Innovations
University of Rhode Island College of Engineering

Interview
Arun Shukla
30 years of outstanding research and education at URI.

Transformation
Aligning the college with URI President David M. Dooley’s ambitions for 21st-century learning.

Innovation
Professor Haibo He endeavors to build an intuitive computer.

Global Learning
An International Engineering Program student follows her toy design around the world.

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MESSAGE FROM THE DEAN

As dean of the college, I am proud to report that the URI College of Engineering is in the process of implementing a series of transformational initiatives that will lead us to a very bright future.

With our ever-improving facilities, enrollment at the college has grown from 750 students at the turn of the century to nearly 1,200 students today. We will complete a Master Plan for the college by the summer of 2012. This plan will advance the vision of the college and will match the outstanding faculty members and their research with the expanding undergraduate and graduate student cohorts in dynamic engineering facilities.

Led by our associate dean for research, our experienced, results-driven faculty are conducting cutting-edge research in remarkably diverse fields such as nanoscience and nanotechnology, cybersecurity, biomedical instrumentation, sensors, materials in extreme environments, robotics, renewable energy and more.

New academic initiatives have included the development of opportunities for students to add emphasis in nontraditional areas such as nuclear engineering, pharmaceutical engineering and green engineering. The International Engineering Program stands as one of the most outstanding opportunities students in North America have today to experience global engineering.

This college has impressive stories to tell about the extraordinary accomplishments of our gifted faculty and talented students. Our marketing and communications plan includes new websites, videos on alumni, faculty and students and this new newsletter you are now reading, Innovations.

» Dean Raymond M. Wright, Ph.D., P.E.
Arun Shukla
30 years of outstanding research and education at URI

Most engineers try to keep things together. Arun Shukla breaks them apart. He shoots bullets, sets off blasts and strikes things with mighty force all in the name of science.

And it’s nothing new for Shukla.

For three decades, Shukla has operated a lab at the University of Rhode Island that tests how materials fracture under unusual circumstances. “I don’t like to do research under normal conditions,” Shukla, 58, says. “It has to be an extreme environment.”

That extreme research brings Shukla national acclaim. Reporters turn to him to explain bridge collapse. The California Institute of Technology invited him to serve as the Clark B. Millikan Visiting Professor in the aerospace engineering department.

With space at a premium, Shukla found himself setting up a laboratory in the attic of Bliss Hall, where hammocks and mini-fridges implied another use. But three years later when visiting officers saw. Grants soon followed, enabling the facility to move and expand to three rooms.

Over the years, research at the lab has led to more than 300 research papers, produced at least nine university professors and more than 80 graduate students.

Some may call that a lot of work, but Shukla has different ideas. "When you’re doing what you’re feeling good about, you want to do it," he says.

Arun Shukla never imagined such work when he arrived in New York City from India on New Year’s Eve, 1976. Carrying just $6 in his pocket and a 40-pound suitcase – 20 pounds of clothes and 20 pounds of books – the 22-year-old Shukla had his sights set on earning a Ph.D. from the University of Maryland.

He did, working under the guidance of James Dally and George Irwin, who is considered the father of fracture mechanics. Dally would later become dean of the URI College of Engineering and recruit his former student to the school as a professor.

Arun Shukla in his Bliss Hall lab in 1982.

Arun Shukla is proud of his students, including more than 80 graduate students.
President David M. Dooley has outlined a Transformational Vision for the University. Now, the College of Engineering is following this vision with vigor.

In September, President Dooley articulated a clear and compelling set of transformational goals for carrying URI into the 21st century.

When I read the President’s goals for the 21st century, I felt excited by their boldness, and I recognized that they truly are transformational in their substance.

As dean of the College of Engineering, I am also pleased by how many of the goals defined by the President are already being carried out by the college.

In many ways, the President’s plan, while bold, seemed quite comfortable, even familiar. And I think the college is already demonstrating the plan and will further articulate and achieve its goals. As you will see below, I am proud to say we are well on our way.

Raymond M. Wright, Ph.D., P.E.
Dean, College of Engineering

Creating a 21st Century 24/7 Learning Environment

The College of Engineering has long recognized that learning outside of the classroom is as important and sometimes more imperative than traditional lecture-based classroom learning. Our globally acclaimed International Engineering Program places students at universities and internships in Europe and China, while our capstone engineering design projects put seniors to work solving real-world engineering problems at local engineering, manufacturing and design companies.

In fact, 84 percent of URI engineering students participate in internships. As a result, they are finding excellent jobs, largely because they have problem-solving and hands-on experience, ready for the engineering marketplace from day one.

“...a campus where undergraduates study abroad or work as interns throughout the region and across the world, while others use state-of-the-art technology to learn at any time, day or night. I see students intensely engaged with faculty across all fields of study, and who are working in interdisciplinary and multidisciplinary environments. I see a community of students, faculty and scholars drawn from afar to a University that values them for who they are.”

President David M. Dooley

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Increased the Magnitude, Prominence and Impact of Research, Scholarship and Creative Work
Over the past four years, the college has celebrated a significant increase in research grants. We continue to have major funding from the National Science Foundation, the National Institutes of Health and the U.S. Department of Homeland Security. Our work within the defense industry includes research with the military and local defense connections such as Raytheon, the Naval Undersea Warfare Center, and General Dynamics/Electric Boat. Areas of expertise within the college include nanoscience and nanotechnology, sensors and instrumentation, materials in extreme environments, renewable energy, robotics and systems. We are proud that the National Science Foundation has awarded our faculty six Career Awards since 2003.

Internationalizing and Globalizing the University of Rhode Island
There is no question that the world is a much smaller place, and that the global community is moving closer together. Long before the word “interdisciplinary” was a buzzword on university campuses, the International Engineering Program married the worlds of engineering and languages in a way now emulated by schools worldwide.

Students in the program earn an engineering degree as well as a degree in German, French, Spanish or Chinese. These students study abroad for a year taking courses at our partner universities for one semester, followed by a six-month internship within their field. All work is done in the language of the host country. These experiences foster an appreciation for very different individuals and cultures, and truly result in a global engineering graduate.

The college is also home to many international students representing countries around the world. Active graduate and undergraduate exchange programs exist with universities in Germany, France, Spain and China.

Building a Community at the University of Rhode Island that Values and Embraces Equity and Diversity
On campus, the engineering living-learning communities are home to a diverse student body, bound together as a tight-knit group nurtured by shared intellect and motivation.

In a field traditionally dominated by white men, the College of Engineering is taking significant steps toward increasing the enrollment of women and minorities. The college employs a full-time diversity coordinator, who is actively engaged in recruiting and retaining students from under-represented backgrounds.

Signature programs like biomedical, pharmaceutical, environmental and ocean engineering and the award-winning International Engineering Program attract high percentages of women. The college supports active student groups such as the National Society of Black Engineers, the Society of Women Engineers, the Society of Hispanic Professional Engineers and the national engineering fraternity, Theta Tau.
The network of wires and poles that stitch together America’s power grid is getting old, and the government knows it. Rather than spend billions of dollars replacing the system, President Barack Obama wants technology that makes the existing grid smarter, more secure and more efficient.

University of Rhode Island engineering Professor Haibo He is already on the case. The 34-year-old researcher is advancing mathematical foundations and computer architectures that bring the power of the human brain to massive networks such as electric grids.

In April, he won a prestigious CAREER grant from the National Science Foundation for his work in the field. That same month he delivered a keynote speech in Paris at an international conference about computational intelligence. In August, he published a book. In September, he received a grant to study cybersecurity. Last month, the Providence Business News named him “Rising Star Innovator of the Year.”

Not bad for a man who joined the University of Rhode Island just two years ago and sports not a single gray hair.

“I’ve just had a passion for it since I was a kid,” he says. The son of a math teacher and an accountant, He grew up in China spending his childhood days in the back of his mother’s classroom.

Today, he spends his days in the halls of URI discovering the endless potential of math while connecting his work to the disciplines of engineering, computer science and social science.

He savors the opportunity to collaborate on such a project, dig deep into the human brain and leverage technology to create computer models.

“URI provides the kind of intellectual environment for my challenge,” he says. “I’m very excited working with my colleagues and students to tackle such a grand challenge.”

His intellect ticks 24 hours a day. Colleagues say the professor is known to respond to emails during the early hours of the morning, driven by a passion to solve the big challenges of today – and tomorrow.
McKechnie, 22, arrived in Hangzhou, China, in August with four other students from the college’s International Engineering Program and two students from URI’s College of Business Administration. The aspiring engineers will spend the next six months at Zhejiang University, followed by a semester working at an international company.

“The group marks the largest contingent of IEP students to land in China since the program launched a Chinese offering three years ago. Since then demand has steadily grown in the Chinese operations, something few Hasbro employees can claim. Her knowledge will include the technical—schematics and the machinery—as well as the cultural—the noodles and the spinach pancakes for breakfast. And there will be little doubt about her foreign language skills: her eight courses at Zhejiang University are all taught in Chinese.”

McKechnie expects her global knowledge to prove crucial as she prepares for life after URI. She knows from her time at Hasbro that the company craves engineers with multilingual skills and global experience.

She will also come armed with intimate familiarity of Hasbro’s Chinese operations, something few Hasbro employees can claim. Her knowledge will include the technical—schematics and the machinery—as well as the cultural—the noodles and the spinach pancakes for breakfast. And there will be little doubt about her foreign language skills: her eight courses at Zhejiang University are all taught in Chinese.”

“It’s such an intense and new experience. You can’t pass it up,” she says.
Engineering 101: high school style
Twenty-six high school students found themselves playing with engineering tools as part of the inaugural URI Summer Engineering Academy.

The students spent four weeks in July taking college-level engineering courses while getting their hands dirty with real-life projects. Teams built pyramids 7 feet tall out of wood, drafted plans for pens with the help of engineering software and used 3-D printers to create them. They then combined all that knowledge to construct and program robots that placed Legos in a pattern.

“At the end of the day there was definitely some group dynamic that clicked,” academy organizer Manbir Singh Sodhi says.

Next year, Sodhi hopes to recruit international students and add day trips to places such as New York City and Boston. He will also expand the roster of companies that campers visit to see engineering skills put into practice.

Shukla garners SEM awards
The Society for Experimental Mechanics has awarded Professor Arun Shukla the 2012 C.E. Taylor Award as well as the 2012 F.G. Tatnall Award. The C.E. Taylor Award recognizes a society member who demonstrates technical excellence in optical stress analysis and good citizenship within the society. The F.G. Tatnall award recognizes individuals who are very involved with the society.

Haibo publishes book
Professor Haibo He’s first book was published in August. The 248-page Self-Adaptive Systems for Machine Intelligence (Wiley, 2011), expands on his research in the field of building computers that think like humans.

Bothun research attracts grant
Professor Geoff Bothun won a $400,000 grant from the National Science Foundation’s Faculty Early Career Development Program. The grant will fund research examining how engineered nanoparticles released from consumer products affect the environment.

Biomed opens doors for disabled
This summer, a team of seven engineering students constructed a device for a woman with cerebral palsy that allowed her to start a greeting card company. With the head-mounted device, Warwick resident Rebecca Beaton can operate a computer, paint, draw and use an iPad.

The team included Chelsae Meier of Boscawen, N.H.; Christopher DeSanto of West Warwick, R.I.; Gemma Downey of Rehoboth, Mass.; Brooke McCarthy of Plympton, Mass.; and Vanessa Landes, Christina Liese and Tanya Wang of Cranston, R.I.

Lucky to be alive
Software developed by a URI engineering professor and his colleagues came to the rescue of five sailors in August.

After being thrown from the Rambler 100 yacht, strong currents swept the sailors out to sea. To find them, the Irish Coast Guard launched SARMAP, a mapping tool developed by Applied Science Associates.

Ocean engineering Professor Malcolm Spaulding invented the basis for the software as part of an academic project to model the behavior of oil spills. He later went on to help start Applied Science Associates.

Stepanishen wins Acoustical Society medal
The Acoustical Society of America will present Professor Peter Stepanishen with its Trent-Crede Medal this November in San Diego. The award recognizes Stepanishen “for his pioneering research in transient vibration and acoustic radiation.”

Robot for the win and $5,000 check
A robotic boat designed by URI engineering students captured first place at an international competition held last summer and garnered a $5,000 gift from Raytheon Co. The vehicle navigated an aquatic obstacle course relying solely on artificial intelligence developed by the students. The vehicle defeated 14 teams, including those from top engineering schools. Team members said winning the competition spurred job offers and interest in commercializing the technology.
The University of Rhode Island College of Engineering presents Innovations, a magazine showcasing the college’s diverse community of scholars undertaking 21st-century research and learning.