SPRING 2018
Boston University College of Engineering

ENGineer

READY BEFORE DAY ONE

VALentina TOLL-VILLAGRA (ME'16) CREDITS MANUFACTURING CONCENTRATION FOR PROFESSIONAL SUCCESS

INSIDE
$20M RESEARCH CENTER
THE ARTFUL ENGINEER
Gender disparity has long been an issue in the engineering profession, and many engineering schools, including ours, have established outreach programs aimed at attracting more young women. Recently, I was invited to give a talk about the future challenges of engineering education to a group of mechanical engineering department chairs from around the Northeast. While preparing for the talk, I researched data on the number of bachelor’s degrees awarded in the top six engineering disciplines for the last 10 years. The data was an epiphany (at least to me). First, of the approximately 100,000 bachelor’s degrees awarded among all engineering disciplines, more students—28 percent—received mechanical engineering degrees in 2016 than any other discipline; in fact, there were more mechanical engineering bachelor’s degrees awarded in the top six engineering disciplines, or we as a nation will never reach mean that no single discipline is doing more to promote gender disparity than their own. In fact, I fail to see how gender equality could occur in engineering unless their discipline, perhaps in tandem with electrical engineering with 12.7 percent women, led the solution. I also noted the irony that of the 35 chairs in the audience, only one of them (our own Alice White) was a woman. Gender disparity has long been an issue in the engineering profession, and many engineering schools, including ours, have established outreach programs aimed at attracting more young women. The makeup of my audience prompted me to question whether those programs have been successful, so I asked whether they have designed programs to attract more women specifically to mechanical engineering. They returned blank stares.

Why does the most popular engineering discipline attract so few women? I have posed this question to my faculty, deans, colleagues and advisory board representatives in the corporate world. Although there is no consensus, there are some opinions that may offer us a way forward.

Some engineering deans and employers have hypothesized that women shy away from mechanical engineering because they don’t have experience using power tools and machine shops, and making things in middle and high school, and they perceive mechanical as a discipline for people who have had such experiences. Yet, ironically, many of my colleagues believe that most male engineering students don’t have such experience either. Another hypothesis is that women do not realize that mechanical engineering engages creative design, robotics, machine learning, artificial intelligence, 3-D printing driven by creative computer design and many other math and science skills that have nothing to do with power tools.

In our increasingly interdisciplinary profession, the skills of the mechanical engineer are essential and must be synthesized with others in fields like electrical, computer and systems engineering. Innovation to meet society’s challenges must be a cooperative venture that involves creators from more than one discipline and gender working together with the essential people, skills of communication and networking. Neither gender has a skills advantage and we need both to participate equally. As a simple example, consider autonomous vehicles, which require human-centered design at the intersection of mechanical, electrical, software and systems engineering. It will impact sustainability and climate, urban efficiency and function, and quality of life, particularly for the elderly who seek ways to remain mobile, interactive members of society.

At Boston University, the proportion of women in our undergraduate mechanical, electrical and computer engineering programs are approximately double their respective national averages. I cannot say for certain why, but I suspect our foundational philosophy of “Creating the Societal Engineer,” along with the inclusion of multidisciplinary concentrations that we offer, has something to do with it. As you will read in this issue’s cover story, concentrations give our students the option of adding a cutting-edge, multidisciplinary field to their major. These concentrations open their minds to how they can engage with engineers from other disciplines, even others like business people and community leaders, to innovate new technologies and products.

Emphasizing the interdisciplinary, collaborative and societal nature of all engineering disciplines is an avenue worth pursuing as we seek to attract more women to the profession. Boston University has made some headway, but no one engineering school can solve the challenge. This is a national challenge and the data indicate that mechanical and electrical engineering must explicitly impact gender equity in their respective disciplines, or we as a nation will never reach gender equity in engineering.
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College of Engineering, except where indicated
$1M Societal Engineering Endowed Fund Supports Transformative Programs

DEDICATED FUNDING SOURCE BACKS EXPERIENTIAL ACTIVITIES

When Kenneth R. Lutchen assumed the College of Engineering deanship in 2006, he introduced the idea of creating the Societal Engineer who will use their engineering skills and training to advance society. The concept quickly took root among the college community and eventually, the phrase “Boston University Creating the Societal Engineer” was trademarked by the US Patent Office.

Now, the $1 million-and-growing Societal Engineering Endowed Fund will back, in perpetuity, curricular and extracurricular programs that support the Societal Engineer.

Gifts from alumni, parents and friends of the college will ensure that existing programs—and potential new ones—will receive ongoing, consistent funding.

Because these programs go beyond what tuition alone can sustain, a dedicated funding source such as this one is critical. Indeed, to support the full range of Societal Engineering experiential activities, Dean Lutchen hopes to grow the fund to $2 million.

“These programs have become so popular with our students that I realized we need to make them a systematic part of the student experience,” he says. “The Societal Engineering Endowed Fund will ensure a minimum level of support for many existing programs and allow us to think about new initiatives in the future as we grow the fund.”

The Societal Engineering Endowed Fund supports programs including:

- The Technology Innovation Scholars Program (TISP), which sends carefully selected and trained undergraduates into middle and high schools around the country to inspire young people to consider engineering as a career.
- The Technology Innovation concentration, which merges engineering innovation with business skills taught by Questrom School of Business faculty.
- The Imagineering Competition, which encourages students to get creative with extracurricular engineering projects in the Singh Imagining Lab.
- The Societal Impact Capstone Project Award, a prize for interdisciplinary Senior Design Projects that emphasize societal impact.
- Engineers in the Real World, a program that brings ENG alumni from various fields into the classroom to expound on how an engineering degree can lead to a career in many different professions.
- The BU chapter of Engineers Without Borders, which gives students the opportunity to work on real-world issues in resource-limited environments.

“The college is extremely grateful to the many donors and foundations who have provided support for its Societal Engineering programs, whether by contributing to the Societal Engineering Endowed Fund, establishing named endowed funds and/or providing gifts for current use or capital projects,” Lutchen says. “Their generosity has helped propel the college on its successful upward trajectory over the past decade.”

—MICHAEL SEELE

Scientists and engineers have been struggling to build or grow artificial organs for decades. But aside from simple, nonmoving parts, like artificial windpipes, the field has not lived up to its early promise. This is partly because organs, with their multiple cell types, have proved difficult to synthesize, and also because researchers have learned that the body’s dynamic stresses—beating hearts, stretching lungs—play a larger role in how tissues grow and perform than originally thought.

The ERC plans to accomplish four goals with the cellular metamaterials it intends to build:

1. Fabricate responsive heart tissue containing muscle cells and blood vessels; understand and control the tissue using optical technologies; scale the process up to easily create multiple copies of the tissue; and personalize the product so it can be tailored to individual patients. The first objective will be to create “functionalized heart tissue on a chip,” Lutchen says—tissue that could be built with a specific patient’s cells and used to test new drugs and therapies. The ultimate aim is to fabricate heart tissue that could replace diseased or damaged muscle after a heart attack.

2. It’s humbling to have the opportunity to work on something that could really be a game changer,” Bishop says. “If we succeed, we’ll save a lot of lives and add meaningful years for many people.”

—BARBARA MORAN

High school students at a STEM outreach event learn to program and work with robots with the help of students from the Technology Innovation Scholars Program, one of the initiatives supported by the Societal Engineering Endowed Fund.
Bridge Builders: Doctors and Engineering Master’s Students Work Together to Build Innovative Devices

T here’s often a wide gap between the new medical devices doctors need and the ones companies decide to make, and the disconnect can cause doctors to accept surgical instruments that can create medical problems and haven’t been redesigned in half a century. Now, what started out as a year-long practical course for master’s students in Boston University’s Biomedical Engineering Department has become a way to help close the gap.

During their one-year program, biomedical engineering master’s students must design and prototype a medical device to solve a problem they pinpoint while observing doctors at Boston Medical Center (BMC). Students work in groups with medical specialists to formulate products that help patients and are feasible from engineering, manufacturing and budgetary standpoints. The drawback was the students’ graduation, which brought product development to a halt.

Seeking to continue the product development process over multiple years, Master Lecturer and Adjunct Professor Jonathan Rosen (BME) established the Bridge Builders Initiative in 2016. By employing enrolled master’s students who are also working on their own academic projects, program alumni and undergraduates, Rosen put together a team to work with doctors at BMC and build trial-worthy products that could become marketable medical devices.

“I was excited because I thought, ‘Wow, these guys can create something that we need, but don’t have,’” recalls Dr. Alan Fujii, director of the BMC Neonatal Intensive Care Unit at Boston Medical Center (BMC). Dr. Fujii, Elizabeth Sridhar (BME’18) and Nicholas Leung (BME’17) gathered at BMC to show off the neonatal vitals monitoring pad prototype.

During the trial, the team found that weighing infants can make it more difficult to get fast and accurate readings. To keep the babies in better contact with the pad, the team has proposed rounding the design up slightly, said Nicholas Leung (BME’17), who was hired to coordinate current students.

The smart vitals pad is just one of four Bridge Builders projects; another is a new surgical instrument. Trelker helped design that spreads a patient’s rib cage during surgery. Standard, hand-cranked retractors exert force at an unnatural angle, sometimes cracking a patient’s ribs. The new internal mammary artery retractor works with the body’s physiology by moving the ribs upward in a clamshell-like fashion instead of pushing them to the side.

“Not that opening your rib cage is ever easy, but if you have to do it, you’d want something that moves with the muscles and bones rather than pulling up at an awkward, harsh angle,” Trelker notes.

Instead of handing students a problem to solve, the master of biomedical engineering program at BU gives students the opportunity to observe physicians in practice and work with them to conceptualize and prototype a solution to a real clinical problem, hand-in-hand work that’s rare for a master’s-level program.

Says Leung, “If you create something that doctors find really helpful and that has a lot of potential, your idea has the possibility of becoming a full device. That’s the whole goal of the Bridge Builders Initiative and why I came to BU.”

In November, two BU student teams were recognized for their scientific achievements during the 2017 International Genetically Engineered Machine (iGEM) Giant Jamboree. More than 3,000 participants from 44 countries showcased their work in Boston during the annual competition for students who wish to explore synthetic biology research, hosted by the nonprofit organization iGEM. The Jamboree is culmination of eight months of rigorous research where teams are judged on an oral presentation, a poster, their team Wiki and a question-and-answer session with the judges. The two teams, BostonU Wet Lab and BostonU Hardware, won recognition for their scientific achievements, teamwork and leadership of the graduate student mentors. Densmore advised the teams, along with Assistant Professor Wilson Wong (BME) and Professor Daniel Segre (Bioinformatics). The Hardware project team consisted of Thomas Costa (BME’18), Shuyi Xu (BME’19), and graduate student Josh Lippai (BME) was recognized for their scientific achievements, teamwork and leadership of the graduate student mentors.

“Participating in iGEM really taught me how to work as a team, to problem-solve because we had to figure out what went wrong and how to control the experiment, and what the next step would be,” Abigail Sasdelli (BME’18) says.

Wet Lab team members included Sridhar, Thomas Costa (BME’18), Shuyi Xu (BME’19), Stephen Tucker (BME’20), Madeline Simista (BME’20) and Samirunal Dasgupta (BME’20); graduate students Alan Pacheco (Bioinformatics) and Matthew Brenner (BME) mentored the team.

 distinguished research, state-of-the-art research skills and to understand what the next step would be.”

In the case of the smart vitals pad, the team’s goal was to create a device that would allow researchers to run smaller-scale experiments; meaning supplies go further and results are produced more reliably, but manufacturing them requires expensive equipment and highly specialized knowledge.

“My course work has taught me that the final product is not what is important, but the passion behind it and the hard work,” Trelker says.

In our coursework we learn about engineering principles, but iGEM is a real good opportunity to learn what really goes into engineering and developing a system for people to actually use,” Hardware team member Dylan Sampere (BME’17) says.

Dinithi Samarasekera (BME’20) has been interested in synthetic biology since high school and joined iGEM as a freshman without having any undergraduate research experience, but “you’re held to very high standards here, so you have to be prepared to perform,” she says.

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A Hidden Pathway Revealed

Blood vessels act as a transportation system, bringing and discarded molecules to and from each organ to maintain the internal stability our bodies need. But during chronic disease or even minor injury, blood vessels can be damaged enough to compromise vital organ function. Professor Christopher Chen (BME, MSE), director of the Biological Design Center and associate faculty at the Wyss Institute, and his team have created a 3-D blood vessel-on-a-chip model at Harvard University, and his team have director of the Biological Design Center

They discovered that physical forces on the blood vessel walls cause the Notch pathway to build a complex of proteins in the cell membrane and trigger a process that holds neighboring cells together, preventing fluid from leaking between them. Their findings have been published in Nature. Leaky vessels alone can lead to major health problems, and this new pathway may offer insight into how this condition occurs. In addition, some newer cancer therapeutics target the Notch pathway in an effort to block the overgrowth of cells. By blocking the entire Notch pathway, these drugs may also be inhibiting the heterotopic-unknown function of sealing blood vessel walls, causing them to leak. Indeed, these drugs have reported such side effects and, until now, clinicians have been at a loss to explain why this occurs. Polacheck and Kutys may have found the answer:

“Going forward, we hope to establish a better understanding of where and when this pathway contributes to health and disease,” Chen says. “We also will continue our efforts to build new cell culture platforms that can be used to mimic and study important disease processes.”

—LIZ SHEELEY

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NASA to Launch BU Student-Built Microsatellites

I MacGyver were on a mission to study the aurora, this is the satellite he might build: A grid of scrap solar cells pasted onto an iPad-sized green rectangle of circuit board; a six-inch cut of stainless steel tape measure soldered in one corner as a make-shift antenna; and inside, a suite of smartphone-class sensors that anyone can buy on the internet. But despite its crude looks, this microsatellite, a piece of a BU student-built experiment called ANDESITE, is actually on the leading edge of a new trend: studying space using “swarms” of inexpensive, lightweight mini-satellites that are cheap to build and launch.

ANDESITE is on track to launch in 2018 as part of a satellite “rideshare” coordinated by NASA’s Educational Launch of Nanosatellites (ELaNa) Project. It’s a teaching mission first roughed out by 15 students, including Project Manager BME graduate students William Polacheck and Matthew Kutys were eager to use the blood vessel-on-a-chip, an ideal way for them to study the effects of the mechanical forces of blood flow on vessels in lifestyle conditions. Their fruitful research uncovered a previously unknown molecular pathway that elucidates how blood vessels maintain their integrity and could explain why cancer patients experience side effects from certain therapeutic drugs. They were trying to discover how mechanical forces affect blood vessel walls and why they leak. When blood flows through vessels, it exerts forces called shear stress onto their walls. “We knew there was a link between shear stress and barrier function,” Polacheck says. The chip enabled them to identify that link by allowing them to replicate the effects of blood flow and measure vessel leakiness, which was not previously possible. Polacheck and Kutys soon noticed that the forces activated a protein-signaling pathway called Notch that has been long known to play a major role in cellular behavior by turning genes on and off. But they also learned that Notch also has another, previously unknown, function that could explain leaky vessels.

“We were seeing that Notch was activated when we simulated blood flow, so we needed to connect Notch to barrier function to close the circle,” Polacheck explains.

They discovered that physical forces on the blood vessel walls cause the Notch pathway to build a complex of proteins in the cell membrane and trigger a process that holds neighboring cells together, preventing fluid from leaking between them. Their findings have been published in Nature. Leaky vessels alone can lead to major health problems, and this new pathway may offer insight into how this condition occurs. In addition, some newer cancer therapeutics target the Notch pathway in an effort to block the overgrowth of cells. By blocking the entire Notch pathway, these drugs may also be inhibiting the heterotopic-unknown function of sealing blood vessel walls, causing them to leak. Indeed, these drugs have reported such side effects and, until now, clinicians have been at a loss to explain why this occurs. Polacheck and Kutys may have found the answer:

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William Polacheck holds the blood vessel-on-a-chip and Matthew Kutys developed to study how blood flow affects vessel integrity.

Maria Kromis (ENG’17) and David Ehren (ENG’17) inspect ANDESITE.

ANDESITE WILL GET CLOSE-UP LOOK AT THE AURORA

I MacGyver were on a mission to study the aurora, this is the satellite he might build: A grid of scrap solar cells pasted onto an iPad-sized green rectangle of circuit board; a six-inch cut of stainless steel tape measure soldered in one corner as a make-shift antenna; and inside, a suite of smartphone-class sensors that anyone can buy on the internet. But despite its crude looks, this microsatellite, a piece of a BU student-built experiment called ANDESITE, is actually on the leading edge of a new trend: studying space using “swarms” of inexpensive, lightweight mini-satellites that are cheap to build and launch.

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YTRAP can be used to create cellular sensors for protein aggregation. The sensor produces fluorescent signals that depend on the protein aggregation state in the cell. In this experiment, three cell types were tested that produce varying signal strengths depending on the aggregation state of a prion protein: the brightest green for no prion aggregation, a slightly dimmer green to show a weak presence of prion aggregation (top right) and an even dimmer green signal for a strong prion presence (top left).

strong [PSS] weak [PSI] [psi] [psi] [psi] [psi] [psi]

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ENGINEERING YOUR CAREER

CONCENTRATIONS PREPARE STUDENTS TO SELL IDEAS AND THEMSELVES.

BY LIZ SHEELEY

Joshua Liebowitz (BME’16)
PHOTOGRAPH BY JEFF WOTASZEK
Even when an engineer crafts an elegant solution to a problem, it doesn’t always get put into practice or become a product. Companies must craft solutions that are both business savvy and budget friendly, and sometimes products (or processes) don’t use the light of day in time to be too difficult to produce or implement. But when engineering students learn early how to design a solution—whether it’s a new medical device or a streamlined warehouse design—and take into account factors like sustainability and commercialization, solutions can become innovations.

The drive to expose students to how engineering innovations improve society—a key to shaping the Societal Engineer—led to establishing undergraduate concentrations in 2009. By focusing on fields where engineers have significant impact, these concentrations go beyond engineering majors to show students the path successful technologies take, from design to the marketplace. They also complement minors, which focus on traditional academic disciplines outside of a student’s College of Engineering or BU major. Nearly half the Class of 2017 graduated with a concentration or minor added to their degree.

With courses like strategy for technology-based firms, students can develop insight that helps them see the bigger picture, such as the timing of a product’s development and why it’s made of a particular material; they also study important business concepts like intellectual property and product management. And because the context is grounded in how actual companies operate, these courses make students very appealing to employers.

“Before I joined this club, I never knew that the ‘right answer’ wasn’t just the one thing that’s been proven to work but more of a process of how you go about a certain task, I can respond with the technical knowledge that I have gained in my concentration to use by working with physicians to finalize design concepts while also analyzing the supply chain to define the product’s manufacturability and marketing.”

Eventually, Liebowitz wants to work at the intersection of new product leadership development and a medical device company. “I would love to define strategy, identify opportunities for innovation and quantify the value that innovation and development would provide for both the healthcare company and a company like Johnson & Johnson,” he says.

Employers also see tremendous value in potential employees who can tackle real-world problems. Valentina Toll-Villagra (ME’16) credits the Manufacturing Strategy course she took in her Manufacturing Engineering concentration with exposing her to case studies that detailed how businesses solve problems they encounter. “You get a broad perspective about real-life experiences when you go through cases and imagine yourself in that role and think about what you would do in that situation,” she says. “I don’t get perfectly crafted problems in my job where there is one solution, but instead more open-ended ones where there may be more than one right answer, so knowing how to analyze a situation and come up with a solution is valuable.”

Toll-Villagra is based out of Austin, Tex., as a start-up project manager for Amazon in the operations engineering department, where she oversees the build-out of new warehouses for last-mile delivery—the final step of a product’s delivery journey to the customer. But it’s not just about choosing a location and constructing a warehouse; she manages everything from the installation of the material-handling equipment to designing a layout that will optimize workflow. Each warehouse is different, which means each project requires a unique plan.

“I work for a very dynamic company so most likely would not be using the same technology over several years. It’s always improving and changing over time, to make processes faster and more efficient. Reduce waste and optimize layout,” Toll-Villagra says.

Automated Manufacturing, which she took as a junior, gave her a realistic perspective about what working in industry was actually like. “We learned about why certain processes are called what they are, or why they are currently used in industrial settings,” she explains. “That class introduced me to the automated conveyor system that’s used in actual warehouses.”

Two recent electrical and computer engineering alumni credit the Technology Innovation concentration with showing them how to integrate technical knowledge and business practices. As a security consulting senior analyst for Accenture in Boston, Santiago Beltran (CE’17) works with clients to develop a personalized security operations platform to monitor for hackers and stop any potential system breaches before they happen.

“Seeing that BU is actually investing heavily in an incubator space and promoting student-run ideas makes me happy,” he says. “I think the combination of a space where students can make their ideas happen and a curriculum that can support that process—that’s big.”

Beltran was also able to use his skills during job interviews and in his role at Accenture. “In an interview when a company asks me how I would go about a certain task, I can respond with the technical answers, but businesses also want to know if they could profit off of this or if they could actually return value; if they are solving the client’s question,” he notes. “And the technology innovation courses I took helped me understand those business aspects and made it much easier for me to answer those questions.”
As a consultant working with clients, Beltran finds one class particularly valuable: technology innovation. “Design-based thinking is an approach where, based on the problems we are observing, we try to come up with solutions, so we put ourselves in the shoes of the client in different perspectives, and then brainstorm a wide array of possible ideas and try to change our approach to come up with a valid solution,” he explains. “In that case you are talking to a client and figuring out of our solution is the right fit for them, or in my position, how we can secure a client’s enterprise. We have the concept for a solution, but then being able to brainstorm and interact with the client can be key. Through talking about what kind of attacks they face and what their vulnerabilities are, you can create interactive opportunities and get them to think about security not just in a technical sense, but also about how it impacts their business or the bottom line, and that all comes down to design-based thinking.”

Basu, too, sees the value of the Technology Innovation concentration in training a technical degree with knowledge about where industry places value: “When you can show a company that you not only understand the technology, but that you also understand the business and customer base enough to cater your work to add value to the consumer—that really helps with the interview process.”

By focusing on fields where engineers have significant impact, these concentrations go beyond engineering majors to show students the path successful technologies take, from design to the marketplace.

Each concentration includes a related experiential component that can be satisfied with a research project, a senior design project, an internship or a directed study.

**DEGREES OF POSSIBILITY**

The College of Engineering offers many ways for undergraduates to enhance their degrees in a foundational engineering discipline. They can add a minor in any discipline outside of their major: Biomedical, Computer, Electrical, Mechanical or Systems Engineering or Materials Science & Engineering. Or, they can choose to add a concentration in a broader field to complement their degree. The Energy Technologies concentration gives students a fundamental understanding of the environmental impacts of various energy technologies and puts them in a position to pursue a career in the burgeoning field of green energy. The diverse course options include the electro-chemistry of fuel and battery cell; environmental policy; the planning, operation and marketing of sustainable power systems; and the emergence of sustainable energy as the defining environmental challenge of our time.

**AEROSPACE ENGINEERING**

Designed for undergraduate mechanical engineering majors and minors, Aerospace Engineering covers the design, construction and science of aircraft and spacecraft. Students are exposed to aerospace fundamentals, including aerodynamics, control and propulsion. The concentration prepares students for careers in aircraft and engine design, avionics, aircraft and spacecraft materials and safety systems.

**MANUFACTURING ENGINEERING**

Manufacturing Engineering is a cross-cutting field that covers the main aspects of computer-based design, the conversion of research ideas into product development, cost control and optimization, company start-ups, cost proposal preparation, operating plan development and supply chain management. Students are prepared for careers in green manufacturing, materials and systems, MEMS and computer-aided design.

**ENERGY TECHNOLOGIES**

The Energy Technologies concentration gives students a fundamental understanding of the environmental impacts of various energy technologies and puts them in a position to pursue a career in the burgeoning field of green energy. The diverse course options include the electro-chemistry of fuel and battery cell; environmental policy; the planning, operation and marketing of sustainable power systems; and the emergence of sustainable energy as the defining environmental challenge of our time.

**NANOTECHNOLOGY**

The Nanotechnology concentration offers students foundational knowledge of the effects and applications of nanotechnology, positioning them for future careers in the expanding nanotechnology field. Courses examine how engineering works on scales as small as millionths of a millimeter while students explore the foundations of quantum mechanics, atomic structure and the physics of molecules and solids.

**TECHNOLOGY INNOVATION**

The Technology Innovation concentration instills an entrepreneurial mindset in and prepares engineering students to recognize and utilize opportunities for technical innovation that can lead to viable commercial products and profitable businesses. The concentration focuses on understanding the innovation and entrepreneurial process from start to finish, offering graduates a path for advancement into future management and leadership positions.
Janice Ozguc never does anything halfway. When she developed an interest in art conservation, she set up her own business in her apartment. And when she wanted to take a budding fascination with science to the next level, she enrolled in the College of Engineering’s inaugural Late Entry Accelerated Program (LEAP) class. Since then, she has melded the worlds of art and engineering into a dynamic career that continues to evolve at the pace of technology.

Established more than 30 years ago to support women who wished to transition into the engineering profession, LEAP was, and remains, a unique master’s degree program for students with bachelor’s degrees in non-engineering fields. After taking some foundational undergraduate engineering courses, LEAP students transition into one of several master’s degree programs. It now attracts men and women from a wide array of academic backgrounds, from math and science to the humanities to business to — as in Ozguc’s case — the arts.

“Entering the LEAP program and graduating with an engineering degree opened up a world of opportunities,” she says. Upon graduation, she decided to move to Japan and accept a position at Mitsubishi, the same company Ozguc’s husband, Ozguc’s case—the arts.

Time electrical engineering was the only master’s degree track for women at BU. When she wanted to transition into the engineering profession, LEAP was, and remains, a unique master’s degree program for students with bachelor’s degrees in non-engineering fields. After taking some foundational undergraduate engineering courses, LEAP students transition into one of several master’s degree programs. It now attracts men and women from a wide array of academic backgrounds, from math and science to the humanities to business to — as in Ozguc’s case — the arts.

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“Entering the LEAP program and graduating with an engineering degree opened up a world of opportunities,” she says. Upon graduation, she decided to move to Japan and accept a position at Mitsubishi, the same company Ozguc’s husband, Ozguc’s case—the arts. Ozguc began moving into the start-up space in 2003 that she was able to finally move toward a career that melded engineering and art. One of the latest of several start-ups that she cofounded was a company that specialized in developing mobile apps for the social photo-sharing segment. Ozguc helped specify not only the look and feel of the app, but also all of the technical aspects. She also noted that in the start-up world, employees need to contribute to all aspects of the business, as, in addition to many other tasks, she was also curating the social media content for her company. Since dipping her toe into start-ups, Ozguc has now completely immersed herself in that world and enjoys the fast pace, accelerated business plans, and the excitement of creating a new product that consumers will love.

“I really credit LEAP and the type of training that I received in the program for helping me make all of those transitions in my career from art history to semiconductors to applications engineering to technical marketing then into the mobile app space,” she says. “Engineering gives you an amazing skillset, a way of thinking, a way of adapting to changes and being able to morph into different things.”

Ozguc has always been a proponent of building a career where she could combine both her appreciation of art and her talent for engineering, her most recent business endeavor, Through My Eyes Media, is the closest she has gotten to fully interweaving the two. The brand-new consulting company will focus on curating social media content for individuals and businesses with a concentration on developing engaging Instagram accounts for clients.

“Instagram is the new web homepage,” Ozguc says. “As a business, if you don’t have a compelling Instagram feed, somebody is not going to use your company. And it has to be something that speaks to them and not just an arbitrary collection of photos.”

Through interviews, she gains an understanding of how clients want their brand to be portrayed and then uses her expertise in marketing, consulting and photography to create an online presence for the clients.

“Think a lot of companies—especially start-ups—try to do too much,” she says. “I always ask companies who their target market is to help them focus on what the market wants and then lead them to translating that into their technology. And I think those types of questions come from what I learned through the discipline of engineering because it’s a very methodical and strategic way of thinking.”

Ozguc sometimes calls herself a ”Renaissance woman,” after an era she sees as reflecting her life’s goal of “a masterful blend of art and science.” And she’s proven that she can translate her skillset across industries and disciplines.

“I started in the arts at BU as an undergraduate,” she says. “When you come from a completely different background like that and then are able to learn engineering through LEAP, that jump gives you the confidence to say, ‘I can do that’ to just about anything.”
A
nne Hines (BME’87) and Larry Leszczynski (BME’85/87) find their vacation time differently than most people—instead of trying to escape reality, they ground themselves in it. “Traveling in developing countries gives you a reality check on your situation in life,” Leszczynski says. “You can reset your priorities and view of the world.”

Traveling also offers them a chance to indulge their passion for trekking, and visiting one of the world’s most exotic trekking locales proved to be a pivot point in their lives and the lives of hundreds of people who live and work there. During a solo 20-day Nepal trek in 2003, Hines met her husband-to-be, Leszczynski, and Larry (BME’85, ’87) a student in a control systems class and the teaching assistant. Years later, the two reconnected online and repaired community buildings like schools.

“Travelling gives you a reality check on your situation in life,” Hines says. “It can be a tough balancing act with our full-time jobs, but Anne is a mover and a shaker and our employers have been helpful and supportive over the years,” Leszczynski says.

The Colorado Nepal Alliance continues to support Nepal by raising money to rebuild schools and provide school uniforms. Their original efforts to collect hiking boots and shoes for Nepali porters is still running as Shoes for Sherpas, a project under the Alliance.

For more about the Alliance, visit: www.coloradonepalalliance.org.

(Left) Larry Leszczynski (BME’85/87) and Anne Hines (BME’87) celebrated the completion of an Alliance-funded school-building project with the father of Gopal Tamang, their Nepal project manager, who worked on the school. (Right) Hines with students from the completed school at the celebration ceremony.

ENG ALUMS CHANGE LIVES
ON THE ROOF OF THE WORLD
| BY LIZ SHEELEY

ENG ALUMS CHANGE LIVES
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To maximize their efforts, Hines and Leszczynski outlined clear objectives to rebuild in a way that would keep the money inside the community: teach residents to rebuild with local materials and in a more structurally sound way than before; pay men and women equally; and focus on repairing community buildings like schools.

“It’s important to listen to the communities and to what each community needs,” Leszczynski stresses (doing just that led them to use local supplies and labor during all of the Alliance’s projects). Many nonprofit organizations assemble high-tech wells for water, but replacement parts are expensive and locals do not know how to fix the unfamiliar equipment. “To keep this from happening with their projects, the Alliance hired a Nepali architect who devised a plan to build broad, deep foundations suitable for the country’s soil and building materials, utilize multiple reinforced concrete tie beams, and improve the techniques workers use when building with field stones. All these improvements are simply designed, help buildings better withstand the force from earthquakes, use less expensive and locally available supplies and allow the local workforce to learn new skills. “High-tech solutions aren’t always the way,” Leszczynski adds.

Over the last two years, the Alliance has built up a network of engineers, builders, suppliers and contacts to smoothly execute their plans. Hines’ guide on one of her first trips to Nepal, Gopal Tamang, became an integral part of that network. He helps them plan around the rainy and farming seasons, recruit reliable labor and suppliers and navigate the Nepali laws. “Gopal figured out a lot for us,” Hines says. “He was able to track down who the best suppliers are, how to get supplies on credit, navigate the communities and negotiate transportation for all of the supplies—we are lucky to work with him.”

Hines and Leszczynski have full-time careers—Hines is a data analyst for cardiovascular research in the Department of Veteran’s Affairs and Leszczynski works as a software and web application developer. “It can be a tough balancing act with our full-time jobs, but Anne is a mover and a shaker and our employers have been helpful and supportive over the years,” Leszczynski says.

The Colorado Nepal Alliance continues to support Nepal by raising money to rebuild schools and provide school uniforms and earthquake and disaster relief. Their original efforts to collect hiking boots and shoes for Nepali porters is still running as Shoes for Sherpas, a project under the Alliance.

After numerous trips to Nepal, the couple has developed strong relationships with the locals, and they try to go back at least once a year for several weeks. Leszczynski credits the Alliance with allowing them to continually strengthen their ties to the area through their support of community projects. “We’ve been able to make a difference and the Colorado Nepal Alliance has made a difference in people’s lives,” he says.
S
ience can be a risky investment, and government institutions holding the purse strings to research dollars want to know their investment is sound—but great scientific ideas don’t always come with a guar-
deed for success. Recognizing this reality, the Dean’s Catalyst Awards (DCA) allow College of Engineering faculty members to explore their riskier ideas, and the investment has paid off nearly tenfold.

Established in 2007 by Dean Kenneth R. Lutchen, the DCA program acknowledges that fields of study within engineering overlap and new perspectives on old problems help move research forward. “The college as a whole is a highly collaborative place,” says Associate Dean for Research and Technology Development Catherine Klapperich. “And the Dean’s Catalyst Awards program gives faculty that little extra push to reach out to their colleagues and get some of those exciting new areas to get started.”

The competitive grant gives projects seed funding for two years to explore new areas of interest that could spark longer-term research endeavors and yield new applications across fields. Over the past 10 years, the program has given almost $5.5 million to projects that have seen a return of over $21 million and counted from outside grants. In addition to a monetary return, the awards have forged strong bonds between colleagues within the college and across the University. “The catalyst program is a spark for new areas of research at the college,” Klapperich says. “We are extremely pleased with the success of the program in terms of collaborative publications and follow-on funding success.”

These engineers and scientists have established continuing working relationships with each other, over half of the collaborations endure. One such partnership is between Professor Soumendra Basu (ME, MSE) and Professor Uday Pal (ME, MSE), who won a DCA in 2012 to investigate how approaches patented by Pal in 2007 could be used to produce solar-grade silicon. The new technique would allow for the production of solar-grade silicon in one step, keeping the membrane intact,” Pal says. “By combining the separation of silicon and oxygen using the mem-
brane and the purification of silicon using the strong temperature dependence of the solubility of silicon in tin, we can produce solar-
grade silicon in one step, keeping the membrane intact," Pal says.

One of the biggest challenges is controlling the temperature of the expensive ceramic membrane caused by extremely high temperatures and the corrosive nature of the flux. If they can minimize the corrosive attack and prolong the life of the membrane, the cost will decrease and open up the possibility for use in industry. Basu’s expertise in how materials degrade at high temperatures will help solve this problem.

The work is ongoing to study why and how the membrane is destroyed during the purification process and solutions to damper or eliminate the damage are being tested. “We have a theory,” Pal notes. “If we can match the basicity of the flux and the basicity of the membrane, then we can stop the attack.” They’ve begun testing this theory by adding different compounds to the flux to see if one will create a less corrosive environment for the membrane.

The original $45,000 DCA allowed Basu and Pal to verify their idea of using the SOM method to produce solar-grade silicon. “Those feasibility results were subsequently used to attract two additional National Science Foundation (NSF) projects on that topic,” Pal points out. They also led to a new patent application. The NSF grants totaled $312,000 and led to a collaboration with Argonne National Laboratory starting in spring 2018 that could be the first of many.

“The initial investment has different branches,” Basu says. “It’s interesting that what started as the SOM process moved to an emphasis on the membrane interaction with the molten salt to the study of the molten salt itself, and now, using that knowledge to branch out.”

One DCA allowed Associate Professor Douglas Denmure (ECE, RME) and Assistant Professor Ahmad Mo’Khalil (ECE, RME) to explore a topic freely, generate new ideas and innovate beyond their own labs, thus helping the two BU engineers lay the groundwork for a $10 million, multi-institutional NSF grant called the Living Computing Project (LCP). The project, of which Denmure is principal investiga-
tor, brings together synthetic biologists from BU, the Massa-
chusetts Institute of Technology and MIT Lincoln Laboratory to study and develop methods to program biological processes that will benefit sectors such as human health and agriculture. (Although the research produced during the DCA funding is not a direct link to the NSF grant, the collaboration is.) The DCA allowed two scientists from separate fields to think and connect with each other, thereby establishing a successful partnership.

“The DCA gave Doug and me a real opportunity to think tangibly about how we can create paradigms of computation in biological systems,” Khalil explains. “The LCP grant, which Doug has so deftly championed and led, is a much more expanded form of that, bringing together many of the best synthetic biologists working on different parts and systems under the umbrella of computation.”

What starts as a small seed of an idea can grow far-reaching branches of collaboration. “We have many, many sub-branches we can start exploring,” Basu says. “And that’s what the DCAs would like to happen.”

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Catherine Klapperich
Associate Dean for Research and Technology Development
Wong Named AAAS Fellow

Professor Joyce Wong (BME, MSE) has been named a fellow of the American Academy for the Advancement of Science (AAAS) for innovative discoveries in biomaterials development to probe how structure, material properties and composition of cell-biomaterial interfaces modulate fundamental cellular processes, and for promoting women in STEM. “The largest general scientific society in the world, AAAS also publishes the journal Science. The fellowship dates back to 1874 and is awarded to members by a panel of their peers. Wong received her award at the 2018 AAAS Annual Meeting in Austin in February.

“I am honored to be an AAAS fellow,” Wong says. “AAAS has always led the charge in standing for what is right in science even when it wasn’t popular.”

Wong’s research focuses on enabling early detection and treatment of human disease using biomaterials, with an emerging interest in creating new materials for doctors to use in blood vessel reconstruction in children. Current grafts used to repair blood vessels in children are not able to grow as the child does, resulting in patients undergoing multiple procedures throughout their lifetimes. Wong is engineering sheets of cells that would grow with the child, thus offering a better quality of life and cutting down on medical expenses.

In addition, Wong’s lab studies how cells migrate depending on their environment; one branch of this research is looking at how cancer cells spread in the body to learn how to predict where they will go. Another arm of this research examines why certain cardiovascular cells will move according to their chemical and mechanical environment, knowledge of which could benefit those suffering from cardiovascular disease, cancer and other ailments where this phenomenon has been observed.

The academy also honored Wong’s commitment to promoting women in science. Since 2013, she has directed ARROWS (Advance, Recruit, Retain & Organize Women in STEM), a BU organization that helps connect undergraduate, postdoc, staff and faculty women in science and develops the mentoring, advocacy, networking and professional development practices at BU.

As a new AAAS fellow, Wong joins three other Boston University College of Engineering professors: Professor Xin Zhang (ME, MSE), Professor Emeritus Temple Smith (BME) and Professor David Campbell (Physics, ECE, MSE) who have all been recognized for “their efforts toward advancing science applications that are deemed scientifically or socially distinguished.”—LIZ SHELLEY

Densmore Named Under 40 Innovator

HONORED FOR CONTRIBUTIONS TO ELECTRONIC DESIGN AUTOMATION, SOCIETY

This year, Associate Professor Douglas Densmore (ECE, RME) is one of two academic researchers to be named among the top five young, global innovators in the field of electronic design automation by the Design Automation Conference (DAC). DAC’s Under 40 Innovators Award recognizes design automation innovators in industry, research labs, start-ups and academia who have made outstanding contributions to the discipline and society.

These contributions include commercial products, software or hardware systems and algorithms. A founding member of the Biological Design Center at BU, Densmore is a dedicated, influential researcher in the design automation community known for his cutting-edge research. Widely recognized for his work developing tools to help create computation in living cells, he is principal investigator of the Living Computing Project, a $10M National Science Foundation-funded collaborative research project. His work applies semiconductor research methods to electronic computing and has far-reaching applications in biosensors, biomaterials and bioscience.

Densmore, who has participated in DAC since 2002, praiseworthy award for its potential to bring engineering disciplines together. “The award highlights how applicable electrical and computer engineering concepts can be toward biomedical engineering areas like synthetic biology,” he explains.

An accomplished researcher, Densmore holds numerous appointments and honors; he is a senior member of the Institute of Electrical and Electronics Engineers and the Association for Computing Machinery and served as Harri Institute Faculty Fellow in 2016. His accolades include the National Science Foundation Faculty Early Career Development Award, BU Ignition Award and BU College of Engineering Early Career Excellence Award.

—AMY FOILD

David Bishop (ECE, MSE), director of BU’s new Engineering Research Center, holds 47 US patents for micromechanical inventions.

“Professor Bishop has an impressive record of identifying real-world applications for his scientific and technical research and translating this research into patents and practice,” ENG Dean Kenneth R. Lutchten says, noting that Bishop’s approach is reflected in his success as principal investigator on the BU team that competed successfully for the $20 million, five-year National Science Foundation Engineering Research Center (ERC) grant to synthesize personalized heart tissue.

—SARA RIMMER

ENG Prof Elected Fellow of National Academy of Inventors

Professor Emeritus Temple Smith (BME) and Professor David Bishop (ECE, MSE) have all been recognized for “their contributions to electronic design automation and translating this research into patents and practice,” ENG Dean Kenneth R. Lutchten says, noting that Bishop’s approach is reflected in his success as principal investigator on the BU team that competed successfully for the $20 million, five-year National Science Foundation Engineering Research Center (ERC) grant to synthesize personalized heart tissue (see story on page 3).

—SARA RIMMER
Katherine Zhang Wins $1.7M for Diabetes Study

PLANS TO STUDY HOW INDIVIDUAL ELASTIN, COLLAGEN FIBERS CHANGE WITH DIABETES

Cardiovascular disease is a leading cause of death in the US, and diabetics are two to four times more likely to have heart disease or a stroke than non-diabetics. For the past seven years, Associate Professor Katherine Zhang (ME, MSE) has been working under a National Institutes of Health (NIH) grant to find out why that is, and has just received a $1.7 million renewal to continue her promising work.

Her initial research led to in-depth understanding of how different microstructures contribute to the behavior of artery walls. Two different fiber types—elastin and collagen—make up a majority of the vascular extracellular matrix (ECM) of arterial walls and work in tandem to bear the pressure loads within the cardiovascular system (collagen is the more naturally stiff fiber, while elastin is more, well, elastic).

Elastin provides the flexibility to gracefully handle the ever-changing volume and pressure within the cardiovascular system. Zhang’s research has found that prolonged exposure to glucose alters the fundamental mechanical properties of elastin by stiffening it. Stiffer arteries put a strain on the system as the body must raise blood pressure to generate flow in the affected areas. These changes could have detrimental effects on cardiac function, but the long-term effects of increased elastin stiffness and the resulting change in how the heart and vessels behave are not yet known.

In collaboration with Dr. Sekh-Hyon Yan from Harvard Medical School and Dr. Francesca Seta from BU School of Medicine, Zhang plans to use her grant renewal to study how individual elastin and collagen fibers change with diabetes. By observing how the ECM changes over age and disease states, the researchers can better understand how to manipulate the changes happening due to prolonged glucose exposure.

“These understandings are highly clinically relevant,” Zhang says. “Altered structure and composition of the ECM are main factors attributed to stiffening of the arterial wall in diabetic patients.”

The novel approach will link the biological, structural, biochemical and mechanical perspectives of how diabetes changes elastin and ultimately contributes to the faster progression of cardiovascular disease.

“ECM mechanics in diseases is under-studied,” Zhang notes. “Looking at the ECM may open up new perspectives in therapeutic interventions. Targeting the ECM might be an effective alternate route to treatment for some conditions due to the important reciprocal interactions between cells and ECM.”

—LIZ SHEELEY

Team of Researchers Awarded $1M Department of Energy Contract

PROJECT AIMS AT BUILDING A SENSOR SYSTEM THAT WILL REDUCE ENERGY COSTS IN COMMERCIAL BUILDINGS

A team of College of Engineering researchers has won a $1 million contract from the Department of Energy’s Advanced Research Projects Agency-Energy (ARPA-E) to develop Computational Occupancy Sensing System (COSSY), a system of sensors that can estimate the number of people in a room and adjust airflow in accordance with occupancy and air conditioning (HVAC) appropriately to save energy.

Professor Janusz Konrad (ECE) will lead the three-year project, one of 15 funded by ARPA-E and aimed at reducing HVAC energy usage, which accounts for 37 percent of energy consumed in commercial buildings in the US. Most commercial buildings operate airflow on a timer according to a fixed schedule, typically a minimum airflow at night and another matched to a room’s occupancy during the workday. With a system of sensors that can provide an accurate count of the number of people in a room, the workday airflow can be reduced while still maintaining air quality, by reducing it across many rooms in a building, the team can meet the ARPA-E’s goal of 30 percent average energy savings.

The team is well equipped to attack this challenge: Konrad specializes in signal processing and computer vision; Professor Prakash Ishwar (ECE) in machine learning; Professor Thomas Little (ECE) in networking; and Associate Professor Michael Gevelber (ME, MSE, SE) in control of commercial HVAC systems and energy. Additionally, three industrial partners have already agreed to collaborate with the BU team on this project.

The team will develop a scalable system that uses both high-resolution panoramic cameras and low-resolution thermal door sensors. The cameras and door sensors will work together to estimate how many people are in the room at any given time. When visual privacy is of concern, just the thermal sensors will be installed so the system can still sense the number of people without using a camera.

“We will be developing COSSY to reduce energy use in commercial buildings, there is a potential for much wider impact of this technology, from optimizing room usage in educational and office buildings to maximizing hotel revenue, both based on room-occupancy analysis,” Konrad says.

—LIZ SHEELEY

Klapperich Awarded Gates Foundation Grand Challenges Grant

SAMPLE PREPARATION AND STORAGE SYSTEM WILL BENEFIT HIGH-RISK HIV PATIENTS

Known as antiretroviral therapy, long-term HIV treatment has dramatically changed the quality of life and longevity of infected and even at-risk patients, but patients receiving this treatment must be constantly monitored by having their blood tested several times a year with nucleic acid amplification testing (NAAT). Sensitive and affordable, for early detection, NAAT is also expensive and requires that samples be refrigerated, which can be a challenge in developing countries.

Professor Katherine Klapperich (BME, MSE) has devised a new, inexpensive, easy-to-use method for preparing samples for NAAT without refrigeration (called SNAPflex (System for Nucleic Acid Prep-Flexible)). The promise of the technology has been recognized by the Bill and Melinda Gates Foundation, which has awarded Klapperich (in collaboration with Cambridge, Mass.-based MakerHealth) a $700,000 Grand Challenges Explorations grant to develop it. A $100 million initiative that supports research to solve new health and development challenges, Grand Challenges Explorations has funded over 1,365 projects in more than 65 countries since its launch in 2008. It covers a wide breadth of disciplines, including innovations for integrated diagnostic systems and health systems strengthening to ensure effective health supply chains. If successful, projects can receive follow-on funding of up to $1 million.

“This project takes everything we have learned in our lab about small-scale and portable blood preparation and combines it with smart, usable design for manufacturing and scale-up,” says Klapperich. “We are very excited to get started.”

The simple sample preparation and storage system will allow infected and high-risk patients in low-resource areas to be consistently monitored. The potential to directly reduce transmission rates and new infections considerably increases when doctors in low-resource areas can combine the effective use of antiretroviral therapy and NAAT diagnostics. The new system also creates more opportunities for faster diagnoses to allow those who are newly infected to limit their exposure to others and implement safe protocols to stop the virus from spreading. Rather than test for antibodies, NAAT looks for the presence of the virus’ genetic material, a method that provides more sensitive and quantitative monitoring but also requires samples to be kept cold during transit to a laboratory in addition to expensive sample preparation and testing equipment. Klapperich’s storage solution is a flexible, layered plastic and paper system that looks like a roll of tape. Along the roll area a series of fluidic systems, each able to store and extract the genetic material used in NAAT. The storage cards can be torn off one-by-one from the roll, and then a patient provides a small amount of blood from a finger prick onto the card. Klapperich developed two innovative liquid solutions that would extract, clean and dry the genetic material from the patient’s blood.

Not only is the cold-storage element of the previous process cut out, but this new device also eliminates the need to use needles, syringes and other medical equipment to draw and store blood samples; laboratory costs are also significantly lowered since the cards prepare for the sample for processing. And because it is easy to use, medical professionals should be able to adapt it with little training. Klapperich’s card system can be manufactured using either laser cutting or stamping—both low-cost processes—because of the simple and flexible design. All of these factors allow the new device to be implemented quickly and economically, getting patients faster access to test results and potential treatments.

—LIZ SHEELEY
Cheng Is Inaugural Moustakas Chair Professor in Photonics and Optoelectronics

MOUSTAKAS LAUDS CHENG AS “VISIONARY RESEARCHER”

On June 22, the College of Engineering celebrated the appointment of Ji-Xin Cheng as the inaugural Moustakas Chair Professor in Photonics and Optoelectronics. Cheng’s research focuses on the development of new technologies for diagnostics and treatments, which could revolutionize the field of medicine.

The College of Engineering is proud to introduce Ji-Xin Cheng, the inaugural Moustakas Chair Professor in Photonics and Optoelectronics. Cheng is a visionary researcher whose work has the potential to change the world.

Before her appointment as assistant professor in the Mechanical Engineering Department, Sheila Russo (ME, SE) was a postdoctoral fellow at the Harvard Bionanosystems Laboratory. Her research focuses on developing new technologies for diagnostics and treatments, which could revolutionize the field of medicine.

The College of Engineering is pleased to introduce five new tenure-track faculty members within the fields of electrical engineering, systems engineering, computer engineering, and biomedical engineering.

ENG Welcomes New Tenure-Track Faculty
Dunlop Receives Young Investigator Award
RECOGNIZED FOR EARLY CAREER IMPACT ON SYNTHETIC BIOLOGY

ASSISTANT PROFESSOR MARY DUNLOP (BME) has received the 2017 ACS Synthetic Biology Young Investigator Award, which recognizes the contributions of scientists who have made a major impact on the field of synthetic biology early on in their careers.

“It is a great honor to receive the ACS Synthetic Biology Young Investigator Award this year,” Dunlop says. “Synthetic biology is an emerging field with many excellent early career scientists. I am thrilled to be recognized for my research group’s efforts on engineering biological feedback control systems.” Before joining Boston University’s faculty in January 2017, Dunlop was an assistant professor at the College of Engineering and Mathematical Sciences at the University of Vermont. Her research focuses on systems and synthetic biology with an emphasis on feedback in gene regulatory networks. The Dunlop lab studies naturally occurring examples of feedback to understand how microorganisms use it to respond to changes in their environment and also engineers novel, synthetic feedback control systems. To support her research, Dunlop has three current grants: a National Science Foundation Early Career Development Award, a National Institutes of Health R01, and a Defense Advanced Research Projects Agency award.

—LIZ SHELEY

Longtime BME Faculty Member Herbert Voigt Mourned

P rofessor Herbert F. Voigt, a longtime Biomedical Engineering faculty member who helped set the department on a course that would lead it to elite, national stature, died suddenly on January 25. He was 65.

Voigt joined the BME faculty in 1981 and played an important role as the department’s small faculty established a research portfolio, the first step on its journey to becoming one of the nation’s largest and highest-ranked biomedical engineering departments.

“Herb Voigt was one of only seven faculty in BME when I joined back in 1984,” said Dean Kenneth R. Lutchen, a BME professor. “He was truly a pioneer in transforming the department from an undergraduate-only program to a fully research-active one with master’s and Ph.D. programs. Herb also amplified the department’s influence nationally in its early years through his service as a leader in several biomedical engineering organizations.”

“Herb was critical in setting us on the path to the success we enjoy today,” said Professor John White, chair of the BME department. “He was department chair during a critical time, working with then-Dean Charles DiLeo to expand our research efforts into applied molecular biology. He had a remarkable record of service to the global community of biomedical engineering.”

Voigt’s research centered on the neuronal circuitry in the cochlear nucleus, a complex within the brain stem that carries information from the inner ear to the brain. Voigt was awarded a Fulbright Scholar grant in 2015 to work with the Pontifical Catholic University of Peru on developing a new BME PhD. He also collaborated with the Instituto Nacional de Salud, Peru’s equivalent to the National Institutes of Health, to create a research program that focused on detecting heavy metals in biological samples. Through his leadership position in the International Union for Physical and Engineering Sciences in Medicine, of which he was president from 2014 to 2015, he assisted in developing programs and policies that advocated for women in engineering, addressed global health issues and supported the development of engineering and healthcare in resource-poor nations.

Voigt was a fellow of the American Institute for Medical and Biological Engineering and was elected the organization’s president in 2005. He also served as president of the International Federation for Medical and Biological Engineering, the Biomedical Engineering Society and the biomedical engineering honor society Alpha Eta Mu Beta. He was appointed the Institute of Electrical and Electronics Engineers’ Engineering and Biological Society Distinguished Lecturer for 2012–13.

In addition to his service in professional organizations, Voigt was active in the life of the University and the College of Engineering. He won the college’s Faculty Service Award in 2000 and served as secretary/treasurer and, later, chair of the University Faculty Council. Donations in his memory may be made to the Bach, Beethoven, and Brahms Society of Brookline, Mass., and to Congregation Beth Shalom of the Blue Hills in Milton, Mass.

—LIZ SHELEY

IN MEMORIAM

Mr. George J. Arrouchoch (*54), Nahant, N.H.
Mr. Harry T. Bred (*53), Metrowe Township, N.J.
Mr. Ronald P. Martin (*56), Williams, Va.
Mr. John D. Lewis (*58), Greenville, Miss.
Mr. Richard Elynn Jeane (*63), Winder, Ga.
Mr. Raymond H. Stone (*63), Brockton, Mass.
Mr. Robert J. Biacso (*65), West Brookfield, Mass.
Mr. Robert M. Stone (*65), Peabody, Mass.
Mr. Norbert Pawlak (*67), Vinel Grove, Ky.
Mr. Richard L. Priorat (*67), Nashau, N.H.
Mr. James D. Mulhallen (*69), Peabody, Mass.
Mr. Francis A. Harrington, Jr. (*70, *77), Marlborough, Mass.
Mr. Scott Alan Walker (*73), Oak Creek, Colo.
Mr. Richard E. Lord, Jr. (*73), Wakefield, Mass.
Mr. William Christopher Rockers (*74), Kansas City, Mo.

alumni

Mr. George J. Amrouche (*54), Nahant, N.H.
Mr. Harry T. Bred (*53), Metrowe Township, N.J.
Mr. Ronald P. Martin (*56), Williams, Va.
Mr. John D. Lewis (*58), Greenville, Miss.
Mr. Richard Elynn Jeane (*63), Winder, Ga.
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NEWS BYTES

Award for his paper, “Message-Passing De-Quantization with Applications to Compressed Sensing,” published in the IEEE Transactions on Signal Processing.

Six researchers earned the Gauss Award at the 2017 International Supercomputing High Performance Conference for their paper, “Diagnosing Performance Variations in HPC Applications Using Machine Learning.” Associate Professor Ayse Coskun led the team, which included Assistant Professor Manuel Egele (ECE) and Postdoctoral Associates Ate Turk (ECE) with PhD students Ozan Tuncer, Enre Aksu and Yijia Zhang.

In his June blog, Director of the National Institutes of Health Francis Collins highlighted Francis Collins

Award of the 2017 IEEE International Symposium on Defect and Fault Tolerance in Very-Large Scale Integration and Nanotechnology Systems Conference.

Nikhil Srivastava (ECE PhD student), advised by Professor Joshua Bloomer, was one of nine students selected for the 2017 NASA Hebergic Research Fellowship Program.

Advised by Associate Professor Ayse Coskun, Anthony Byrns (EECS) received the Best Lightning Talk Award at the IEEE MIT Undergraduate Research Technology Conference for “DeltaSherlock: Cloud Integrity Through Machine Learning.”

Advised by Assistant Professor Michel Kiney, Lake Bu (ECE PhD student) and Hien Nguyen (ECE MS student) received Best Paper nominations and the Best Student Paper Award at the 2017 IEEE International Conference on Signal Processing and Integration and Nanotechnology Applications to Compressed Sensing, Tolerance in Very-Large-Scale Integration and Nanotechnology Systems Conference.

Assistant Professor Ahmad Mo’ Khaled’s yTRAP research (see page 10) was noted in The Scientist magazine and recommended in PhysiologicalOmics, a database of important articles in biology and medicine, in research publications that are identified by peer-reviewed global faculty of the world’s leading scientists and clinicians.

Assistant Professor Ioannis Paschalidis (ECE, BME, SE) hosted the second Symposium on the Control of Networked Systems SCONE(S) in October.

In his NSF proposal, “A high school teacher can use a course that would lead it to elite,” Royster said, “Herb Voigt was one of only seven faculty in BME when I joined back in 1984.”

To help set the department on a course that would lead it to elite, national stature, and to develop the department’s reputation, Herb also amplified the department’s influence nationally in its early years through his service as a leader in several biomedical engineering organizations.

“Herb was critical in setting us on the path to the success we enjoy today,” said Professor John White, chair of the BME department. “He was department chair during a critical time, working with then-Dean Charles DiLeo to expand our research efforts into applied molecular biology. He had a remarkable record of service to the global community of biomedical engineering.”

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—LIZ SHELEY

Mr. William Christopher Rockers (*74), Kansas City, Mo.
Distinguished Alumni Awards Honor ENG Grads

During BU Alumni Weekend 2017, the College of Engineering honored three alumni for their career achievements and the support they have shown for the Boston University community.

After Dean Kenneth R. Lutchen’s welcoming address on Friday, September 15, two current students, Natalia Frumkin and Aidan Ryan, and one recent alumnus, Santiago Beltran (CE'17), introduced the three 2017 honorees, Bettina Briz-Himes (EE'86), Denise Schier (ME'81, ME) and Bill Weiss (SE'83, CE'97). Weiss supports the Societal Engineering Endowed Fund benefiting the Technology Innovation concentration.

Frumkin and Ryan were part of the Summer Term Alumni Research Scholars (STARS) program, which provides housing support for undergraduates to make it easier for them to perform research and work with faculty over the summer; Beltran completed the new Technology Innovation concentration during his time at ENG.

Briz-Himes graduated with a master’s from ENG after earning her BA in biophysics from the University of California, Berkeley. She works as the senior director of strategic alliances at GoPro, based in San Francisco, Calif., where she has been since September 2013. A technology executive for many decades, Briz-Himes has helped advise and grow businesses internationally across diverse technologies and markets.

Schier was involved in the Society of Women Engineers during her time at ENG, and after graduating with her bachelor’s, she earned her MBA from Northeastern University. She then served as manager of operations at General Electric before moving to Ametek in 1989, which specializes in electronic instruments and electromechanical devices. Schier just recently retired from her role of vice president and general manager of Ametek after serving in a number of senior positions, including manager of operations, strategic marketing and heading up their cable business and power and industrial products division.

Weiss earned both his bachelor’s and master’s degrees from ENG, and has worked for General Dynamics for the past 34 years. He leads their mission systems ground systems line of business, which is focused on military networks, networked computing and mission command systems and satellite ground systems. During his career at General Dynamics, Weiss has directed a number of important programs and business efforts, including the US Army’s Warfighter Information Network-Tactical and Common Hardware Systems programs.

“College textbooks have become pricy, and as a young adult it’s been really burdensome having to find the money to pay for them. I’m glad to know that there are people willing to look out for struggling students and assist us as we try to achieve success.”

—Troy Harper (ME’19)
Ji-Xin Cheng

PHD, UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA, HEFEI, CHINA
MOUSTAKAS PROFESSOR IN PHOTONICS AND OPTOELECTRONICS
PROFESSOR OF BIOMEDICAL ENGINEERING, ELECTRICAL & COMPUTER ENGINEERING, CHEMISTRY, AND PHYSICS

As a new faculty member, I’m excited to bring my passion for interdisciplinary research and developing real-world applications to a university that also recognizes those values. My lab focuses on three goals, which build on each other: the development of new imaging technologies; the discovery of new biology; and the delivery of innovative diagnostic tools to a clinical setting.

We focus on label-free imaging, which holds the potential to discover unknown cellular mechanisms involved in human diseases. By developing a new biological imaging method, we can see things we couldn’t before. The imaging techniques and tools paired with true discovery allow us to build devices for increasingly precise diagnosis and treatment of human diseases, including breast cancer and spinal cord injury.

To learn more, visit bu.edu/eng.