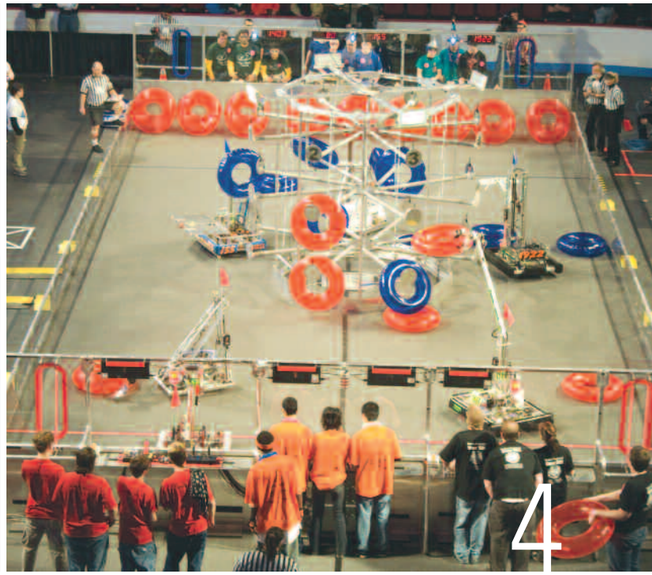

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COVER: BU Academy students Jacob Magid and Laurel Desrosier prepare RoboRhett for battle at the FIRST competition.

Striking a Balance

By Dean Kenneth R. Lutchen

When we talk about engineering education, we often use terms like curriculum, student experience, research funding, alumni participation, career mentoring, and the like. Each of these areas is important, but looking at this broad picture, we can sometimes lose sight of what ties it all together to ensure excellence. It's not the buildings, the classroom and laboratory facilities, or even—I'll admit it—the dean. It's the faculty, a collection of highly intelligent, highly educated and highly dedicated people who make an engineering school what it is.

Different schools' faculties take different approaches to their missions. For some, research is paramount and the faculty generally works with graduate students on a personal level but far less so with undergraduates. For others, undergraduate education is the singular or major focus and while students gain faculty mentors and personalized attention, little new knowledge finds its way from the research lab to the classroom.

At Boston University, we work hard to strike a balance between the two. This is difficult to accomplish and can be articulated but not actually implemented by the university president, the college's dean, or any other single person. To the extent we have been successful, it has only been because the faculty embrace this concept and have made it part of our culture. The ideas and energy that go into designing a research program, securing external funding, and seeing it through to publication, can only be done by faculty. Imagining new courses, improving existing ones, and fine-tuning the curriculum must also originate at the faculty level. And no one can force a professor to care about his students' progress and their postgraduation prospects, or to care about initiatives that enhance professional and scientific experiences for all students outside the classroom.

Since I became dean last year, I have been engaging our faculty in formulating new ideas and visions for the College and have been heartened by the response. Faculty members eagerly augment their already substantial workloads to do the spade work that will shape the College for the coming years. They are fueling a culture of intellectual excitement and collegiality, the extent of which is likely not common at other institutions.

Our students are bright and motivated and want to wring the most out of their educational experience. Their desire for challenge perpetuates a healthy cycle where faculty push students to do more and students push faculty to provide more. So many of our professors recognize this synergy and draw from it the energy needed to push the boundaries of innovation and bring the cutting edge of engineering into the classroom.

But they are also doing so much more. Our faculty are mentoring students and taking a genuine interest in their success. Many go beyond teaching and research to get involved with student organizations—like the recently formed Engineers Without Borders chapter on campus—and devote time to talk with prospective students and their parents. In short, our faculty members have owned the concept of how central they are to creating and sustaining a sense of community in the College of Engineering, a community that engages teaching, research, alumni and students. As dean, I could not be more grateful or more proud of their accomplishment and, equally important, their attitude and perspectives.

I believe what distinguishes a great engineering school is a balanced commitment to research and education combined with personalized attention to students. We are fortunate to have such a combination at Boston University. Each year when we begin the process of filling vacant faculty positions, we look for women and men who strive for this balance so that our community will be sustained and enhanced in the decades ahead.

New Engineers Without Borders Chapter Forges a Connection Between BU and Peru

By Kate Fink

A normal day for a BU student may begin with the electronic swipe of a Terrier Card in exchange for a ready breakfast, followed by a walk past screeching, honking Commonwealth Avenue traffic. More than 3,000 miles away, the residents of Chirimoto, Peru live with no electricity, television, Internet, running water or restaurants, but they maintain a strong connection with BU.

"They know Boston and the Red Sox," said Luis Chavez of the kids in Chirimoto, his remote hometown in northern Peru that was decimated by severe flooding 30 years ago and has yet to fully recover. Chavez, a doctoral candidate in Romance Languages at Boston University, brings them BU and Red Sox T-shirts on his trips home. Soon, through the College's new Engineers Without Borders (EWB) chapter, he will also bring Boston University engineering students to help rebuild Chirimoto.

U.S.-based chapters of this nonprofit humanitarian organization work with developing communities around the world to address problems such as a lack of clean drinking water or need for electricity. Created in 2000, EWB now includes 70 professional and 186 student chapters that work in more than 44 countries. According to Diane Shanks, EWB executive deputy director, it is the fastest-growing organization in the engineering field.

In October 2006, College of Engineering students formed an official EWB chapter at Boston University. The group includes undergraduate and graduate students from the College of Engineering and faculty advisors Associate Professor Greg McDaniel (AME) and Assistant Professor Catherine Klapperich (MFG).

"Engineers Without Borders is an organization that lets you participate in an engineering initiative on every level, dealing with people and their needs, but you also have restraints typical to engineering projects. This lets you think creatively and use what you're learning to find a solution," said graduate student and project chair Rachel DeLucas (MFG).

"There are significant benefits to everyone in learning engineering in a service environment," said McDaniel. "One is understanding society's needs and being able to deliver the technology. Another is increasing the participation of underrepresented groups in engineering, such as women and minorities."

Chris Spring and Rachel DeLucas plan to visit the remote town of Chirimoto, Peru, to help its citizens rebuild after severe flooding.

Approximately 300 people live in Chirimoto, with another 3,000 scattered throughout the region. "The people are farmers. The town grows coffee, bananas, yuccas, oranges, papayas and apples, and they raise cattle," said Chavez.

From 1980 to 1982, spring rainstorms flooded the Shocol River valley, destroying the town of Chirimoto. About 10 years ago, the government funded improvements to the river's drainage system, reducing the risk of floods and allowing residents to begin rebuilding. Chavez is constructing a community center he named Hummingbird House.

Several EWB members will visit Chirimoto—likely in January 2008—to plan a project, returning six to eight months later to implement it. The group may work on water purification, solar panel installation or planning the town's infrastructure.

Like many fledgling organizations, the group first needs to raise funds. A typical EWB project requires $30,000 to $50,000 for project materials and airfare costs. They plan to hold fundraising events throughout the fall, including a silent auction on October 18. The group is also looking to bring experts in solar panel technology and civil engineering to BU for workshops to help the EWB members learn how to do the work themselves in Chirimoto.

"I've never traveled outside the country," said chapter president Chris Spring (AME'08), "but from what I've heard, getting to go on these trips is a life-changing experience."

For more information, visit http://people.bu.edu/ewbexec/

Children in Chirimoto help build the community center, "Hummingbird House." [Photo courtesy of Luis Chavez]

By Kathleen S. Carr

Now, the Future

Recruiting the Next Generation Requires More Fun

Willing their robot to win, Madeline Hickman (BUA'07), Owen Shea (BUA'10), mentor Brandon Mensing (CAS'08) and Sam Roberts (BUA'08) participate in the FIRST Robotics Competition.

It's like walking into a U2 concert. Agganis Arena is full of loud music, and lots of energy greets the crowd, which ranges in age from 2 to 82. Parents bring young kids, teens cluster together, and grandparents bond with grandchildren, but no one is here for a rock concert—they are here for the FIRST Robotics Competition. Robots, and the high school students controlling them, take center stage. The intense contest pits robots against each other, as students maneuver their handcrafted machines through complex tasks requiring dexterity and strength. The event—For Inspiration and Recognition of Science and Technology—is just one of the ways Boston University is appealing to a younger generation to combat the foreboding statistics facing the future of engineering in the United States.

Historically, the United States has been a world leader in providing higher education in science and engineering, according to the National Science Foundation. For the past three decades, however, the U.S. has lagged behind Japan, China and South Korea. In a 2006 report, "Science and Engineering Indicators," the NSF noted that many countries now surpass the U.S. in producing students who receive their first degrees in science or engineering. While 33 percent of U.S. students fall in this category, 64 percent do in Japan, 57 percent in China, and 47 percent in South Korea. In addition, the percentage of engineering degrees among all bachelor's degrees in the U.S. has dropped from 7 percent to 5 percent in the last 20 years.

So how can the U.S. make a comeback? What can the country do to increase the number of students who choose to pursue degrees in engineering? The answer lies not simply in increasing the quantity of U.S. engineers but also in improving the quality of their education.

"Society is increasing its dependence on technologies and innovation," said College of Engineering Dean Kenneth R. Lutchen. "If the U.S. is going to lead and sustain all those aspects of society for technology and innovation, we have to put out great engineers."

"The U.S. would be silly to contemplate putting out 300,000 to 600,000 engineers; we simply don't have that capacity," Lutchen added. "But we should put out 100,000 to 200,000; we can handle that capacity." Playing to the country's strengths may yield the best results in this effort. "We will integrate technology and innovation. We can do this better in the U.S. because we're open to innovation and risk taking."

"If you have no clue how technology works, you're dependent on a lot of other people. And dependence doesn't make for great leaders," says Lutchen.

The engineers produced in the United States should have skill sets that go beyond those traditional for engineering, according to Lutchen. Future generations of engineers should contribute to other areas of society—through fluency in literature or economics, for example. Enter the theory of the engineer as a versatilist. Rather than extreme specialization, engineers will understand not only the details of their profession but also how to integrate that knowledge into society and how to use their skills to lead. "Society is getting so complicated," says Lutchen. "An engineering education is a great foundation for any field, particularly for a career in business or politics. If you have no clue how technology works, you're dependent on a lot of other people. And dependence doesn't make for great leaders."

Spread the Excitement

Being a leader may mean guiding a company out of a slump, inventing a lifesaving medical device, or even broadly impacting quality of life, the speed of business, or the health of the environment. The life's work of an engineer-leader could take almost any shape but requires the same sturdy foundation—a solid education in engineering.

The opportunities and excitement available to engineers need to translate to younger students. But, according to Lutchen, perception is a big issue. "Someone needs to introduce students to engineering but also explain to them what engineers actually do. Students don't realize that people go into business from here. We've seen how perception influences kids with the growth of such fields as biomedical engineering. It's showing substantial growth, because, from a high school kid's perspective, it's cool," says Lutchen. "It's our job to show what engineers can do and how they can advance society." In the early 1960s, when President Kennedy announced his commitment to putting a man on the moon, interest in engineering spiked. "We need to articulate the exciting challenges of our time, such as biodefense, controlling infectious disease, as well as biomedical engineering and computer engineering," says Lutchen. "These challenges will get students interested in engineering."

Where will these interested students come from? How do we transfer the excitement and potential that a degree in engineering provides to high school students who might not have any idea what it means to be an engineer, students who feel pressure to be cool in a world where math and science have traditionally been viewed as somewhat uncool? Get inside the mind and world of a teenager. There's loud music there. There's costume. There's a desire to fit in and to engage with other teens. There are pep rallies and dancing. There's a love of gadgets. And there's endless creativity. It's a fun place. And if we can make engineering fun, we're in.

Inventor Dean Kamen, best know for the Segway® Human Transporter vehicle, saw the pipeline of future engineers in the U.S. slowing to a trickle, so he developed the FIRST competition in 1989 to encourage students' interest and participation in math and sciences. Or, as Kamen puts it, "To create a world where science and technology are celebrated, where young people dream of becoming science and technology heroes." He wanted to get kids interested in the collaborative, hands-on work of creating so they could experience what engineers actually do and consider careers in engineering and science.

His idea appears to be working. According to FIRST, students who participate in the competition are three times more likely to major in engineering and four times more likely to pursue an engineering career when compared to a matched group of students who did not participate.

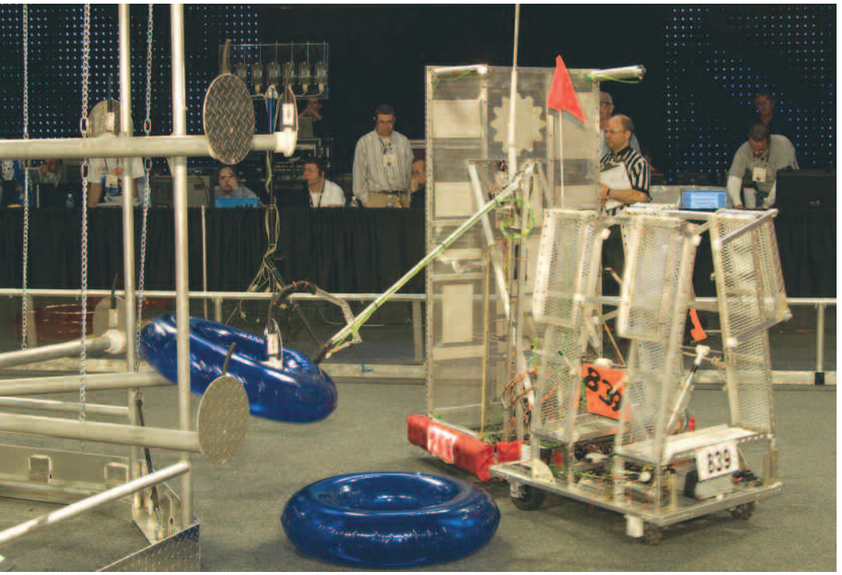
The FIRST Robotics Competition gives 1,305 high-school student teams and their mentors six weeks, a pile of parts and a book of rules. Teams form in the fall and competitions take place in March and April. There are 37 regional competitions held in the United States, Canada, Brazil and Israel, followed by the championships in Atlanta.

For the past two years, Boston University and the College of Engineering have hosted the northeast regional FIRST event at Agganis Arena. "It's a rock concert, it's wrestling and you'll never hear booing, always cheering," says ENG Assistant Dean Richard Lally. At last March's event—amid the cheerleaders, painted faces, matching outfits, dyed hair and mardi gras beads—teams unveiled robots with names like Killer Queen, Siriuz Biznes, HYPER Drive and Big Jimmy. The schools have mottos too: "We not me," "Let the robot do the talking," "Get it right the fourth time" and "Never quit, never give up."

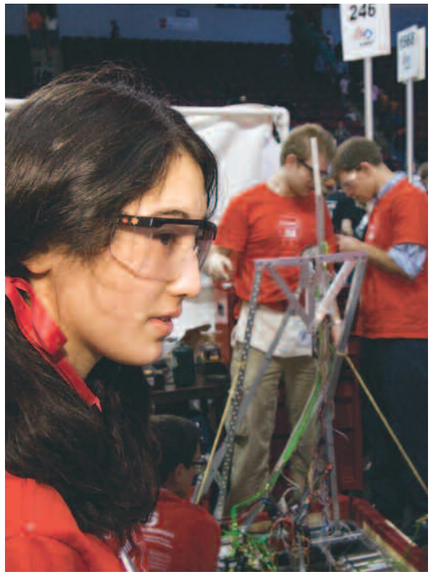
As the competition gets under way, music booms from Agganis Arena's formidable sound system. On the floor, a large curtain separates an arena about half the size of a tennis court [see photo on page 1] from a "pit" area where students work on their machines between matches. The curtain is festooned with thousands of LEDs that flash messages such as "Get Loud!" "Wowsie!" and "Do you feel the brainpower in the room today?"

The students have had just a few months to design and build robots to compete in this year's challenge. Aside from performing the tasks required in the competition, the machines must meet a few specifications. They can be no taller than six feet, must fit on a 28" x 38" floor area and weigh no more than 120 pounds, roughly the height and weight of their designers. They need to operate in an autonomous mode and under remote control.

This year's event, Rack 'N' Roll, revolves around a giant coatrack at the center of the arena. The rack consists of a central pillar with 24 large spokes radiating from it: eight near the floor, eight at the top of the pillar and another eight in between. The robots hang inflatable tubes of different colors—similar to the ones found floating in backyard pools—on the rack. Red or blue tubes with colored lettering are "keepers," and those



RoboRhett takes action, placing a "keeper" tube on the rack.



Alex Schultz (BUA'07) heads into a RoboRhett tune-up session at the FIRST competition.

without lettering are "ringers." Black tubes are "spoilers."

During a 15-second autonomous period that begins each match, the robots operate without driver control, using a color vision tracking system. The goal is to put a keeper tube on one of the rack's spokes. During a two-minute period that follows, robots have the benefit of their teenage masters who control them using joystick-like contraptions. Robots add ringer and spoiler tubes to the rack. If a spoiler is placed over a ringer, that ringer no longer counts. If a team gets three ringers in a column or row, like tick-tack-toe, they earn extra points.

Teams can also form alliances, earning themselves more points by getting one robot to zoom up another's platform and balance there. But making this happen involves some frantic tugging on joysticks, ramming of opponents and a lot of team encouragement. Often, a team will get its bot to climb the ramp, only to see it topple off and get damaged. It's difficult to watch. Teams freeze during that moment, as if their own breath might cause the bot to fall. But the points (and bragging rights) they accrue for a balanced bot make the risky attempts worthwhile.

Some of the robots function solely as ramps—they ram other bots during the competition and wait for their moment of glory when a bot will drive up onto their platform. It's a strategy that works for some teams. Other bots zip around the arena like NASCAR hotrods, flicking inflatable tubes onto their hook-like arms and placing them gingerly on the rack.

RoboRhett and Gracious Professionalism

The BU College of Engineering fully supports the BU Academy team. "The College gets involved in FIRST in a variety of ways," says Lally. "We sponsor the BU Academy team and provide funding and lab space. Some of our undergraduates who participated in FIRST in high school and have received FIRST Scholarships from us also volunteer their time to serve as mentors to the team."

The BU Academy team's robot, RoboRhett, is the only one in the competition that can autonomously balance itself, an important skill to have when being knocked around by other bots. Well-positioned pistons beneath the robot's platform make this balancing act possible. "Our strength is our platform and other teams have taken notice," says BU Academy senior Alex Schultz, who considered a classics major until she got involved in FIRST and is now looking to study cognitive neuroscience in college.

This year's challenge was announced and the pizza- and soda-fueled weekend brainstorming sessions began. "We spend one week sifting through our ideas and then Brandon Mensing, [a BU student mentor], comes in," says Schultz. "He listens to our ideas and helps us weed some of them out. We're a huge pile of junk and he's our sifter."

The philanthropy begins immediately, too. The BU Academy team opens its doors that first weekend, and every day thereafter, to other teams who might need a space to work. Tools, ideas and the know-how that come with participating in this competition for nine years are shared in the team's workspace in the basement of the College of Engineering building at 44 Cummington Street.

This concept of "gracious professionalism" is central to the FIRST competition and teams that practice it are rewarded. Woodie Flowers, a FIRST national advisor and MIT professor of mechanical engineering, coined the term that has served as the competition's motto. Gracious professionalism encourages fierce competition but also mandates that teams treat their competitors with respect. "It's unlike athletics, in the sense that anything you do to help others hurts you. In this competition, everything you do to help others helps you," says Lally.

The FIRST organization is serious about the notion, and teams that best exemplify it receive awards, scholarships and spots in the national finals. The BU Academy team puts the credo into practice regularly. The team gloats, not about its own standings, but about the standings of the rookie teams it has helped this year. "Last year we had six teams working in our building, and this year we had 12 teams in our lab. That shows you how much we've progressed. We're role models now," says Schultz.

College of Engineering freshman Victor Liu is here, too. He is one of several engineering students who volunteer to work with the high schoolers. He emphasizes the importance of alliances within the competition. "It's important to get noticed and form friendships," he says. Not a bad life lesson. He's referring to the part of the competition in which the top eight teams pick alliance partners to join them in the rest of the competition. So even if the team is not in the top eight, it still has a chance to compete in the finals if a winning team picks it as a partner.

There's Payoff in the Giving

Although the BU Academy team did not finish in the regional competition's top three—which would have meant an automatic berth in the national finals—it did gain passage to Atlanta on the strength of its gracious professionalism. "We qualified for nationals because we got the engineering inspiration award," says Gary Garber, the team's coach and a physics teacher at BU Academy. "One of the main reasons we got it was because of all the outreach we did with other Boston schools."

And they're not stopping there. They already have plans to do even more to help other teams next year. "We're getting pretty good at this," says Garber. "But," he emphasizes, "there's lots of room for more undergrads and professors to help us."

This is where the movement towards not only more engineers, but more well-rounded, thoughtful, creative and collaborative engineers begins—by reaching out to students, by encouraging them to reach out to each other, and by getting inside their world, where the music is loud, determination is fierce and grace is rewarded.

These ideas—gracious professionalism, the advent of the versatilist engineer and the teamwork of engineers with younger, undecided students—can change the future of engineering in the U.S. Increasing the leadership and influence of U.S. engineers on the world stage might begin with ringers, keepers and spoilers, and RoboRhett's high school inventors.

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High School Students Driven to Design

Legos, duct tape, elastic, action figures, tennis balls—associate these items with high school students and you're more likely to think of the bottom of their closets than an engineering design competition with a $5,000 college scholarship on the line.

Each June, high school students from all over the Northeast combine their engineering know-how with nearly anything they can find to compete in the Boston University Design Competition, now entering its 18th year. The students, working alone or in teams of two, compete for the chance to earn Boston University tuition scholarships.

The 2007 Design Competition was hosted by Peter Cirak (ENG'01, '06), who was volunteering at the competition for the seventh year.

"The best part of the competition is seeing the enthusiasm and the energy of all the young people involved," he said. "I'm not sure if they truly understand what they're doing yet, but it's just great to see a wide and diverse variety of young people getting excited about engineering."

The Design Competition is part of the College of Engineering's Outreach Program, which sponsors several local and national efforts to engage young people's curiosity about science and engineering. These efforts also include FIRST; the U-Design summer program, which teaches engineering fundamentals to sixth- to ninth-graders; the Junior Science and Humanities Symposium, which provides high school students with the opportunity to do original research in the sciences, mathematics and engineering; and the regional Science Bowl, in which scientists and engineers of the future compete in a trivia-style quiz competition at BU for a spot in the National Science Bowl finals.

In the 2007 Design Competition, students designed 12-inch-square vehicles that were required to descend an eight-foot ramp, drop a beanbag through a hole, climb back up the ramp, knock over a flag at the top, and hold position against an opposing vehicle for victory. No remote controls were allowed.

Students relied on their mechanical and engineering experience to build the vehicle's motor and drew on their creativity to design the protective exterior. Miniature catapults, shields and barricades were just some of the devices students used to hold off their opponents.

"We were kind of scared going in because last year our vehicle fell off the ramp and shattered," said Nicole Repina, who, as a member of the 2007 winning team from Newton South High School, is eligible for a BU scholarship. "This year it fell but didn't break, so we were really hoping to win after that."

Throughout the competition, all the students experienced the highs and lows of designing and engineering their own vehicle.

"Getting a beanbag to drop into a hole sounds simple but it's actually extremely difficult," Hopkinton High School's Andrew Ruggeri said. "But it's cool just to build your own car from scratch and see it go up and down. Beating another team is always good, too."

— Jason L. London

By Kate Fink

Engineering Alum Selected as "New Face of Engineering"

Earl Valencia's ('03) photo hit newsstands across the U.S. on February 20, when he was named one of 2007's New Faces of Engineering. The National Engineers Week Foundation included him in this elite group of 15 young engineers, announcing their selection with a full page ad in *USA Today*.

"Obviously, my mom was freaking out—she bought about 30 *USA Todays*," said Valencia, who recently completed a two-year Engineering Leadership Development Program at Raytheon. He added, "It's pretty wild. For me, this award is for everyone that taught me and contributed to my success."

The National Engineers Week Foundation, established by the National Society of Professional Engineers, aims to raise public understanding and appreciation of engineers' contributions to society. It annually selects 15 engineers 30 years old or younger for its New Faces of Engineering list.

Valencia earned a bachelor's degree in electrical engineering *summa cum laude* in 2003, but he almost didn't arrive on campus in time to start his freshman classes. Growing up in the Philippines, Valencia began college there but saw from his older brother's experience studying in America that a U.S. degree presented more opportunities. He applied to BU and waited. His acceptance letter, after getting lost in the mail, came in August. Valencia had to scramble to move from the Philippines to Boston in time for the first day of class.

While at the College of Engineering, Valencia completed an independent study with Professor Min-Chang Lee (ECE). "To him, it was just for fun," said Lee. "He really enjoyed it, and he really benefited from it."

Professor Michael Ruane (ECE) advised Valencia throughout senior project class and noted Valencia's dedication to many projects simultaneously. "He saw something that needed doing—whether in the College, the University or the community at large—and he'd just go and do it without letting other stuff slide. He really managed to keep a lot of balls in the air," said Ruane.

"I base my decisions on whether I can make a difference in the world," says Earl Valencia.

Valencia has participated in the Big Brother mentoring program since his days at BU and continues to keep in touch with his Little Brother in Boston.

"I saw the evolution of our conversations—first we talked about sports, then girls, now college. I guess I influenced him because he wants to do business or engineering," he said.

Valencia points to a student leadership award received from the College of Engineering as his most important accomplishment. "It was one of the tipping points in my life. The award shows the ability to influence and impact other people for the better," he said. "Because I did not grow up in the U.S., it reaffirmed that I could lead in a different country, in different cultures. That gave me huge confidence coming into my career."

Valencia next completed a master's degree in electrical engineering at Cornell before entering Raytheon's two-year Engineering Leadership Development Program (ELDP) which rotates participants to three different Raytheon locations across the country.

"We have high expectations for these individuals," said Donald Medeiros, head of the ELDP at Raytheon. The program, he said, "Gives them exposure not only to new technology but also cultural differences. More than typical employees, they see how different parts of the business approach common issues and problems."

After graduating from the Raytheon program in summer 2007, Valencia's interest in leadership, innovation and globalization led him to enroll in Stanford University's Graduate School of Business.

"I really want to try to take on some leadership roles in engineering in the future," he said. "I base my decisions on whether I can make a difference in the world. I want people to think, 'Hey, that guy really did something important.' "

By Kate Fink

Women Move in to Engineering

New dorm floor, shared experiences support female students

Freshmen engineering majors, from left, Salwa Masud, Vanessa Yanez and Lana Osher settle in on the new women's science and engineering dormitory floor.

Going it alone in any enterprise can be daunting. When that endeavor includes learning the complexities of heat transfer, engineering mathematics and fluid mechanics, having a few friends right next door who are going through the same thing is priceless.

A new dormitory floor—home exclusively to women students in science, technology, engineering and math—made its debut this fall at BU. The 38 residents of the 15th floor of Warren Towers A, in addition to commiserating over tricky problem sets, will participate in networking and mentoring events throughout the year, discussing career options and talking informally with women faculty and professionals from a variety of science and engineering disciplines.

Along with the rest of the nation's 338 engineering schools, BU's College of Engineering has seen the number of female graduates fall in recent years. This themed dormitory—along with the example set by the existing community of the College of Engineering's female students and alumni—may help them to maintain their interest in engineering and science careers and possibly inspire future generations of women engineers.

While women now populate medical and law schools in equal or greater numbers than men, national statistics for engineering reveal a slippery backwards slide. Twenty percent of engineering undergraduate degrees went to women in 2004, 19.5 percent in 2005 and 19.3 percent in 2006—the lowest percentage since 1998, according to statistics compiled by the American Society for Engineering Education. The College of Engineering at BU does better than the national average but has also seen the numbers trend downward in recent years.

Solutions to bolstering these slipping numbers at BU include the new dormitory and

the valuable resource of women who are now becoming engineers or have successfully navigated this path in the past. Women undergraduates, graduate students and College of Engineering alumnae reveal diverse and interesting views on their engineering education and careers—they share their excitement about the many and varied opportunities in the field and dispell many of the negative myths that persist about engineering. With a dormitory full of friends and plenty of female role models in engineering, more girls may begin to steer their education and career goals toward the field, and stay there, reversing the current trend away from engineering.

It's attainable

Lauren Varona, a senior majoring in mechanical engineering, looked forward to timed math tests in third grade and participated on the math team in fifth grade. By sixth grade, she knew she wanted to be an engineer. She also knew the field would be challenging and didn't want to sacrifice her other interests to become an engineer; at BU, she found she didn't have to.

"One of the things I really love to do is be well rounded—I don't like to focus only on engineering. I feel like I'd really stress myself out if I did that," says Varona. "Everyone believes engineers don't have time to do anything and we're all studying constantly. We do study a lot because the professors aren't just going to hand out a degree. They want to make sure you will do well in the real world because the things you design or build will affect many people's lives. They make it challenging, but it's not anything you can't do."

The Miami native says her enthusiasm for extracurricular activities helped her make the transition.

"Once I started becoming more involved within BU and the College of Engineering, then I really started to find my place and became much more comfortable. I became a Dean's Host for engineering and a student advisor,"

Cassie Browning commanded military operations before heading to BU to learn electrical engineering.

"Once I started becoming more involved . . . then I really started to find my place," said Lauren Varona, a senior studying mechanical engineering.

[Photo courtesy of Lauren Varona]

she says. She is also a member of step squad Tru Sole, Hispanic group La Fuerza, and dance group Danzon, plays viola in the orchestra and works at a part-time job.

"I really want to go out there and encourage women to come into engineering. I feel like a lot of people are scared to because everyone thinks it's really hard. So it'd be good to say, 'No, it's really possible. Try it first, and you'll see.' "

It's never too late

"I'm a little unusual because I have two kids," says Cassie Browning (ECE'07), about why it took her longer than some of her BU classmates to get her master's degree in computer engineering. She had an undergraduate degree in communications, a career in the Army and a master's degree in clinical psychology before she decided to become an engineer.

"I grew up in a very small town in Kentucky and hadn't been exposed to engineering—other than what I had seen on television. It wasn't something I'd been exposed to enough to think about until I was working alongside electrical engineers in the Army," says Browning, who directed a group of 45 tactical communications soldiers.

"Most of my peers were electrical engineers, so they were working with the technical aspects of the equipment. That's what I found so fascinating and I thought, 'I wish I had gone down that path,'" says Browning.

She enrolled in the Late Entry Accelerated Program (LEAP), a master's degree program for students without academic backgrounds in engineering. But in the midst of the program, her three-month-old son was diagnosed with cancer and needed immediate treatment.

"His surgery was scheduled for the week of finals," Browning says. "I told my professors what was going on because I felt I couldn't sit in class or concentrate very well. They were so accommodating and understanding. I can't imagine a better way they could have been; they made me feel really comfortable. He's doing well now, and they still, to this day, ask about him."

Browning completed the master's degree this year and is continuing on toward a doctorate.

"Just because you majored in engineering doesn't mean you have to be an engineer," says Foley.

Kerry Foley, a commercial litigator and mother, with her children, Jack, 8, and Maggie, 6. [Photo courtesy of Kerry Foley]

It's limitless

Like many students entering college, Kerry Foley had an idea of the career she wanted, but the experiences along the way changed her destination more than once. Foley came in to the College of Engineering thinking about medical school, but by the time she graduated with a biomedical engineering degree in 1991, she was looking for something different. She briefly tried a graduate program in engineering, then remembered a summer job working in a law firm.

"It was something new every day, and there was always some problem that needed to be solved, which was very similar to engineering but using more words and with no electronics involved," she says. "I found it very intellectually stimulating."

After finishing law school, Foley started a career as a commercial litigator and came to appreciate her undergraduate senior design project. "We were making an oral presentation and having to explain our projects to people who were not experts in the field," she says. "As a lawyer, I've had to do that many times—explain complex concepts to a judge and jury. That initial experience of standing in front of a crowd taught me I really liked doing that. It was a great experience and helped quite a bit in law school and later."

Foley's engineering education has also served her well. She works on product liability cases and must often distill the details of product design by engaging scientists and engineers who serve as expert witnesses. "They gave me anything that involved scientific witnesses because I wasn't afraid to read a journal article," Foley says.

"Just because you majored in engineering doesn't mean you have to be an engineer. It doesn't limit you; it actually opens up other opportunities that other majors don't," says Foley, "They teach you a way to think—the problem-solving skills that you learn can be applied to any field."

It's rewarding

Jennifer Gruber (AME'99) guides space shuttles into smooth landings on a thin strip of tarmac from 4,000 miles away and 400,000 feet high. "It's basically in the South Pacific and we have to get it to Florida in one shot," she says of the shuttle.

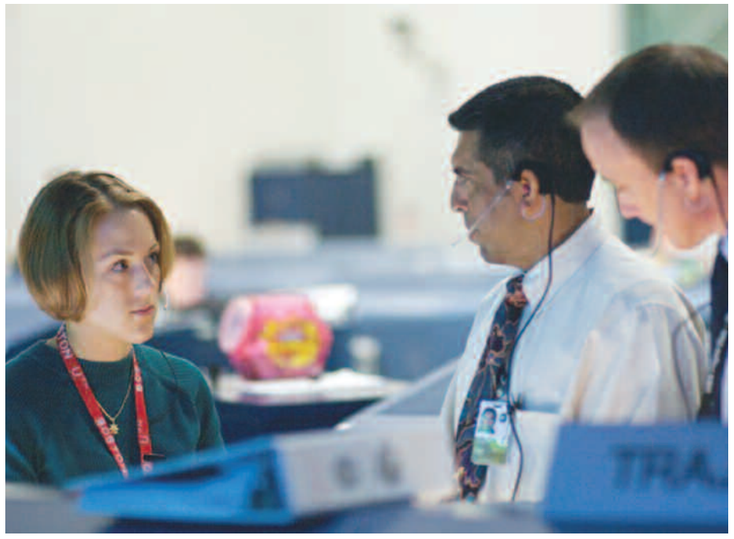
Gruber is an orbit flight dynamics officer at NASA in Houston, yet she didn't know aerospace engineering existed until her senior year of high school.

"Growing up I always knew I wanted to be involved in space exploration, but I didn't hear about engineering until I was taking AP physics and my teacher brought up the subject of engineering. He described it as problem solving in a way that uses your math and science skills," she says.

Gruber completed her undergraduate and master's degrees in aerospace engineering at BU, supplemented by three co-ops at NASA. She then won a Rhodes Scholarship and completed a doctorate in aerospace engineering at Oxford University before returning to NASA for a full-time job. She plans to seek membership in the astronaut corps when NASA issues its next call for applications.

On the road to becoming an engineer, Gruber found no deterrents particular to women but felt almost over-encouraged. "It was continually mentioned to me that there weren't that many women. We've made such a big deal about telling young women there are not enough women doing it. If you're good at it, it's treated as abnormal," she says. Gruber often visits local schools to talk about space and her job at NASA. Just being there and saying, "Hey look, I'm a normal-looking woman with a husband and a mortgage," helps girls realize that a career in engineering is not out of their reach or a bizarre choice, says Gruber.

"A big part of engineering is teamwork and socialization…. The ability to communicate is key," says Jennifer Gruber, an orbit flight dynamics officer at NASA in Houston, Texas.



Gruber also emphasizes that engineering involves teamwork and community service, qualities that women often seek in careers.

"A big part of engineering is teamwork and socialization. No one gives engineering enough credit for that. Really, it's a very social profession. The ability to communicate is key. [Women] stereotypically have an advantage with communication."

Middle- or high-school girls thinking about what to study in college or what kind of job they want may not realize these qualities exist in engineering because the field is not often portrayed that way.

"Young women want to be in professions that are obviously helpful to the rest of society. In engineering, the contributions we make don't get applied until well into the future, but the quality of people's lives is improved by airplanes, cars and space technology. That's part of the reason I'm here."

Engineering is not easy or simple, but the women who study and practice it point out that its many challenges are rewarding and exciting. The skills and thought processes of engineering can be applied to myriad careers, from teaching students to practicing medicine to exploring space. With the support of peers and advisors, and the role models of women who have gone before, young girls and new engineering students can see more accurately what the field is really like. Engineering is more welcoming now than ever before to prospective women engineers, within the 15th floor of Warren Towers A and far beyond.

For more information and profiles of women in engineering, visit the BU Engineering website at www.bu.edu/eng/wie.

Arterial Plaques Meet Their Match

By Kate Fink

Interdisciplinary Team Takes on Medical Problem

The heart pumps blood from the largest arterial superhighways to the tiniest back road capillaries. Cells, platelets and plasma course through the snarled network of blood vessels. As years pass, the relentlessly high volume of traffic and the stress of millions of vessel-wall expansions take a toll. Arteries can harden and inflame as atherosclerotic plaques—piles of lipids, cell debris and connective tissue—accumulate along the vessel walls.

Some plaques are more dangerous than others. A hulking boulder of a plaque might sit placidly for years, letting blood slide around it. Or, a small, seemingly innocuous plaque may rupture, exposing cracks where blood clots can form, stopping blood flow and resulting in heart attack.

"We don't understand very well why some plaques cause heart attacks and some don't, and we are definitely unable to predict which plaques will rupture before an event actually occurs, based on conventional risk factors," said Frederick Ruberg, assistant professor of medicine and radiology at BU School of Medicine and co-director of the Advanced Cardiac Imaging Program at Boston Medical Center.

The technology needed to discern riskier plaques from safer ones may come from cross-disciplinary work between BU engineers and medical doctors.

Associate Professor Joyce Wong (BME) collaborates with Ruberg and James Hamilton, who holds faculty appointments in both ENG and MED and directs the High Field Imaging Center at MED. The trio is developing a tactic that uses targeted molecules and magnetic resonance imaging (MRI) to accurately identify dangerous plaques.

The project is funded through a Translational Research Partnership between the University and the Wallace H. Coulter Foundation that supports several research projects aiming to improve patient care through collaboration between biomedical engineers and clinicians.

Wong, postdoctoral researcher Kristen LaFlamme and undergraduate Alexander Razon (BME'10) make particles of iron oxide approximately five to 10 nanometers in diameter that can seek and attach selectively to the dangerous plaques, based on specific molecular "tethers" on the particles. An MRI scan then reveals the particles' location as dark dots clustered at the surface of high-risk plaques.

"To have something like this with a very clear endpoint could become a test bed for clinical trials," said Wong. "We already have a particle you can see in magnetic resonance; it's a matter of fine tuning it," said Wong.

"The standard technique to look at plaques in blood vessels just gives data on quantity or how tight the blockage is and doesn't give information about the plaque makeup," said Hamilton. In combination with other test results, detecting the composition of plaques would help doctors pinpoint dangerous plaques early and treat them aggressively.

With their year-long Coulter award, the three researchers will work on selecting tether molecules to coat the particles that can most accurately point out dangerous plaques. They will also conduct toxicity studies, making sure the plaque-finding particles will not disrupt normal functions when injected into the bloodstream.

"The common goal is to detect vulnerable plaques, and we all come at it from different angles," said Wong. "The project wouldn't succeed with just one of us. We need all three aspects to make it work."

Frederick Ruberg (MED) (left), *Joyce Wong (BME), and James Hamilton (MED) collaborate on research to find dangerous arterial plaques using targeted particles developed in Wong's laboratory.*

By Kate Fink

The Creation of Animation

Alum P.J. McNerney Doesn't Make Movies, He Makes Movies Better

P.J. McNerney ('00, '03) works with green ogres, hypochondriac giraffes and karate-chopping pandas, bringing hours of entertainment to kids and making him one of the best babysitters you've never met. As a software engineer, he has had a hand in creating popular video games and films for some of Hollywood's leading companies.

During his nearly two years at Insomniac Games in Burbank, California, McNerney helped create games including the Ratchet & Clank series. In the games, players take on the role of Ratchet the mechanic—a fictional creature called a lombax living on a distant planet—who joins forces with a tiny robot, Clank, to save the galaxy from an evil dictator on neighboring planet Belchworld. Recently, he brought his experience to DreamWorks Animation in Glendale, California, which has produced such computer-generated animated features as "Shrek," "Madagascar," and the forthcoming "Kung Fu Panda."

To help bring these characters to virtual life on the small and big screen, McNerney's role involves acting as both a negotiator and as the manager of a high-tech art supply store. McNerney is responsible for creating the tools—such as computer programs—that programmers, artists and designers use to bring a realistic look and lighting to Ratchet, Clank, kung fu pandas and their worlds. He typically does not work directly on specific movies, but the tools he supplies, such as one that places virtual lights in a 3-D scene, are used across many different projects.

McNerney works closely with programmers and artists to continually answer the question, "What do my users need?" he says. "You're basically trying to take their dreams and make them reality. And, obviously, there's a whole slew of people who are involved in that process. We stand at the interface."

Providing the right programs requires McNerney to negotiate a balance between innovation and timeliness. "It's a process of both trying to continually push the state of the art and, at the same time, being responsive to production schedules to get a picture out at a certain time," he says. Sometimes keeping up with a project timeline means telling artists the virtual paintbrush they want doesn't exist, but other times he can make it for them, creating new programs that let artists manipulate huge amounts of data more easily.

Growing up in Providence, Rhode Island, McNerney first exercised his programming skills on his family's Commodore 64 computer. With the advent of more technologically complex special effects in TV and movies—from "Star Trek" to "Terminator 2"—McNerney's fascination with the field grew. He and friends made sci-fi movies in high school, using Brown University's computer graphics facilities.

At Boston University, McNerney studied computer systems engineering on a Trustees Scholarship, receiving his bachelor's degree in 2000. He stayed at BU for a master's degree in electrical engineering but maintained his focus on imaging, video processing and computer graphics. "I was very enchanted, and still am, with special effects and trying to get at the heavy duty math that's used to create all this stuff," he says.

At DreamWorks, McNerney says, "For things I deal with on a daily basis, I go back and pull out the textbooks that I used years ago." But it isn't only problem sets from class that he puts to good use.

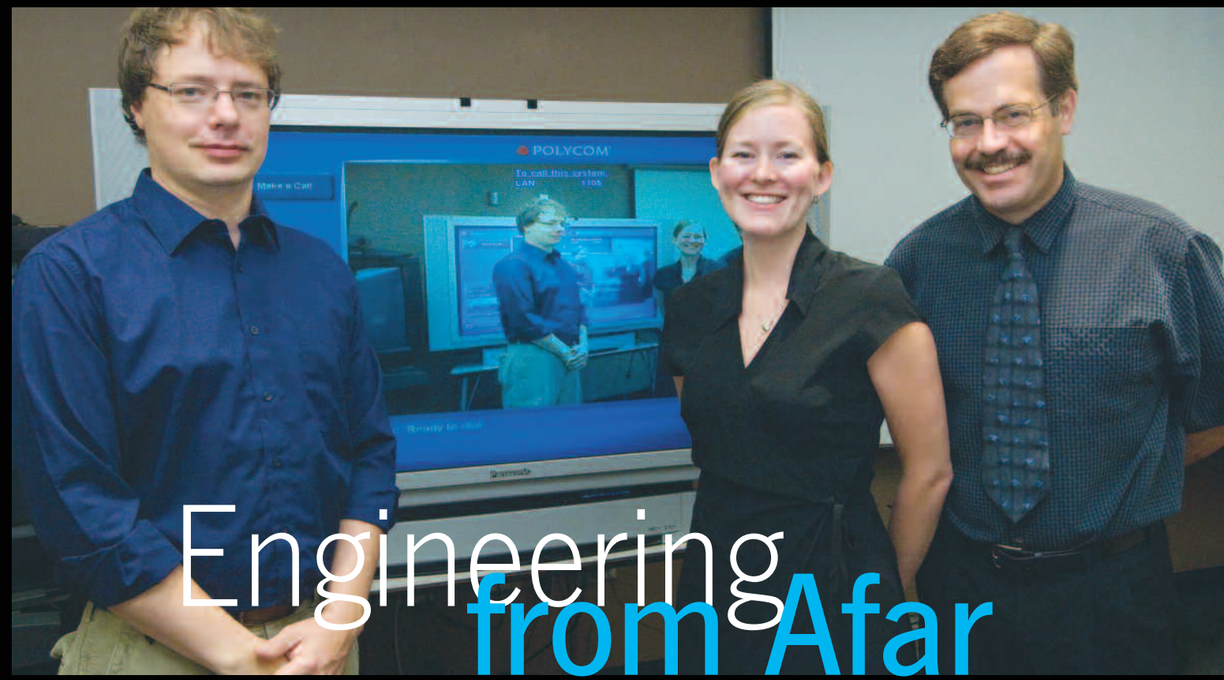
"What I really found tremendous was [not only] the technical knowledge I got, but a lot of the emphasis with regard to teams. The lone-gun programmer only gets so far. The many group projects you work on at BU and the many activities you do with your fellow engineers are a big part of the process that you need to develop—working with other people and being able to interface in a personable way. I think that's a key part of BU for which I'm really grateful."

P.J. McNerney, on the sunny California campus of DreamWorks Animation. [Photo courtesy of P.J. McNerney]

Chhavi Sachdev contributed to this article.

By Kate Fink

From left, Andrew Abrahamson, Sarah Cowen and Dan Cole



Engineering from Afar

Students Participate from Anywhere with New Distance Learning Technology

The College of Engineering's Distance Learning Program is moving into the future and around the globe with a new director and new teleconferencing technology.

Dan Cole, associate professor of manufacturing engineering since 1998, has taken over the Distance Learning Program from Merrill Ebner, who retired at the end of 2006.

The program, which offers a master's degree in manufacturing engineering, also recently switched to an Internet-based videoconferencing technology that lets distance learners participate more fully in classes and requires a minimum of technical set-up.

Using their personal computers, distance learning students can now participate in classes from anywhere. The previous system required them to attend at specific locations—such as a conference room at work—with an onsite technician available. Additional new features, from file and application sharing to chatting, enhance distance students' interaction with classmates and professors, says Andrew Abrahamson, Research Assistant for the Distance Learning Program, the program's key technical architect who implemented the new technology. Students can also view archived videos of the classes online to review the material or catch up. These improvements are the latest of Abrahamson's and Ebner's efforts to keep the Distance Learning Program on the forefront of technology as it has evolved during the past decade.

"All I need is a Windows computer with a web cam," says Supachai Kanjanasakchai (CSE'07). He now lives in Thailand, where he started taking distance learning classes this fall.

In the BU classrooms that feed lectures around the globe, a large TV monitor shows the class materials and a smaller one shows the distance learning students, while wireless microphones pick up the professor's voice and student questions and comments.

"It is very interactive. I love it. I feel that I am in the classroom, and I am able to participate equally," says Griselle Rodriguez, a manufacturing engineer at Textron in Wilmington, Massachusetts, who will complete her degree in the spring of 2008. "With the old system, I needed to take classes from the company I was working for, so if I didn't get to work one day, I still had to go and take the class, drive to Boston, or miss it. With the new system, it doesn't matter which place on earth I am, I can still take the class from there."

The program enrolls about 20 students each year, typically a mix of those fresh out of an undergraduate program and those already working in industry who want to rejuvenate their technical and business knowledge. About one-third are College of Engineering alumni.

"I enjoy the combination of people on the far end who have been out there in business and the students here who get a taste of what

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By Jason L. London

ENG Welcomes New Director of Development and Alumni Relations

For graduates who think their walk across the stage at graduation signals the end of their connection to BU, Scott Muirhead, the College of Engineering's new director of development and alumni relations, has news: the relationship is actually just beginning.

"Participation in the College of Engineering after graduation is an investment in your diploma," says Muirhead.

Muirhead's first order of business is to create awareness of the continuing growth and evolution of the College among alumni.

"There is a sense of movement in all areas of Boston University right now," he says. "And the movement in the College of Engineering is even further along. Dean Lutchen is working very hard to make it one of the very best engineering schools in the country."

While new to Boston University, Muirhead is no stranger to the worlds of engineering and academia. He earned his bachelor's degree in electrical engineering from Union College in 1979 and his career in alumni relations has stretched over parts of four decades with five universities. Muirhead believes the College of Engineering is his most exciting challenge yet.

"One of the challenges for Boston University is that the reputation of the school is ahead of the perception of the school," he says. "The more our alumni know about the College, the more excited they will become. Some alumni are not aware of how high the quality of education is. Graduates of the College of Engineering are getting very high-quality jobs with high-quality companies," he says. "As engineering continues to play a critical role as a catalyst for economic development, the College's influence will grow in the region and the country."

Muirhead says alumni support is critical to maintaining the College's quality of education. He notes that only about 5 percent of alumni contribute financially to the College, a lower rate than competing engineering schools. He hopes to raise that to the 15- to 20-percent range and aims to expand the number of Leadership Donations, gifts of $1,000 or more.

Scott Muirhead

"A contribution to the College will only strengthen the value of your degree," he says.

In addition to his undergraduate studies in engineering, Muirhead earned a master's degree in experimental psychology from Union College and a doctorate in social psychology from Northwestern University. Over the course of his career, he has helped raise millions of dollars at the University of New Haven, Dartmouth College, Florida International University, and Syracuse University.

Muirhead says his greatest achievements have been the relationships he's created between alumni and their institutions.

"We're not just seeking donations but for people to become more actively involved," he says. "Whether it is attending alumni events or serving on boards or steering a student to this institution, participation and time are just as important as money."

Continued from page 15

it's like out in their industry. It excites the students in class," says Cole. This connection between industry and the classroom is one of the most valuable facets of the Distance Learning Program, he says. "It provides students who leave the University with a lifelong learning experience by having the College in touch with industry—these are the people using engineering principles."

The interaction is also appreciated by those tuning in from the industry side. "Being able to ask questions during class and participate in class conversations is priceless," says Warren Rayford, a lead mechanical engineer at Caterpillar, Inc., in Griffin, Georgia. "The ability to listen to other students' opinions and engage in class conversation truly helps in my understanding of the material." He has been able to apply his class work directly to his responsibilities in industry. "As an engineer, I impact the supply chain, velocity and quality in the manufacturing process. Through my course material, I have a heightened awareness of the way inefficiencies in the manufacturing process and supply chain negatively impact profit."

Cole has several further improvements in mind for the Distance Learning Program, including expansion into other engineering specialties, such as mechanical and biomedical. "We're interested in appealing to as broad a range of engineers as possible," he says.

The program provides free math tutorials to help students who have been out of college for some time. Cole will also add a free lecture series on a variety of engineering subjects during the '07–'08 academic year, starting with a talk by Adjunct Assistant Professor Bill Hauser, who teaches about the interface of business and engineering. The free lectures will introduce potential new students to the distance learning technology and give enrolled students a supplement to their classes. Anyone with a personal computer and an Internet connection can tune in to get a taste of distance learning.

For more information, visit the Manufacturing Engineering Distance Learning Program website www.bu.edu/mfg/dlp/ *or contact program administrator Sarah Cowen at* scowen@bu.edu *or 617-353-2943.*

ENG, BME Move Up in *U.S. News*' Graduate Programs Rankings

By Michael Seele

The College of Engineering continues to advance its standing among the nation's top engineering graduate programs as rated by *U.S. News & World Report*. The College now ranks 41st in the nation and its biomedical engineering program is rated 6th in the nation by the magazine.

For several consecutive years the College of Engineering has moved up in the rankings among graduate engineering programs in the country. Like the College as a whole, Biomedical Engineering rose one place in the ratings this year.

"We are careful not to tailor our programs to these types of rankings," says Dean Kenneth R. Lutchen. "Instead, we focus on initiatives that add to our excellence and impact. The rankings will follow. The *U.S. News* ranking is one of many indictors that show we are among the best engineering programs in the country and are getting better."

Lutchen says a number of factors have contributed to the rise in the rankings, chief among them being faculty productivity, and faculty and student quality.

"We are among just 21 engineering schools with research expenditures per faculty member above $500,000," he adds. "Our faculty is attracting research support from the nation's premier funding agencies, and the impact our faculty is having on engineering innovation has a ripple effect that enhances our educational mission at the graduate and undergraduate levels. Clearly, the emphasis the College has been placing on recruiting and developing faculty is bearing fruit."

Lutchen notes that the *U.S. News* survey measures only a handful of criteria and does not reflect many of the College's strengths. "Still, we have to be aware of this list's disproportionate impact on the decision-making processes of potential students and their parents," Lutchen says. "In a sense, being on this list serves to prompt the best students to take a closer look at us. When they do, I'm confident they will like what they see."

Dean's Catalyst Awards Aim to Spark the Research Engine

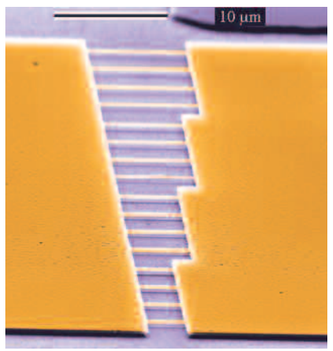
By Kate Fink

Many research ideas are highly intriguing, but the risks that come with untested areas of study can make it tough for engineers to find government or industry funding in the early days of a project.

In an effort to give promising faculty research ideas an initial boost, Dean Kenneth R. Lutchen has instituted the Dean's Catalyst Awards in the College of Engineering. The first awards in the program—aimed at encouraging innovative, cross-cutting collaborative research that is likely to attract external funding in the future—were presented in spring of 2007.

The selection committee recommended funding five of the 16 projects submitted this year, putting particular emphasis on those that foster collaborations among multiple disciplines and those most likely to result in future proposals for external funding. In the future, three to five Dean's Catalyst Awards—typically ranging from $10,000 to $50,000 each—will be awarded annually.

"These grants will allow our faculty to move in new directions to begin some truly ambitious and innovative work," says Lutchen. "We see tremendous value in encouraging cross-disciplinary initiatives and in helping the College of Engineering community leverage its expertise in new ways."



Nano-wires created by one of this year's DCA winners, Assistant Professor Kamil Ekinci (AME)

Alum Garners Honor, Meets With Students

By Chhavi Sachdev

When Jennifer Gruber (AME'99) landed a co-op at NASA before her junior year, she could not have foreseen that her association with the space agency or Boston University would last this long.

Gruber, an orbit flight dynamics officer at NASA, was one of two recipients of BU's Young Alumni Award for service to the field and the University last January 19. She was the first ENG alum to be honored with the award.

Gruber, a former Rhodes Scholar with a doctoral degree in engineering science from Oxford University, said she was excited about the award, which, according to Meg Umlas, executive director of Alumni Relations at the University, recognizes a graduate of the last 15 years who brings honor to Boston University through personal and professional achievements, character and support of the University.

"I had a really good experience here," Gruber says. "Boston University made an investment in me and my professors made an effort. I don't want to let them down. This award tells me they think I'm doing all right."

Earlier in her trip back to Boston, Gruber had two meetings scheduled with ENG students, one solely for sophomores to help them apply for a NASA co-op. "If you want to co-op at NASA, it is key to get involved in planning it by your sophomore year," says Gruber, who serves on the AME advisory board.

"I come from a socio-economically deprived background," says Gruber. "I strongly believe in a meritocracy and I'm here to tell students that you can have your dream job. You really can't let people stop you."

At NASA, Gruber's responsibilities include tracking the shuttle, modeling its orbital mechanics, and backing and synching the shuttle's onboard computer with Mission Control's model, which is enhanced by ground tracking. Gruber was on assignment during the Atlantis shuttle mission in September 2006 and during entry for the Discovery space shuttle in December of that year.

Jennifer Gruber receives the Young Alumni Award from Steve Karbank (CAS'79), first vice president of the Boston University Alumni Council, January 19.

"On orbit, we track the shuttle and plan and monitor the execution of its maneuvers to rendezvous and dock with the Space Station or Hubble [telescope]," she says. "During entry, we track the shuttle and manage its energy to ensure it makes the runway and touches down at a good speed."

"The shuttle cannot circle around and have another shot at the runway if we miss it. We have to get it right the first time," Gruber explains.

During the annual Alumni Awards Dinner and Ceremony, President Robert Brown said the recipients' "achievements say something about the impressive quality of education we hope you received here. The honorees reflect the University's highest ideals: creativity, innovation, leadership, service and academic accomplishment."

This award is traditionally presented during Homecoming Weekend at a special Young Alumni event, says Umlas. In 2006, the Alumni Awards committee made the decision to incorporate the Young Alumni category in the University-wide Distinguished Alumni Awards ceremony. In 2007, the University conferred these awards during Winterfest Weekend, in the Metcalf Trustee Center.

Emerging Technology Seminars Examine Topics From Clean Energy to Cancer Detection

By Kate Fink

On Friday, April 27, the College of Engineering and the School of Management co-hosted a daylong seminar, "Clean Energy: Pathways to Adoption." The event, part of the Emerging Technology and Best Practices Seminar Series, examined the developing landscape of clean energy. Nearly 200 attendees—including industry representatives, alumni, BU faculty and students—listened to 19 speakers discuss promising technologies, investing in clean energy, efficiency and conservation, and challenges to adoption.

University President Robert Brown opened the seminar by noting the importance of university-based research in addressing such big technological challenges. Technology still used by the petroleum industry originated in university laboratories decades ago, he said, and today, "Our solutions will come from a complex interplay of many technologies."

On Friday, November 30, the Emerging Technology Seminar turns to the topic of optical imaging and its applications in detecting cancer. The event will focus on progress and new directions in optical imaging technology for use in cancer diagnosis and therapy.

The seminar will give Boston University researchers, alumni, students, area academics and industry representatives a chance to communicate about some of the most recent developments and challenges in optical imaging of cancer such as tissue depth penetration and sensitivity and specificity of molecular markers.

More details about the event, "Optical Imaging for Medicine and Biology: Applications in Cancer Detection," including a list of speakers and online registration, are available at *www.bu.edu/eng/etseminar*.

Uday Pal discusses BU's many complementary areas of expertise in clean energy research at the April 27 Emerging Technology Seminar. [Photo courtesy of Andrew Abrahamson]

Hard Work, Anxiety, Relief Mark Seniors' Rite of Passage

By Kate Fink

Bundles of nervous energy wearing their best suits paced and eddied around the Photonics Building's second-floor atrium at 7:30 a.m. on Friday, May 4. Senior Project Day, the culmination of every engineering undergraduate's four years of education and months of project work, was about to begin. Composed and well studied, the seniors took a deep breath as they prepared to present their projects to audiences of faculty, industry representatives, alumni and fellow students.

"A lot, a lot, a lot," says Olga Starobinets (BME), in answer to how many times she rehearsed her presentation. She presented work resulting from the 20 to 30 hours a week she spent at Boston Scientific designing and testing strategies for loading painkiller drugs into drug-eluting ureteral stents. "This was a chance to go in and try industry research," she says. "It was fun."

"It's tough because the presentations are only nine minutes long, but it's a whole year of work," says Nimesh Patel (BME) who said he rehearsed his presentation about 20 times. Patel presented his research on computational models for studying how structural features of the airway contribute to asthma.

Monica Ortiz (BME) estimates that by the end of second semester, she had spent 40 to 45 hours a week on her project. She researched why shock wave lithotripsy, the technique used to pulverize kidney stones, sometimes fails. "You really do become invested in your project and want to spend more and more time on it," she says. "I literally just went to class and lab."

For students in the Biomedical Engineering Department, now in its 22nd

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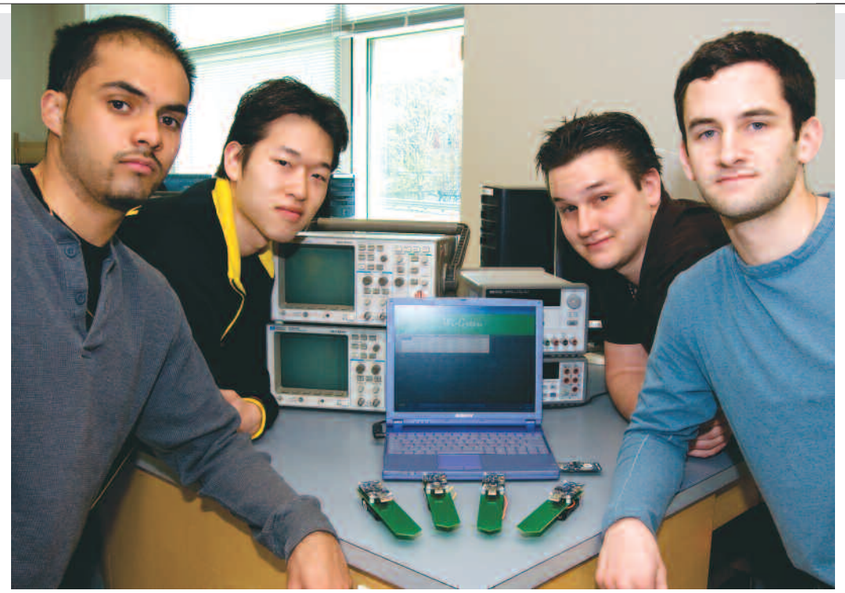


The Wi-Green, a wireless system that senses when plants need watering won (from left) Naman Gupta, Philip Kim, Gregg Fischer and Kurt Matarese the P.T. Hsu Memorial prize for outstanding senior design project in the ECE department. [Photo courtesy of Gordon Ryan]

year of senior projects, completing a research project is a solo endeavor. Other departments' students form teams, allowing them to take on the many components of a big project.

"We've done group projects for 15 years or so—it reflects where most of our students go. They're going to work in an engineering company of some sort, in a team setting," says Professor Michael Ruane (ECE), who has taught at the College of Engineering for 27 years and advised ECE seniors on their projects for the last 13. "When they come back as alumni they tend to talk about the interpersonal work of working on the team more than the technical aspects. Everyone faces the problem of how to interact with other engineers in the most productive way," he said.

Evan Butler, a senior studying aerospace engineering, noticed the importance of solid teamwork in attaining his team's goals. "You can't design each piece independently," said Butler. "It's so interwoven. There was constant contact, communication and sacrifices among the areas." He and teammates Wesley Caissie, Genevieve Betro, Philip Diette, Michael McManus and Scott Owen designed a submarine-deployed unmanned aircraft for military reconnaissance missions. Each team member specialized in one area—from the plane's launch out of a torpedo tube to its self-destruction upon re-entry into the water. The team received the Senior Project Award for outstanding design in aerospace engineering. The best part, says Butler, was realizing that, "As a team, we made it and it would work."

Dedication and colossal time commitment marked the students' progress throughout the year as they researched, designed, built and troubleshot their projects over the months leading to the presentation day. "We worked through spring break," says Philip Kim (ECE). "That lab is our second home, but it's worth it. It's our most important class." Kim and teammates Gregg Fischer, Naman Gupta and Kurt Matarese developed the Wi-Green, a wireless sensing system for greenhouses that detects soil moisture in many locations. The team won the P.T. Hsu Memorial Award for the outstanding senior design project in the ECE department.

"They were aggressive on their schedule, and they were able to go through several revisions. It not only worked, but it worked correctly," says Ruane. "They had very balanced responsibility—everyone on the team individually accomplished some good goals."

Ruane bills the senior projects not as the students' last class at the College of Engineering but as their first professional experience. This interaction with real businesses and real engineering challenges sets BU's senior projects apart from those of other universities.

"The projects have gotten more sophisticated in their technical complexity and they have attracted more outside customers than they used to," says Ruane. "We've created a very highly professional environment where the students are really expected to use professional tools, work with real vendors, and be concerned about legal and standard-based issues like intellectual property."

Seniors are well prepared for a variety of future endeavors after completing and presenting these projects. The experience of applying their classroom work will serve the newly minted engineers well as they move into industry, graduate studies and medical schools.

"This combines everything we had to learn in manufacturing, and we had to put it all together," says Kelsey Coletti (MFG). She and teammates Colin Kelly-Rand and Yosef Rantz worked to improve the design and manufacture of turboshaft jet engine components for General Electric Company. "It got me my job," says Coletti, who talked about the project during a job interview.

As Senior Project Day wore on, the ratio of relief to anxiety among seniors gradually shifted higher as the last PowerPoint slides clicked off, ties loosened and congratulations echoed through hallways and seminar rooms.

"Today you stand on your own accomplishments," said Dean Kenneth R. Lutchen in closing. "The things you work the hardest at should make you the proudest. The hard is what makes it great. You should feel extraordinarily proud."

The Final Countdown

By Kate Fink

At the May 20th College of Engineering Commencement ceremony, computer networking consultant Nicholas Lippis advised graduates on the opportunities, identity and connections that come with being BU alumni. "Every generation has its moment of great opportunity," he said.

Cameras and umbrellas were the accessories of the day at the 54th College of Engineering Commencement. Graduates, friends and families stepped out of the rain into the dry interior of the Track and Tennis Center, where frequent camera flashes, mylar balloons and congratulatory flowers reigned.

The College awarded 232 undergraduate degrees, 91 master's degrees, and 45 doctoral degrees to students completing requirements in the past year. This year's class included 13 nontraditional students graduating from the Late Entry Accelerated Program (LEAP), constituting the largest class in this program's 27-year history. LEAP offers individuals with undergraduate degrees in other fields—from fine arts to business—a unique opportunity to earn master's degrees in engineering.

Lippis has designed some of the largest computer networks in the world and is a renowned authority on corporate computer networking. Now the president of Lippis Enterprises, Inc., he received his bachelor's degree in electrical engineering and master's degree in systems engineering from BU in 1984 and 1989, respectively.

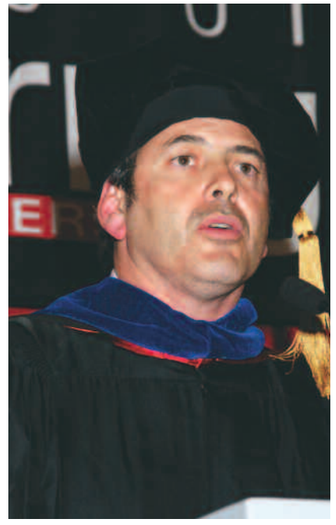
Lippis spoke about his personal experiences in engineering, starting out at Digital Equipment Corporation before striking out on his own to become a consultant. Information technology solutions that improve companies' business processes and their ability to serve customers, he said, marked his generation's impact on the world.

"When I look at my generation of engineers, we're improving the human experience," he told the graduates. "Your generation—you—has the unprecedented opportunity to improve the human condition." Developing green energy solutions, biotechnology and nanotechnology will be the challenges of their era, he said.

He also reminded members of the Class of 2007 that their specialized education offers them a nearly limitless range of possibilities. "There is no single definition of what an engineer does. An engineer's greatest asset is the way we're taught to think deeply and solve many problems," said Lippis. Whether they become engineers, venture capitalists or CEOs, he urged graduates to "make a personal commitment to understand the ecosystem of your industry. Identify key trends. Become a player. Don't be afraid of failure and don't be afraid of responsibility. Don't let anyone deflate or calm your passion for your career."

Lastly, he told the graduates to stay connected to BU. "Give back to the community that helped give you your success," he said. More than simply sending dollars, Lippis emphasized maintaining a connection of time and expertise, collaborating with the College of Engineering on a more meaningful level. "BU is very family-friendly," he said, pointing out his family in the audience. "You're always welcome back at BU."

Maggie Koker, who received a bachelor's degree in mechanical engineering *magna cum laude*, delivered the student address. She spoke to her classmates about her efforts to sum up their BU experience using lists. Coming to BU, she made lists of essentials to bring—sheets, towels and toiletries. Once here, she went through, "two laptop computers, 600 sheets of graph paper, over 3,000 homework problems and 50 gallons of coffee." Koker said she soon realized this list didn't really do justice to her BU experience. "This has been about gaining a deep knowledge of engineering concepts, ethics, and teamwork."



Nicholas Lippis

After all the diplomas had been handed out and the electronic scoreboard above the stage flashed each student's name in red lights, the opening keyboard riff of "Final Countdown" by '80s rock band Europe started graduates on their recessional walk. The graduates and their families wandered outside, where the rain had given way to perfect picture-taking weather—a glimpse of sun through the receding dark storm clouds.

Ünlü Named Associate Dean for Research and Graduate Programs

By Michael Seele

College of Engineering Dean Kenneth R. Lutchen has appointed Professor **Selim Ünlü** as the College's associate dean for Research and Graduate Programs. Ünlü, a faculty member in the Department of Electrical and Computer Engineering, assumed this role on September 1.

"Research and the education of our graduate students are critically important to the College's future," said Lutchen. "Selim Ünlü has proven himself a leader in innovation and is ideally suited to guide the College to new heights in graduate research."

Ünlü takes over for Professor Mark Horenstein, who announced earlier this year that he would return to the ECE faculty full time. Horenstein has held the position since 1998.

"The tremendous progress the College has made in its research and graduate education initiatives over the past decade is due in large measure to Mark's efforts and guidance," Lutchen said. "On behalf of the faculty, I'd like to thank him for his service and for his continuing involvement as a member of the faculty."

A native of Turkey, Ünlü joined the ECE Department as an assistant professor in 1992, shortly after earning his Ph.D. in electrical engineering from the University of Illinois, Urbana-Champaign. He has been a full professor since 2003.

Ünlü's research interests are in the areas of nanophotonics and biophotonics. Currently, he is working on high-resolution solid immersion lens microscopy of semiconductor devices and circuits, as well as biosensor fabrication and development of biological imaging techniques, particularly in high-throughput, label-free microarrays. He has authored or co-authored more than 100 journal articles and several book chapters and magazine articles; edited one book; holds three U.S. patents and has several pending. He has presented more than 100 invited talks at conferences, departmental colloquia and other research institutions and has participated in various international conference organizations. At Boston University, he has supervised more than a dozen Ph.D. dissertations.

His contributions to the field of optoelectronic devices earned him elevation to Fellow of the Institute of Electrical and Electronics Engineers earlier this year. He has long been active in the IEEE, having served as chair of its Laser and Electro-Optics Society and winning the LEOS Chapter of the Year Award with the Boston Chapter. He serves as the founding chair of the IEEE/LEOS technical subcommittee on nanophotonics and is past chair of its technical subcommittee on photodetectors and imaging. He is an associate editor for *IEEE Journal of Quantum Electronics* and has

Selim Ünlü

been selected as a LEOS Distinguished Lecturer for 2005–2007 and Australian Research Council Nanotechnology Network Distinguished Lecturer for 2007.

Ünlü won a National Science Foundation Research Initiation Award in 1993, a United Nations TOKTEN award in 1995 and 1996, and both the National Science Foundation CAREER and Office of Naval Research Young Investigator awards in 1996.

Three Faculty Members Earn Promotions

By Jason L. London

Three members of the College of Engineering faculty, from three separate departments, received promotions at the beginning of this academic year.

Bela Suki was promoted to professor in BME. Suki's research involves characterization of the mechanical properties of soft biological tissues and developing techniques to measure the tissue's rheological properties. His research interests also include the ensemble behavior of complex biological systems and nonlinearities in biological systems.

Suki, whose career at Boston University began in 1991, earned his master's degree in physics in 1982 and his doctorate in biomechanics from Jozsef Attila University in Szeged, Hungary, in 1987.

In 2006, Suki received a Coulter Foundation grant to develop a novel system to prevent ventilator-induced lung injury.

Todd Murray was promoted to associate professor with tenure in AME. Murray also serves as the director of Boston University's Laser Acoustics Laboratory. His research interests include developing photoacoustic and photothermal microscopy systems, modeling pulsed laser generation of acoustic waves and wave propagation in multilayer and graded materials systems.

He received his bachelor's degree in biomedical engineering from Johns Hopkins University in 1992 and remained there for his master's and doctoral degrees in materials science and engineering in 1995 and 1998, respectively. He joined the faculty of BU in 2001.

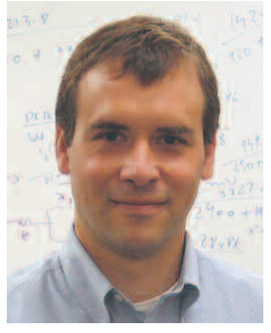
He is a member of the American Society of Mechanical Engineers (ASME), the Optical Society of America (OSA), and the Acoustical Society of America (ASA).

Srikanth Gopalan was promoted to associate professor with tenure in MFG. An assistant professor at Boston University since July 2001, he earned his bachelor's degree from the Indian Institute of Technology in 1990 and his doctorate in materials science and engineering from the University of Utah in 1997.

As Director of BU's Green Manufacturing Lab, Gopalan has research experience in solid state ionics and high temperature materials developing solid oxide fuel cells, ceramic processing science and gas separation membranes.

Prior to his appointment at Boston University, Gopalan was the senior scientist at Siemens Westinghouse Power Corp. from 1997–2001. He is a member of the Electrochemical Society and Materials Research Society.

Bela Suki



Todd Murray

Srikanth Gopalan

ENG Welcomes New Faculty

By Jason L. London

Hatice Altug, an assistant professor, joined ECE in January from Stanford University, where she earned her doctorate in applied physics and master's degree in electrical engineering. She received her bachelor's degree in physics from Bilkent University in Ankara, Turkey.

Altug's demonstration of the world's fastest on-chip semiconductor laser was the cover story of the July 2006 issue of *Nature Physics* and highlighted in *Nature Photonics* and *Laser Focus World* magazines. She won an award for the best research paper at the November 2006 IEEE LEOS Conference and received the IEEE LEOS Research Excellence Award in October 2005.

Hatice Altug

Xi Lin

Xi Lin, an assistant professor, has joined AME from the Massachusetts Institute of Technology, where he was a research assistant from 1999–2003 and a postdoctoral research associate from 2003–2007. He received his bachelor's degree in chemistry and computer science from China's Peking University in 1996 and his doctorate in chemistry from MIT in 2003.

Lin has also worked as a research assistant at the University of Pennsylvania and Peking University. He was awarded three separate grants from Honda R&D Co., Ltd., between August 2005 and March 2007 for his resesarch on conducting polymers. Lin's work has been covered on CNN, *The Financial Times*, and the *MRS Bulletin*, among other media outlets.

Interim Department Chairs Named for BME, ECE, AME

College of Engineering Dean Kenneth R. Lutchen has appointed three *ad interim* chairmen for the 2007–08 academic year: **Solomon Eisenberg** in the Biomedical Engineering Department; **David Castañón** in the Electrical and Computer Engineering Department; and **Ronald Roy** in the Aerospace and Mechanical Engineering Department. The three senior faculty members will hold the positions while the search for permanent chairs is under way. Eisenberg will also retain his duties as the College's associate dean for Undergraduate Programs.

Eisenberg—a full professor in the Biomedical Engineering, and Electrical and Computer Engineering Departments—has overseen the College's undergraduate programs since 1998 and served as the College's dean *ad interim* during the 2005–2006 academic year. He was the chief architect of the College of Engineering's Study Abroad programs and is co-principal investigator on a Biomedical Engineering Research Experience for Undergraduate Site grant from the National Science Foundation.

"Sol Eisenberg's intimate knowledge of the College from his longstanding leadership in both academic and administrative roles will lend itself to his guidance of the Biomedical Engineering Department as it maintains its excellence in teaching and continues to chart an innovative and productive path in research," said Lutchen.

Eisenberg joined the College of Engineering faculty in 1983 after completing his doctorate at the Massachusetts Institute of Technology. His biomedical engineering research has focused on understanding electrically mediated phenomena in tissues and biopolymers and computational modeling of electric field distributions in the human heart and thorax during defibrillation.

Castañón joined the faculty of the ECE Department as an associate professor in 1990 and was promoted to full professor in 1999. This year, he won the department's Teaching Excellence Award.

"David Castañón is a leader in the laboratory, an excellent instructor and a thoughtful member of the faculty who cares deeply about ECE and the College as a whole," said Lutchen. "He is well respected by his peers on the faculty and in the profession and I am grateful for his service as chairman *ad interim*."

Castañón replaces Professor Bahaa Saleh, who has returned to full-time faculty duties after serving as ECE chairman since 1994.

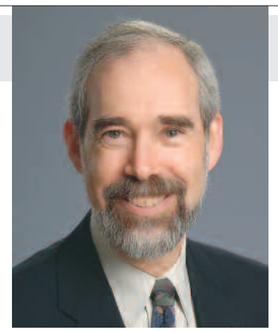
Long active in the Control Systems Society of the Institute of Electrical and Electronics Engineers, Castañón received the society's Distinguished Member Award in 2006 and is its president-elect this year. Last year, he was selected to join the Air Force Scientific Advisory Board, which serves as a link between the service and the nation's scientific community. Additionally, he is co-director of the Center for Information and Systems Engineering at the College of Engineering and associate director of the National Science Foundation Engineering Research Center on Subsurface Sensing and Imaging Systems.

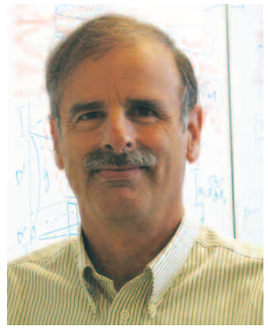
Ronald Roy steps into the AME chairmanship after spending a year abroad as a visiting professor at the University of Oxford. He joined the College of Engineering faculty in 1996 and was promoted to full professor in 2002. He succeeds John Baillieul, who has served as AME chairman since 1999 and will return to a faculty position.

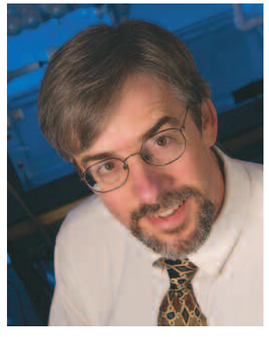
"I'm very excited about the challenges of this position," said Roy. "Our goal is to increase the national rankings of the College and enhance the visibility, capability and productivity of the department."

Roy's research focuses on applying physical acoustics principles to problems in biomedical acoustics, industrial ultrasonics and acoustical oceanography. In addition to his interest in the acoustics of bubbles and bubbly media, he and some colleagues recently developed new techniques for imaging the optical properties of soft tissues through the nonlinear interaction of light and sound.

Roy is a fellow of the Acoustical Society of America and a member of the American Society of Mechanical Engineers and the International Society of Therapeutic Ultrasound.







From top: *Solomon Eisenberg, David Castañón, Ronald Roy*

Baillieul Elected VP, Board Member at IEEE

By Katelyn Boller

Professor **John Baillieul** (AME) has been elected vice president of publication services and products for the Institute of Electrical and Electronics Engineers (IEEE).

According to Baillieul, who is on the IEEE board of directors and chairs the publication services and products board, the IEEE's publications constitute "the biggest business line of the IEEE."

"We're in the process of doing mainly strategic planning, looking at the finances of publications and taking care of policies," he says. "There is more of an interest in scholarly and technical publishing throughout the world."

Baillieul points out that due to new technology, scholarly and technical publishing has gone through large changes since its beginnings.

"About 20 years ago all scholarly publication was through technical journals," he says. "Everybody who published would publish through these journals and people would join organizations in order to have access to the journals so they could keep up with their fields."

In the last five years virtually all technical publications have become available on the Internet, with some authors bypassing established journals by self-publishing. "There are search engines that index all of these things," says Baillieul. "The whole business has changed."

As the new vice president of publication services and products, Baillieul has to ensure that the IEEE is fully utilizing these new technologies to create archives of their own publications.

"One of the things that you have to be concerned about if you are running a $400 million corporation whose business is publishing is how to continue to deliver value and make this something that is a real service and worth money," says Baillieul.

"This is an extraordinary honor and responsibility for John," says Dean Kenneth R. Lutchen. "He will undoubtedly bring the leadership and vision to address quality in these publications and the operational challenges. From the College's perspective we are very proud that someone of John's scientific and professional stature derives from Boston University."

The IEEE is the largest international organization for professional engineers, comprising 39 societies and 5 technical councils, each representing an area of electrical and electronics engineering. Baillieul has been a member of IEEE's Control Systems Society since 1983.

John Baillieul

Acoustical Society of America Honors William Carey

By Jason L. London

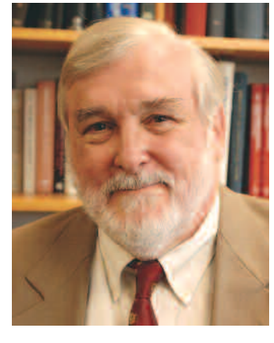
The Acoustical Society of America has awarded Professor **William M. Carey** (AME) the "2007 Pioneer of Underwater Acoustics" silver medal for his contributions to understanding ocean ambient noise and defining the limits of acoustic array performance in the ocean.

According to the Acoustical Society of America, the "Pioneer of Underwater Acoustics" medal is awarded to "an individual, irrespective of nationality, age, or society affiliation, who has made an outstanding contribution to the science of underwater acoustics, as evidenced by publication of research results in professional journals or by other accomplishments in the field." Only 16 other individuals have earned this distinction since the medal was introduced in 1959.

"This award really caught me completely by surprise," Carey says. "To me, it's

Continued on page 26

William Carey



a very significant award, especially because it was voted on by people I've worked with over the years. It's true recognition by your peers."

An AME professor since 1999, Carey's acoustical work and research has centered on the imaging, ability and resolution of underwater acoustic antenna known as arrays. Arrays were used by the U.S. Navy during the Cold War to track submarines off the coasts and more recently have been used to listen to and study the environment of marine mammals.

Carey's most recent and continuing research has focused on two areas: the development and demonstration of hydrophone arrays, and the measurement of directional ambient noise produced by microbubble clouds.

The arrays are towed by autonomous underwater vehicles and detect sound around shallow water coastal areas and ports. Carey's research has contributed to improved understanding of sound propagation, the predictability of propagation and the limits of spatial coherent signal processing. It has also helped determine that the microbubble clouds produced by breaking waves can radiate low-frequency sound and has produced the measurement of the physical acoustic properties of oceanic bubble distributions.

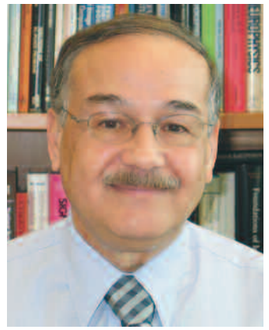
"What we did was determine how much ambient sound is produced in the ocean if all of the ships—and everything else—are removed," he says. "This was an important discovery on an environmental level, oceanic level, and a military level."

This is not Carey's first honor in oceanic achievement. During his tenure at Boston University, Carey has received the 1999 Distinguished Technical Achievement Award by the IEEE/Oceanic Engineering Society of America, the IEEE/Oceanic Engineering Society 3rd Millennium Award in 2000, and the 2005 IEEE/Oceanic Engineering Society Distinguished Service Award. He is a member of the Cosmos Club and of Sigma Xi, a Fellow of the Acoustical Society of America, a Fellow of the IEEE, and Editor Emeritus of the *Journal of Oceanic Engineering*.

Kuwait Prize Spotlights Optics Expert

By Kate Fink

The Kuwait Foundation for the Advancement of Sciences awarded the 2006 Kuwait Prize in Basic Sciences to Professor **Bahaa Saleh** (ECE), deputy director of the Center for Subsurface Sensing and Imaging Systems.



Bahaa Saleh

The foundation awards two prizes annually, one for Kuwaiti citizens and the other for citizens of Arab countries, in each of five fields: basic sciences (this year in the specialty of optical science); applied sciences; and three humanities disciplines. The science awards acknowledge significant intellectual achievements and scientific advancements.

Saleh's contributions to optical science include extensive research in squeezed and entangled light. Squeezing light can remove its random fluctuations, forcing individual photons to behave in more regular, predictable ways. The technique is akin to restricting the random flow of traffic by requiring 100 feet between cars on a highway. With many cars on the road, a regular pattern will develop. Saleh was the first to achieve this regular stream of photons in experiments, reducing randomness by enforcing an effective photon repulsion.

A second area of Saleh's interest, light entanglement, involves studying the connection between pairs of photons. If two entangled photons separate as they are emitted from a light source and travel in opposite directions, quantum physicists have found that observing one of the twins affects the other, despite the physical separation. Einstein didn't believe this, calling the phenomenon "spooky action at a distance," but today's quantum physicists do, calling into question long-held perceptions of the reality of the world around us. The fundamental and philosophical questions in this area of research intrigue Saleh.

"In engineering, we want to understand how the world behaves in the deepest possible ways, but we are also interested in how properties of the world can be exploited to design systems that have benefit for us," he says.

Applications of Saleh's work in quantum entanglement include metrology—using light to measure surface properties of materials—and biological imaging. Specifically, Saleh works on optical coherence tomography, a medical diagnostic method that uses light to create three-dimensional images, for example, sections of the retina. His work with Professors Malvin Teich and Alexander Sergienko at BU's Quantum Imaging Laboratory aims at improving this method and may lead to the ability to capture higher resolution images with greater diagnostic power.

Smith Honored with Award in Vienna

By Michael Seele

The International Society for Computational Biology honored Professor **Temple Smith** (BME) for his contributions to the field of bioinformatics with its Senior Scientist Accomplishment Award at its annual conference in Vienna, Austria, in July.

According to the ISCB, the Senior Scientist Accomplishment Award recognizes members of the computational biology community who are more than 12 to 15 years postdegree and who have made major contributions to the field of computational biology through research, education or service, or a combination of the three. Smith codeveloped the Smith-Waterman sequence alignment algorithm, the standard tool underlying most DNA and protein sequence comparison.

A nuclear physicist by training, Smith joined the Los Alamos National Laboratory in the 1970s, where he helped found GenBank and began applying computational mathematics to biological problems. In the nascent field of bioinformatics, Smith and colleague Michael Waterman were among those searching for a reliable mathematical method for searching separate strands of DNA for short sequences of proteins known to have similar functionality and aligning them.

A serendipitous event occurred in 1980 when Waterman visited Smith, who was on sabbatical at Yale University. As the pair walked to lunch, they passed through the geology department lobby, where two large core samples on display stopped them in their tracks. Similar sequences of strata on different columns were connected by strings, and Smith and Waterman immediately saw the columns as strands of DNA and the comparable strata as the short protein sequences they were trying to align.

"We now faced the possibility that a geologist had solved the problem before us," Smith says. Resigned, Smith and Waterman visited the geology chairman and asked how the sequence alignment had been done. Their mood elevated when the chairman informed them that visual observation and string were as far as anyone had advanced with a solution.

"Lo and behold this was an unsolved problem in geology," Smith says. "This resulted in our first geology paper, basically written over the next couple of days." With a fresh perspective, the team returned to bioinformatics work and published the Smith-Waterman sequence alignment algorithm the following year. It remains one of the most referenced papers in molecular biology.

Smith arrived at Boston University in 1991 and established the BioMolecular Engineering Research Center, which he directs. Early on, he organized a series of "Genes and Machines" workshops on the use of computer analysis in modern biology that introduced many young researchers to bioinformatics. The center's research has focused on problems in the reconstruction of evolution and the structure of proteins. The latter was one of the early applications of the Markov Model (used in voice-recognition and the prediction of stock market trends) to predict the three-dimensional structures of proteins.

Temple Smith

Smith cofounded Modular Genetics, a gene and protein engineering company based in Cambridge, Massachusetts.

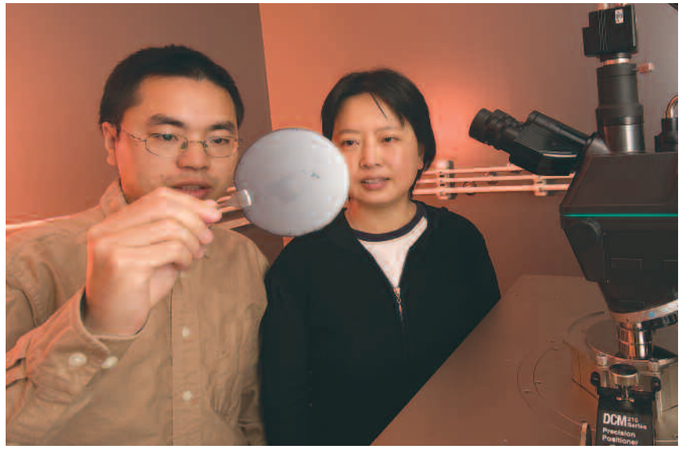
National Academy of Engineering Honors Xin Zhang

By Kate Fink

The National Academy of Engineering selected Associate Professor **Xin Zhang** (MFG) to participate in the 13th annual U.S. Frontiers of Engineering Symposium. Eighty-three engineers between the ages of 30 and 45 from across the country received invitations to the September meeting. The invitees, nominated by engineers or organizations and chosen from among more than 260 applicants, include representatives from industry, academia and government with research interests spanning a broad range of engineering and technical disciplines.

The NAE symposium gives a group of innovative, emerging leaders in engineering the opportunity to foster collaborations across disciplines by discussing several large-scale engineering challenges. The meeting at Microsoft's Redmond, Washington, campus, addressed trustworthy computer systems, safe water technologies, modeling and simulating human behavior, biotechnology for fuels and chemicals, and the control of protein conformations.

"It's interesting to go there. It's important," says Zhang. "You have a chance to interact and participate in dis-



Xin Zhang and former graduate student Shusen "Forest" Huang inspect arrays of tiny infrared sensors

cussions of important issues in science and engineering, and it's very open—you have a chance to speak with people from government labs, industry and academics." She hopes to contribute to the discussion on biotechnology for fuels and chemicals in particular.

Zhang came to the College of Engineering in 2002 from MIT, where she was a research scientist in the Microsystems Technologies Laboratory and Gas Turbine Laboratory. Her research in manufacturing engineering at BU includes work on biological, photonic, and power applications of microelectromechanical systems (MEMS) as well as developing new manufacturing technologies and materials for MEMS and NEMS.

AME's Katherine Yanhang Zhang wins DARPA Young Faculty Research Award

Katherine Yanhang Zhang (AME) was recently awarded a Defense Advanced Research Projects Agency (DARPA) Young Faculty Research Award for her proposal titled "Micro- and Nano-Mechanics of Thin Film and Thin Film Coatings."

Through the Young Faculty Research Award program, DARPA awards grants to nontenured assistant professors with tenure-track positions proposing innovative research that could lead to revolutionary advancements in the state of the art in any of five areas: electronics, photonics, microelectromechanical systems (MEMS), architectures, or algorithms. Only 10 awards are presented annually, each for $150,000.

Zhang is a Clare Boothe Luce Assistant Professor at the College of Engineering. Her research focuses on understanding the mechanical behavior of soft biological tissues and composites at multiscale using both experimental techniques and advanced computational modeling. Her research interest also lies in the mechanical characterization of MEMS and NEMS structures.

Zhang explained that the growing interest in device miniaturization to micro- and nano-scale has posed a new challenge for the development of reliable design and analysis tools; however, mechanics within and between films and coatings at this scale are not fully understood. "The successful completion of this project will bridge the gap between basic research and microelectromechanical systems (MEMS) applications, and is critical for future technology development," she says.

Katherine Yanhang Zhang

Zhang's research integrates knowledge of biology, nonlinear solid mechanics, and finite element modeling. She did her graduate work in mechanical engineering from the University of Colorado at Boulder and previously attended Tsinghua University, where she earned her undergraduate degree in engineering mechanics.

↑ Red Sox Versus White Sox, July 22, 2007

Alums, friends and families enjoyed a pre-game meal at Fenway Park before heading into the stands to cheer the Red Sox on to victory over the Chicago White Sox.

Photos top left to right:

Rick Paul ('72), center, *and family*

From left, *Katherine Greaney ('00), Mike Greaney, Paula Jedzinak and Robert Jedzinak*

Middle Photo:

Peter Cocolis ('64), second from right, *and family*

↓ Nashoba Valley Ski Trip, March 3, 2007

A trip to Nashoba Valley ski area in Westford, Massachusetts, gave alumni a chance to catch up on the slopes and in the lodge.

Photos bottom left to right:

Corin Williams ('04) and Richard Williams ('04)

From left, *Mose Tse, Briana Tse, Lisa Lam ('99) and Sabrian Lam*

AlumniEvents

Dean's Receptions

Dean Lutchen traveled the country earlier this year to visit with alumni in California, Florida, Washington, D.C. and New York.

Photos top left to right:

Bettina Briz Himes ('86) and Dean Lutchen at the Palo Alto, California, reception

In New York City, from left: Dean Lutchen, Lawrence B. Tena, MD ('88), Brett Bu Sha ('94), and Shrenik Daftary ('96)

Middle Photo:

At the San Diego, California reception, Lauren Cheney ('00), Dean Lutchen and Gerardo Sanabria ('02)

Bottom Photo:

At the Palo Alto, California, reception, Samuel Lipson ('88), Mark Deem ('88), Dean Lutchen, Richard Scully ('81), and Michael Foster ('05)

ClassNotes

1985

Juan J. Diaz Colocho, BS
San Salvador, El Salvador
Juan was recently elected as a board member of the American Chamber of Commerce of El Salvador and Chairman of the trade and investment committee of the chamber. He writes, "I have recently traveled throughout Japan, China, Hong Kong, Los Angeles, and Dallas, where I have met with lots of BU alumni and colleagues from the American Chamber of Commerce. I would love to hear from all former classmates as well as from friends of the international community." E-mail Juan at *juandiaz@alum.bu.edu*.

Albert P. James, BS
Boston, Massachusetts
Albert is a senior project engineer at Axcelis Technologies. He is working on the development of the next generation of ion implanter machines for the semiconductor capital equipment industry. E-mail Albert at *albertjames@comcast.net*.

Johanna Rothman, MS
Arlington, Massachusetts
Johanna published *Manage It! Your Guide to Modern, Pragmatic Project Management* (Pragmatic Bookshelf, 2007), a guide for software project managers.

Alex W. Thomson, BS
Pittsburgh, Pennsylvania
Alex was recently reelected to the executive committee of Houston Harbaugh, one of the largest law firms in Pittsburgh.

1990

Alan Taboada, BS
Eatontown, New Jersey
Alan and his wife Judy are proud to announce the birth of a baby boy, Atticus James, who was born on January 18, 2007 in Long Branch, New Jersey, and weighed 7 lbs., 15 oz. They write, "This is our first child and the parents are doing as well as can be!"

Alan also reports that after working in intellectual property law for over five years, he has recently been made a partner at Moser IP Law Group in Shrewsbury, New Jersey. E-mail Alan at *ataboada@moseriplaw.com*.

1991

Evan Sherr, BS'91, MS'96
Acton, Massachusetts
Evan recently joined Neuroptix Corporation, a development-stage company focused on developing a non-invasive diagnostic test to diagnose Alzheimer's disease at its earliest stages, as Vice President of Product Management.

1994

Craig Anthony Bernero, BS
Upton, Massachusetts
Craig was recently promoted to global senior director/business general manager of EMC Corporation's global services infrastructure software division and environment support. He and his wife Kim have three children, Kyle, Julia, and Grace. E-mail Craig at *cbernero@resourceful.com*.

Michele Friedman, BS
Baltimore, Maryland
Michele graduated *summa cum laude* with a doctorate in pharmacology from the University of Maryland School of Pharmacy in May. She recently married John L. Sharkey in Cancun, Mexico. E-mail Michele at *friedmanmichele@hotmail.com*.

1998

Alex D. Kondé, BS
Vienna, Virginia
Alex and his wife Pamela announced the birth of their third child, Gabriela, on January 17, 2007. She joins sister Sophia, age five, and brother Joshua, age three. Contact them at *alex.konde@neustar.biz* or *akonde@cox.net*.

Greg Semeraro, BS
Fairport, New York
Greg writes, "I have recently embarked on a new phase of my career: I am in business for myself as a consultant. I am enjoying the challenges and would enjoy hearing from old classmates." Contact Greg at *semeraro@ieee.org*.

1999

Nikesh Kotecha, BS
Stanford, California
Nikesh and Masumi Patel (SMG'99, MET'02) were married on July 3, 2006, in Atkinson, New Hampshire; stories and pictures can be found at *www.masumiandnikesh.com*. Nikesh is a doctoral candidate in biomedical informatics at Stanford University and Masumi is a product manager for Verizon Communications. E-mail them at *masumi@alum.bu.edu*, *nikesh@alum.bu.edu*, or *masumiandnikesh@gmail.com*.

2000

Lisa (Waterhouse) Rogers, BS
Londonderry, New Hampshire
Lisa and her husband Rob (CAS'00) announce the birth of their second child, Cole Alphonse, on June 5, 2007. Contact them at *lisawrogers@verizon.net*.

Loretta (Hawkes) McHugh, BS
Thompson, Connecticut
Loretta and her husband Evan announce the birth of their daughter, Margaret Catherine Elizabeth, on February 18, 2007. Loretta writes, "Maggie can't wait to go to her first hockey game in the fall!" Contact Loretta at *loretta.hawkes.2000@alum.bu.edu*.

2001

Lisa (Mraz) Goodman, BS
Metuchen, New Jersey
Lisa married Michael Goodman on October 28, 2006, in Princeton, New Jersey. Carissa Bellardine Black (BS'01, PhD'05) was the matron of honor, and Katharine McDonald (BS'01) and Danielle Sockolosky (SAR:BS'01, MS'03) were both in the bridal party. Lauren Black (BS'03, MS'06), Michael Hobson (BS'01), and Vanessa Hobson (BS'02) attended. Lisa is a territory manager for State of the Art Medical products in Manhattan, and Michael is a product manager for consumer GPS navigation software at ALK Technologies.

2002

Jason Light, BS'02, MS'04
Fort Lewis, Washington
Jason was promoted to captain in the U.S. Army on May 1, 2007. When he wrote, he was about to become an environmental engineer at the U.S. Army Center for Health Promotion and Preventive Medicine. Contact Jason at *jasonrlight@yahoo.com*.

2004

Nicholas Pratt, BS'04, MS'06
Bennington, Vermont
Nicholas and Jasmine Marrero (CAS'04, CGS'02) of Bennington, Vermont, became engaged in April 2007 and are planning a Fall 2008 wedding. Nicholas is an engineer at Vermont Composites, a structural composites production company, and Jasmine is an early childhood clinician at Rutland Mental Health Services. E-mail them at *jasminecmarrero@yahoo.com*.

What are you doing?

We want to hear from you! Send your class notes submissions to *engalum@bu.edu*.

By Jason L. London

Alums Honored for Service

The annual Alumni Award ceremony honored three individuals this year. The awards recognize alumni service in several capacities, highlighting contributions that College of Engineering graduates have made to their professions, communities and Boston University.

SERVICE TO PROFESSION AWARD

The Service to Profession Award honors alumni whose work has significantly contributed to the advancement of their profession and brought them recognition within their field. Providing they are active members who have made a significant contribution to the field, involvement in engineering societies counts as service to the profession.

Warren M. Grill, Ph.D. ('89)

An associate professor of Biomedical Engineering at Duke University, Warren M. Grill is one of the nation's leading experts in neural stimulation and neural prostheses.

Grill was named the 2003 Neurotechnology Researcher of the Year by *Neurotech Business Report* and, along with his colleagues, was the recipient of the 2002 Excellence in Neural Engineering Award by the IEEE-EMBS/BMES. Grill serves on the editorial boards of the *IEEE Transactions on Neural Systems and Rehabilitation Engineering* and *Neuromodulation* and is a consultant to the U.S. Food and Drug Administration's Neurological Devices Panel of the Medical Devices Advisory Committee.

Grill earned his doctorate at Case Western Reserve University, where he was an associate professor of biomedical engineering. His current projects include using electrical and deep brain stimulation to restore control of complex motor functions. He has been nominated for both undergraduate and graduate teaching awards.

SERVICE TO COMMUNITY AWARD

The Service to Community Award honors alumni who, through volunteer service or paid work, have made exceptional contributions to the betterment of their community or the circumstances of a group of people.

A. Wallace Everest ('59)

Through both his charitable efforts and outstanding accomplishments as an engineer and manager in the aviation industry, A. Wallace Everest's service to the community spans over 50 years.

During 35 years of engineering and leadership positions with General Electric and Raytheon, Everest was involved with the design, flight testing and production of numerous aircraft engines and the Advanced Sparrow Missile. At General Electric, he received three CEO Awards, a noteworthy accomplishment within the corporate hierarchy of such a large organization.

In 2002, Everest became aware that a developer was planning to use scarce shoreline property in Chelsea, Massachusetts, for non-water related usage, thus depriving residents of waterfront access in the process. He then spent over 800 volunteer hours determining whether the legal restraints imposed on the developers were being met. Everest eventually became a lead expert in the case and was named the Chelsea Human Services Volunteer of the Year for his effort.

His involvement with the ocean has stretched well beyond Chelsea. In 1957, Everest won the inaugural Intercollegiate Sailing Association Allen Jr. Championship. In 1970, he became the first Boston University alumnus to be inducted into the Intercollegiate Sailing Hall of Fame, and while sailing in Marblehead Harbor in September of 2006, he and his wife Christine were involved in the rescue of a lobsterman.

Everest currently serves as a trustee for Adirondack Public Conservatory, a charitable organization which aims to advance the science and public awareness of astronomy, contribute to scientific discovery, and encourage and support amateur astronomers of all generations.

SERVICE TO ALMA MATER AWARD

The Service to Alma Mater Award honors alumni who have enhanced the stature of the College of Engineering through voluntary association with the University.

Janet A. Allen Fraser ('81)

Since her graduation from Boston University in 1981, Janet A. Allen Fraser has been a loyal supporter of the College of Engineering. In 2001, she became a member of the Annual Fund Leadership Giving Society, a distinguished group of contributors who help the College of Engineering prepare young people for success, and has maintained her membership to date.

During her time at Boston University, Fraser was deeply involved with the Catholic Community and continues to support it today through the Newman House, the Catholic Center at Boston University.

Fraser was a Case Scholar in her last year at ENG and received her master's degree from MIT. She has attended numerous alumni events, including her 25th Reunion in 2006.

Photos left to right:

A. Wallace Everest ('59) with wife Christine

Janet A. Allen Fraser ('81) with Dean Kenneth R. Lutchen

Reaching OUT

New College of Engineering Dean Kenneth R. Lutchen traveled across the country in 2007 to meet with alumni in New York, Washington, D.C., Florida, and California as part of his outreach initiative. He knows how important alumni are to the College's future and he wants your feedback and involvement.

If you would like Dean Lutchen to meet with a group of College of Engineering alumni in your area, send an e-mail to *engalum@bu.edu*.

[Photos courtesy of iStockphoto]

"My work is at the interface of nanoscience and biophysics. We are making new materials to detect and characterize biological molecules," says Amit Meller. The unique nanopores he creates allow for rapid analysis of DNA, contributing to the burgeoning field of biological diagnostics as well as to fundamental research.

"I like BU because the human environment stimulates collaboration at many different levels, and there's a strong sense of collegiality among faculty, staff and students," said Meller.

"BU brings in students from around the world and provides high-level research opportunities. Through daily interactions with their peers, students are exposed to different cultures. Yet, we all are scientists with a common, basic language. This is an enriching and mind-opening experience. "

Amit Meller

PhD, Weizmann Institute of Science
Associate Professor of Biomedical Engineering

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