

Department of Electrical Engineering and Computer Science

The [Department of Electrical Engineering and Computer Science](#) (EECS) has continued to shape its role as an international leader in electrical engineering and computer science through innovations in education and research. Members of the department have worked to successfully implement initiatives in AY2014 that complement those established since fall 2011 to advance the department's mission in the years to come.

Leadership Roles at MIT

During the past year, several members of the EECS faculty were selected for major leadership roles at MIT. As the Institute announced its plans for a major innovation initiative, Microsystems Technology Laboratories (MTL) director Vladimir Bulović was selected as the School of Engineering's associate dean for innovation. Professor Jesús del Alamo was subsequently named director of MTL. Having served as MIT's chancellor since 2011, Eric Grimson was selected as chancellor for academic advancement, a special role created to ensure that the needs of the Institute's faculty and students are met as MIT's capital campaign begins in 2015. Professor Martin Schmidt, associate provost since 2008 and acting provost since fall 2013, was named provost in February 2014. Professor and EECS associate department head Munther Dahleh was appointed acting director of the Engineering Systems Division (ESD), interim director of the Laboratory for Information and Decision Systems (LIDS), and director-designate of a potential new organization that would incorporate the people and programs of ESD, LIDS, and a significant new initiative in statistics. Professor David Perreault succeeded Professor Dahleh in the role of EECS associate department head. On July 1, 2013, professor Dennis Freeman, who had served as EECS undergraduate officer since 2011, assumed the role of MIT's dean for undergraduate education. Professor Albert Meyer succeeded Professor Freeman as EECS undergraduate officer.

Launch of Start6

With the goal of creating an opportunity to support students interested in entrepreneurship, and based in part on feedback from the Visiting Committee, EECS launched a new initiative during the 2014 Independent Activities Period (IAP) called Start6: A Workshop for EECS Entrepreneurs and Innovators. This new two-and-a-half-week workshop, which was offered for academic credit, incorporated presentations by more than 50 top entrepreneurs from across the country. Roughly 60 undergraduate and graduate students and postdoctoral associates were exposed to topics such as equity division, models of funding, marketing, scalability, and team building and were also given the opportunity to meet with successful entrepreneurs and leaders in the venture capital field. Over spring break in March 2014, approximately 30 Start6 students traveled to northern California to continue exploring opportunities to move their ideas and prototypes forward. Encouraged by the rich experience and excellent feedback, EECS will offer Start6 again during IAP 2015.

Rising Stars in EECS

Fall 2013 marked the second year of the Rising Stars in EECS workshop, an opportunity for women from across the country who have demonstrated the highest levels of scholarship and research in fields encompassed by EECS to network and build their profiles for academic positions. As women from two years of Rising Stars—now numbering more than 70—have gained this exposure to increased possibilities for collaboration and professional support, the positive outcomes have created a new awareness and interest on the part of electrical engineering and computer science departments across the country in collaborating on and promoting this event. The University of California, Berkeley, will offer the Rising Stars workshop in fall 2014. EECS welcomed Vivienne Sze, among the first Rising Stars participants in 2012, as a new faculty member in fall 2013, and one of the latest faculty hires (starting in spring 2015) is Tamara Broderick, a 2013 Rising Stars participant.

Undergraduate Student Advisory Group

In its third year, the Undergraduate Student Advisory Group in EECS (USAGE) attracted 36 students who enthusiastically devoted themselves to several initiatives that have or will soon come to fruition. One is the establishment of the new EECS undergraduate student lounge to be located on the first floor of Building 36. The lounge, scheduled for completion in September 2014, will enable students to gather for meetings and engage in informal discussions of research and innovation projects. The group also provided significant input on ways to improve the advising experience in EECS. In fall 2011, the inaugural USAGE group helped shape the new SuperUROP advanced research program for EECS juniors and seniors (described below).

SuperUROP Program

In May 2014, at the end of the second year of SuperUROP (based on MIT's Undergraduate Research Opportunities Program), 72 juniors and seniors in EECS completed their research projects and the required coursework in the subject 6.UAR Preparation for Undergraduate Research. Each student worked as a member of a research lab on campus while gaining insights on various EECS technical areas and on topics such as the selection of research projects, entrepreneurship, and ethics in engineering. Three major deliverables were a poster presentation, an in-class presentation, and a journal-style paper describing students' research results.

SuperUROP is supported by the Research and Innovation Scholars Program, a named scholars program that funds students taking part in SuperUROP and provides some associated discretionary funding for the host research group. The scholars program would not have been possible without the generous support received from corporate and individual sponsors, all of whom are committed to growing the SuperUROP program and enhancing the student experience at MIT. Numerous corporate sponsor representatives who attended the SuperUROP research presentations throughout the two semesters remarked that what is being done by these students as undergraduates is impressive and often at the graduate level.

This year, a group of the named scholars had the opportunity to visit the offices of their corporate sponsor and present an in-depth seminar on their work to more than 30 researchers and engineering staff. After the experience, one presenter remarked that, “the group was engaged and genuinely interested in what we had to say. It made me feel more strongly that our research really matters and can help drive change.” Similar to last year, many of the students built on their SuperUROP projects to develop master of engineering projects. According to one student, “With what I learned during this class and relationships I developed with the research group, I have been able to strengthen my MEng project and accelerate the completion of my degree. SuperUROP has been an exceptional experience.” The SuperUROP cohort was an important constituent at the second annual EECS undergraduate research conference (EECScon), with 25 members of the cohort selected to participate in presentations and poster sessions.

Undergraduate Research Conference

Student research in EECS has continued to gain wider interest as a result of EECScon, the department’s student-organized and student-run undergraduate research conference. The 2014 conference reflected the enthusiasm of the student committee, which began building the program in fall 2013 and engaged fellow students to prepare for entry in the event, one that mirrors a professional-level research conference. A well-planned prize format for both oral and poster presentations was designed to encourage the professional level of the entries. The event drew nearly 170 attendees, including a large number of undergraduate students. The turnout for EECScon 2014 was heightened by the decision to offer the EECS Masterworks 2014 event to follow EECScon at a nearby location on the same afternoon, providing industry guests as well as EECS students and faculty the opportunity to see both undergraduate and master’s-level research in a single afternoon.

Postdoctoral Associates

EECS employs roughly 230 postdoctoral associates through its four affiliate laboratories, the Computer Science and Artificial Intelligence Laboratory (CSAIL), the Laboratory for Information and Decision Systems, the Microsystems Technology Laboratories, and the Research Laboratory of Electronics. With the encouragement of the Visiting Committee, the department created the EECS postdocs group in fall 2013, laying the foundation for a daylong “Bootcamp for Postdocs.” This event, held at the end of IAP 2014, involved nearly 40 postdoctoral participants. Panels and detailed talks held during the workshop covered topics such as employment options, teaching, how to find a faculty job, and how to write a research statement. Three lunch and network sessions were also held during 2014. The format of a half-hour lunch and networking followed by a half-hour informal talk attracted 50 to 60 postdocs each time. CSAIL research scientist and former DARPA (Defense Advanced Research Projects Agency) program manager Howard Shrobe spoke in February on “How to Be a Part of the DARPA Community.” Professor Greg Wornell spoke in March on “How to Start Your Teaching Career,” and in May a panel of three recent EECS graduates who had been interviewing for faculty jobs during the spring provided an overview of the academic job market.

Faculty Enhancements

EECS has continued its commitment to raising faculty excellence through the Faculty Research Innovation Fellows (FRIF) program, which recognizes senior faculty members for outstanding research contributions and international leadership in their fields.

Now in its third year, the FRIF program awards three years of funding as discretionary support for new or ongoing research projects (the FRIF winners are listed below under Faculty Awards and Honors).

Lead Roles in MITx/edX Development

In response to the continued demand for and the potential of online learning, members of the EECS faculty have taken a lead role in the development of a new phase in MITx known as the X Series. EECS developed Foundations of Computer Science as one of the first two certificate-granting sequences in the Institute's massive open online course effort. The complete series consists of a sequence of related modules on the edX platform, launched by MIT and Harvard University in 2012. Similar to EECS subjects offered on campus, Foundations of Computer Science introduces key concepts of computer science and computational thinking. EECS faculty members have shortened the on-campus versions of the classes to more accessible lengths for students already in the workforce who want to take advantage of this opportunity. A certificate will be given to reflect successful completion of the sequence over a two-year commitment.

Online MITx classes have also become the mechanism for EECS faculty to experiment with the flipped classroom approach: offering online lectures followed by an in-person class experience or office hours for problem solving and discussion. The continued development of online teaching and learning is becoming a major part of the activity of several EECS faculty members who view edX as an opportunity to explore how to teach better.

Undergraduate Enrollment

Undergraduate enrollment in EECS averaged 1,235 during the 2014 academic year, representing an almost unprecedented 21% increase over the previous academic year. Approximately 6% of the current enrollment is in electrical science and engineering (Course 6-1), 51% is in computer science and engineering (Course 6-3), 36% is in electrical engineering and computer science (Course 6-2), and 7% is in computer science and molecular biology (Course 6-7).

The master of engineering program entered its 20th year with an average of 172 students enrolled.

Managing the Enrollment Overload

We expect that in September 2014 there will be more than 6,000 filled seats in EECS classes, 4,000 of which will be occupied by undergraduates. This will make EECS responsible for more than one fifth of all MIT undergraduate classroom instruction and will result in an average student-faculty ratio of 60 to 1. Student-faculty ratios in most of the undergraduate computer science classes and introductory EECS classes are even higher, despite three years of department-wide load balancing. The situation is notably worse in infrastructure-intensive software engineering, computer systems, and lab-centric classes.

Three years ago, EECS began experimenting with adding longer-term lecturer support. We focused on finding lecturers who could be faculty collaborators in resource-intensive classes. As of fall 2014, EECS will have six such lecturers, each with a three-year contract. These instructors, part of the Extraordinary Educators in EECS program (EE-EECS),

have a strong record of collaborating with faculty on course development and delivery. They include Adam Hartz (6.01), Katrina LaCurts (6.033 and 6.02), Joe Steinmeyer (6.01), Max Goldman (6.005), Ana Bell (6.00 and 6.00x), and Silvina Hanono Wachman (6.004 and 6.004x). Our EE-EECS lecturers are dedicated, award-winning technical educators and creative curriculum developers and leaders. They co-lead classes during the term and spend summers collaborating with faculty on education-related research. The EE-EECS program, while still in its infancy, has already dramatically improved both student evaluations and faculty quality of life.

Curriculum

Over the past few decades, the computer has been at the heart of EECS and played a central role in the core curriculum. The pursuit of ever-faster and lower-cost processing neatly tied together our broad interests in technology, circuits, software, systems, and algorithms. But computing has become so readily available, and so inexpensive, that harnessing it in new ways has become as important as improving its efficiency and performance. What is capturing the imagination of increasing numbers of students and faculty is the challenge of combining computing and technology to comprehend, to diagnose, to control, and to create. The curricular impact of this shift has been extraordinary because it has simultaneously been pervasive, focused, and unifying. Recently launched EECS classes include computational fabrication, network science, constructive computer architecture, and synthetic biology. As described below, we also have a new focus on medical technology, and we are improving department unity by placing “mathematics in the middle.”

Medical Technology

Increasing the number of undergraduates literate in medical technology was a key part of the fall 2012 EECS strategic plan, in response to the rapidly growing student and EECS faculty interest in medical and clinically related research. In AY2014, more than 250 students took one of the four recently launched EECS classes focused on medical technology: Gim Hom’s revamped introductory analog circuits lab (6.101), featuring circuits for electrocardiogram (ECG) detection and pulse-oximetry; Alex Slocum and Charles Sodini’s joint Mechanical Engineering and EECS capstone course in medical device design (2.750/6.025/2.75/6.525); Seth Teller’s capstone class in assistive technology (6.811); and our flagship medical technology class, 6.S02, led by Collin Stultz, a practicing cardiologist, along with Joel Voldman and Elfar Adalsteinsson. The 150 students who took 6.S02 this past spring received instruction in classical EECS topics (e.g., Fourier analysis) and newer topics (e.g., machine learning) but in the context of measuring and analyzing clinically related signals: their own ECGs (taken with circuits designed in 6.101), glucose response curves, and magnetic resonance imaging (MRI) data (acquired via new table-top MRI scanners built in collaboration with Massachusetts General Hospital).

Mathematics in the Middle

The now ubiquitous role of computation in engineering has triggered a reevaluation of our core curriculum, driven in part by the changing background needs of our students. A new nexus is emerging for EECS, as evidenced by converging (or at least fruitfully interacting) approaches in such historically distinct subjects as machine learning and signal processing, algorithms and information theory, and control and robotics. And

even though we do not yet know the totality of this new nexus, we do know that our students need more computationally focused foundations in probability and statistics, optimization, dynamics, and linear algebra.

More than 600 students are now the alumni of three new “mathematics in the middle” EECS classes, each a collaboration between traditionally electrical engineering and traditionally computer science faculty and each involving a more computationally focused approach to traditional material. The first of these popular classes is a revised signals and systems subject (6.003), taught by professors Russ Tedrake and Pablo Parrilo, that emphasizes linear algebra and optimization; the second is a new computational inference course for sophomores taught by professors Gregory Wornell, Polina Golland, Lizhong Zheng, and Constantinos Daskalakis; and the third is a new junior-level machine learning class led by professors Tommi Jaakkola and Regina Barzilay, with help from professors Leslie Kaelbling, Tomás Lozano-Pérez, and Jacob White. The machine learning class’s approach to probability and linear algebra, presented in the context of classification and clustering, has been particularly popular with students. More than 250 students attended the class in spring 2014, in only its second offering.

Undergraduate Teaching Laboratories

The department’s undergraduate teaching laboratories enable students across the Institute and beyond to hone their craft as engineers and scientists. Our goal is to provide students with first-rate experiences that connect deep analytical tools with practice.

During the past year, the teaching laboratories supported a wide range of EECS core and laboratory subjects that offer hands-on experience and education in a variety of topic areas, including but not limited to energy conversion (6.007, 6.131, 6.A47, 6.A48), digital design (6.111, 6.004), embedded control (6.115), power electronics (6.131), robotics, motion, and task planning (6.01, 6.141, 6.142), silicon microfabrication (6.152J), analog design (6.101, 6.301, 6.302, 6.331), wireless communication (6.02, 6.102), optics and lasers (6.007, 6.161), and bioelectrical engineering (6.123J). Students from the Sloan School of Management, Mechanical Engineering, Ocean Engineering, Aeronautics and Astronautics, Physics, Mathematics, and Earth, Atmospheric, and Planetary Sciences (to name a few) are drawn to EECS laboratories. The laboratories also provide demonstrations and activities for General Institute Requirement subjects such as 18.03, facilities for freshman seminars, and activities for outreach programs with international extent, including, for example, the Women’s Technology Program, the Center for Materials Science and Engineering educational outreach program, the Cambridge Science Festival, Campus Preview Weekend, and innumerable outreach activities for local K–12 schools, teacher organizations, and organizations such as the Boy Scouts and Girl Scouts.

We recently completed the renovation of more than 2,500 square feet of space in the Room 38-500 teaching area to create the new Cypress Engineering Design Studio (EDS). The space, previously used for storage, was transformed into prototyping laboratory.



Old storage space converted to new Cypress Engineering Design Studio, spring 2014.

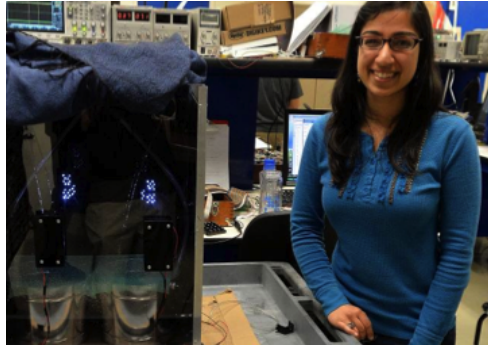


The new Cypress Engineering Design Studio in Building 38, spring 2014.

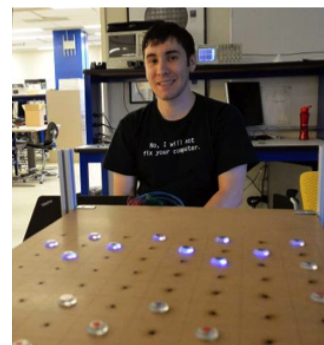
The new design studio has been put to immediate use, supporting an Institute freshman seminar program in the fall for 24 students, led by professors James Kirtley, Leslie Norford, Marc Baldo, and Steven Leeb. Professor Wojciech Matusik offered a new activity in additive manufacturing and computer graphics in the laboratory. All spring-term EECS laboratory subjects (including 6.101, 6.141, and 6.115) made use of the EDS for supporting students' final projects with a new level of prototyping capability for electronics and mechanical assembly, testing, and programming. Some of these activities are illustrated in the photos below.



Freshman Winter Guerra completing stereo speakers he designed and constructed in the Engineering Design Studio.



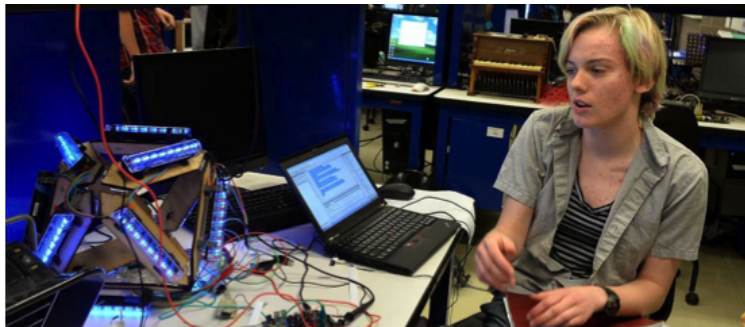
Aeronautics and Astronautics major Henna Jethani demonstrating her stop-motion strobe chamber.



EECS major Alexander Konradi demonstrating his robotic checkers table with automatic game play.

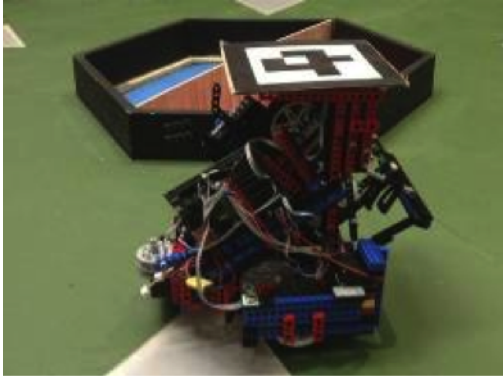


Physics major Danny Ben-David demonstrating the player-piano he constructed and programmed.



EECS major Sara Sinback demonstrating her DMX programmable polyhedron light display.

The department's teaching laboratories continue to be a focal point for student competitions and interactions with industry and alumni. For example, the laboratories host the highly popular 6.270 robot competition over IAP. This competition exposes students, primarily freshmen, to robotic design, including the hardware, software, and information needed to design, build, and debug a working robot. The laboratories also host design competitions from visiting industry sponsors such as the Bose Corporation and Cypress Semiconductor, allowing students the chance to connect with "real-world" activities involving practicing engineers and alumni.



A 6.270 robot in the Independent Activities Period competition.



Bose Corporation and Cypress Semiconductor industry sponsors work with students in the new Engineering Design Studio.

Master of Engineering Thesis Program

The department's 6-A Master of Engineering Thesis Program is in its 97th year. The 6-A International Internship Program is in its ninth year, with one MEng student in Beijing China, at Microsoft Research Asia. Thirty students applied to 6-A for summer 2014 positions at 10 participating companies. Thirteen students were selected as members of the incoming 6-A class. Currently, there are 11 undergraduates and eight MEng students in the program. The program provides leading-edge technology thesis opportunities with a full calendar year of tuition support for all 6-A MEng students who are company funded by the 6-A Fellowship Program. Participating companies continue to offer challenging and well-mentored assignments.

The J. Francis Reintjes Excellence in 6-A Industrial Practice Award was presented at EECS Celebrates, the spring awards ceremony, to 6-A student Timothy Galvin, who demonstrated outstanding performance in his 6-A work assignments at Draper Laboratory. His thesis research is titled "Faster Streaming Algorithms for Low-Rank Matrix Approximations." Tim is heading to the Nuclear Power School in South Carolina as an ensign in the US Navy.

There have been numerous inquiries from companies interested in the 6-A program, and we hope that we can obtain new members in the near future as well as increase the number of program applicants, positions, and participants.

Graduate Program

The EECS graduate program offers high-quality academics with a broad range of advanced course offerings. Moreover, our graduate students make leading contributions to an extremely wide range of research and technology activities in areas as diverse as

nanoscience, health care and medical instrumentation and imaging, energy and energy efficiency, manufacturing, robotics, computer science, and management of big data.

The 2014 admissions season saw 2,743 applications from all parts of the world. Of these, 165 students from 30 countries were admitted into our graduate program (approximately 6% of applications). Once again, EECS visit days (described below) occurred jointly across the department, with all of the admitted students in electrical engineering and computer science invited to visit campus together in early March. In the fall semester, 101 applicants will join our graduate program (including joint graduate programs). Our incoming 2014 class of graduate students includes 11% women and 3% underrepresented minorities. Approximately 50% of the new students will be funded by fellowships. Of the fellowships awarded, 57% are MIT Presidential Fellowships, 35% are departmental EECS fellowships sponsored by EECS alumni, and the remainder are externally awarded fellowships. Such fellowships, while being important for financial support, also provide incoming graduate students with flexibility in selecting the appropriate research group and project to meet their interests and career goals. In 2014, all students who were admitted into our graduate program were provided financial support in the form of a fellowship, a research or teaching assistantship, or financial support offered by EECS.

At present there are 683 active students in our EECS graduate student population (including students beginning in fall 2014) with 145 women students (21% overall); 57% of these students have an international citizenship. The graduate student body is 54% electrical engineering (24% women) and 46% computer science (18% women). Our graduate student body is highly accomplished, having received a wide assortment of fellowship awards; nearly 170 current students are supported by fellowships. In addition to the fellowships awarded at the time of admission (described above), our students have received fellowships from the US government (53%), from US industry (8%), from industrial internships (5%), from foundations (4%), and from foreign countries (28%). Our graduate students have won a number of scholarship awards, including the Hertz Fellowship and Fulbright Scholarship, five Siebel Scholarships, the Simons Foundation Award, and two Dimitris N. Chorafas Foundation Prizes.

In AY2014, EECS graduated students in September, February, and June. Total numbers of advanced degrees awarded were as follows: 138 master of engineering degrees, 92 master of science degrees, 100 doctor of philosophy degrees, one doctor of science degree, and four electrical engineering degrees. EECS awarded numerous joint master of science degrees with the Technology and Policy Program (two degrees), Leaders for Global Operations (five degrees), Naval Engineering (two degrees), Nuclear Science and Engineering (one degree), Civil and Environmental Engineering (one degree), Architecture (one degree), and the Engineering Systems Division (one degree). In summary, 335 students obtained an advanced degree from EECS in AY2014.

Along with a graduate student body that is diverse in nationality, EECS strives to achieve a graduate student community that is diverse in gender, ethnicity, and race. To make inroads in supporting the diversity of applicants, the graduate office staff and faculty regularly participate in MIT's Institute-wide recruiting efforts. In addition to supporting MIT's Minority Summer Research Program, EECS supports the GEM

(National Consortium for Graduate Degrees for Minorities in Engineering and Science) GRAD (Getting Ready for Advanced Degrees) Lab and the CONVERGE graduate preview weekend held in the fall. Also, the EECS graduate office staff participated in the annual meeting of the Society of Hispanic Professional Engineers held in Indianapolis.

Once the admitted applicants become part of the EECS community, networking and mentoring seminars are offered each fall (with reunions in the spring) for women as well as for individuals who might benefit from weekly group meetings and discussions. Four different networking seminars are currently offered for various groups of incoming graduate students.

Visit Days for Newly Admitted Graduate Students

For the second successive year, the department organized a joint electrical engineering and computer science visit weekend for students newly admitted to our graduate program. Our goal is to provide admitted applicants with a preview of their life as a graduate student working on research and academics in EECS and at MIT, as well as an opportunity to see firsthand the multitude of opportunities provided by the MIT environment and the Boston metropolitan area. Admitted applicants are able to meet and interact with potential research supervisors, view laboratories, chat with research groups and potential classmates, and visit graduate dormitories and living spaces. This weekend visit event ensures that admitted applicants can directly observe the opportunities available and determine whether the EECS graduate program will meet their career goals and aspirations.

The EECS visit days span two full days, beginning with an evening dinner and reception organized by the current EECS graduate student body, led by the EECS Graduate Student Association. Formal sessions include a research exchange during which EECS faculty and staff briefly share their research goals and philosophy, followed by one-on-one meetings with faculty and staff, allowing the new admits to meet prospective research groups. There are also laboratory tours, a reception hosted by faculty and laboratory directors, and a number of dinners arranged by research area or research group offering additional opportunities for informal interactions. On the second day, newly admitted students learn about the academic requirements of the graduate program from the EECS graduate officer, followed by a discussion panel comprising current graduate students. The day also includes an EECS “fun fair” that highlights the ways faculty, students, and staff enjoy MIT, Boston, and New England; graduate dormitory tours; campus tours; and an MIT Coop shopping spree. The weekend is capped by a dinner at the MIT Museum with guests, current students, and faculty.

International Experiences

The department is actively engaged in developing opportunities for global experiences for our students and faculty. A record number of EECS students have been participating in MIT International Science and Technology Initiatives (MISTI) activities, supported by the extensive efforts of Sean Gilbert and others at MISTI. This year 182 EECS students are engaged in summer MISTI internships, up from last year’s previous record of 144 students. Most of these internships are with corporate research and development labs, universities, and government research labs in more than 20 countries, allowing our students to put their education into practice globally.

The Hong Kong University of Science and Technology–MIT Research Alliance Consortium was launched in January 2014. The founding companies are Intel and Texas Instruments, whose funding of approximately \$100,000 per year is matched 9 to 1 by the Hong Kong Innovation and Technology Commission (ITC). Fifteen proposals in the areas of information and communication technology and smart green buildings have been submitted. The Hong Kong University of Science and Technology and the executive advisory board have selected three proposals for submission to ITC for matching funds. MIT investigators are involved in all three proposals, with EECS faculty involved in two of the proposals (Anantha Chandrakasan, Dina Katabi, Jing Kong, and Timothy Lu).

Under the MIT and Masdar Institute Cooperative Program, MIT is helping the Masdar Institute develop its education and research programs. EECS faculty member Duane Boning is the program's director. Over the past year, joint research projects pairing EECS and Masdar Institute faculty members have included work on mitigating inter-area oscillations in power grids, the design of ultra-low power analog-to-digital converters, and computer-aided design (CAD) methods for minimum energy design of microelectronics circuits. Larger joint flagship projects involving EECS faculty include efforts focusing on multi-junction photovoltaic cells and architectures for resilient power grids. A joint effort of the Masdar Institute's Ibrahim Elfadel and MIT's Luca Daniel won the Institute of Electrical and Electronics Engineers (IEEE) Transactions on CAD 2013 Best Paper Award. EECS faculty also serve as education program coordinators helping to guide the evolution of MI's master's degree programs in electrical and power engineering and microsystems.

The Madrid-MIT M+Visión Consortium is a partnership between the community government of Madrid and MIT dedicated to innovation and translational research in biomedical technology. M+Visión is catalyzing a transformation of the Madrid ecosystem by developing new modes of training and collaboration. Chief among these efforts is an interdisciplinary approach—called IDEA3—to identifying and solving complex medical challenges. Our flagship program, the M+Visión Fellowship in Translational Biomedical Imaging, is built around IDEA3 and involves dozens of organizations in high-impact research projects. Our other programs, initiatives, and events are similarly designed to attract talented people, provide a meaningful and productive framework for collaboration, and, over time, change the way the ecosystem responds to the innovation opportunities of the future. Led by EECS professors Martha Gray and Elfar Adalsteinsson, the consortium now has 87 core faculty members and 49 participating organizations.

A number of computer science faculty in our department are engaged in research projects under international sponsorships or partnerships at CSAIL, the largest two being with Quanta Computer Inc. and the Qatar Computing Research Institute (QCRI). Under Quanta support, Project Qmulus is in its ninth year and supports 15 EECS members working in four broad research areas: cloud technologies, education, medicine and health care, and multimedia. The collaboration with QCRI, in its second year, involves 17 EECS members working in advanced analytics and visualization in sports, cyber security, data integration, data management for social computing, and speech and language processing. Smaller engagements include Foxconn (five faculty and projects), and we are working on several new opportunities.

Women's Technology Program

2014 marks the 13th summer of the Women's Technology Program (WTP), which was founded in EECS in 2002. The WTP mission is to encourage high school girls with demonstrated math and science talent to pursue engineering and computer science by introducing them to these subjects in a hands-on, team-based format. WTP runs each year from the last week in June through the third week in July.

WTP added a second curriculum track in mechanical engineering in 2006. Although the two tracks have separate classes, staffing, and budgets, they operate as one interdepartmental program. WTP director Cynthia Skier SB'74, SM '81 (who sits in EECS), manages many administrative operations shared by the WTP-EECS and WTP-ME tracks, such as admissions, housing, dining, and a guest speaker series attended by all the students.

For summer 2014, 60 students (40 for WTP-EECS and 20 for WTP-ME) were selected from an applicant pool of 367 female 11th-grade high school students from across the country. The WTP students are all top math and science performers who are not yet committed to pursuing engineering or computer science; they will all be applying to colleges in fall 2014. WTP gives them an opportunity to learn more about their aptitude for engineering, shows them some of the exciting research being done here at MIT, and allows them to explore the MIT community. The WTP-EECS students take hands-on, lab-based, college-level classes introducing them to electrical engineering, computer science, and discrete mathematics, all designed and taught by a dedicated female staff of MIT postdoctoral, graduate, and undergraduate students. This also provides a unique professional development experience for the MIT women students, encouraging them to pursue academic careers.

The entrance and exit surveys we administer to the WTP-EECS students show dramatic increases in their interest in engineering and computer science and confidence in their ability to succeed in these fields. Over 85% of respondents indicate that their attitudes and perceptions of electrical engineering and computer science were more positive after attending WTP. We also track alumnae long term. Since 2002, 63% of the WTP-EECS alumnae have majored in a field of engineering or computer science (with another 22% in science or math).

Although not a stated goal, the WTP-EECS students also develop an interest in MIT. Of the 466 WTP-EECS alumnae since 2002, 195 (42%) have chosen to attend MIT; of this year's 40 summer students, 13 will enter as MIT freshmen in fall 2014. WTP-EECS alumnae often pursue UROP or MEng thesis projects with MIT faculty who were WTP guest speakers in the summer they attended WTP. They also return to WTP to work on the staff; this summer, four of the 16 WTP-EECS staff and one of the WTP-ME staff were alumnae of WTP-EECS. WTP alumnae at MIT as well as other colleges stay involved with mentoring programs and other STEM (science, technology, engineering, and mathematics) activities that encourage younger women to pursue engineering and computer science.

Faculty Notes

Faculty promotions (effective July 1, 2013):

Associate professor without tenure: Armando Solar-Lezama, Dana Weinstein

Associate professor with tenure: Scott Aaronson

Full professor: Regina Barzilay, Karl Berggren, Jongyoon Han, Robert Miller, Li-Shiuan Peh, Joel Voldman, Lizhong Zheng

Faculty on sabbatical leave:

Hari Balakrishnan, spring 2014

Robert Berwick, fall 2013/spring 2014

Adam Chlipala, spring 2014

Polina Golland, fall 2013

John Guttag, fall 2013/spring 2014

Judy Hoyt, spring 2014

Robert Morris, fall 2013/spring 2014

Collin Stultz, fall 2013

Russell Tedrake, fall 2013

John Tsitsiklis, fall 2013/spring 2014

Cardinal Warde, spring 2014

Gregory Wornell, fall 2013/spring 2014

Fatih Yanik, fall 2013

Markus Zahn, fall 2013

Faculty on junior research leave:

Dana Moshkovitz Aaronson, spring 2014

Faculty on family release:

Hari Balakrishnan, fall 2013

Jing Kong, fall 2013

Yury Polyanskiy, spring 2014

Rahul Sarpeshkar, fall 2013

Armando Solar-Lezama, spring 2014

Dana Weinstein, spring 2014

Faculty on leave:

Martin Rinard, spring 2014

Retired faculty:

Barbara Liskov

Alan Oppenheim

Stephen Ward

Alan Willsky

Thomas Heldt joined the EECS faculty in July as an assistant professor of electrical and biomedical engineering. He was also appointed to MIT's new Institute for Medical Engineering and Science, where he holds the Hermann von Helmholtz career development professorship. Thomas studied physics at Johannes Gutenberg University (Germany), Yale University, and MIT. He received a PhD in medical physics from the Harvard-MIT Division of Health Sciences and Technology and stayed at MIT for postdoctoral training. Prior to joining the faculty, Thomas was a principal research scientist with MIT's Research Laboratory of Electronics, where he co-founded and co-directed (with professor George Verghese) the Computational Physiology and Clinical Inference Group. Thomas's research interests focus on signal processing, mathematical modeling, and model identification to support real-time clinical decision making, monitoring of disease progression, and titration of therapy, primarily in neurocritical and neonatal critical care. His research is conducted in close collaboration with colleagues at MIT and clinicians from Boston-area hospitals.

Vivienne Sze joined EECS as an assistant professor in August 2013. She received the 2011 Jin-Au Kong Outstanding Doctoral Thesis Prize, awarded for the best PhD thesis in electrical engineering at MIT, for her work on "Parallel Algorithms and Architectures for Low Power Video Decoding." From September 2010 to July 2013, she was a member of the technical staff at the Systems and Applications R&D Center at Texas Instruments. Her research interests include energy-aware signal processing algorithms and low-power circuit and system design for portable multimedia applications. Her work on implementation-friendly video compression algorithms was used in the development of the latest video coding standard, HEVC/H.265, enabling it to deliver better compression than previous standards while still achieving high processing speeds and low hardware costs.

Vinod Vaikuntanathan joined EECS as an assistant professor of computer science in September 2013. After receiving his SM and PhD from MIT in 2009, he spent two years as a postdoctoral fellow at IBM T.J. Watson, one year as a researcher at Microsoft Redmond, and two years as an assistant professor at the University of Toronto. He is broadly interested in cryptography, security, and distributed algorithms. His current research focus is on developing technologies for computing on encrypted data and guaranteeing the privacy of sensitive data. His work has been recognized with a George M. Sprowls PhD thesis award at MIT, an IBM Josef Raviv postdoctoral fellowship, a University of Toronto Connaught Foundation award, and an Alfred P. Sloan Fellowship.

The department hosted the following visiting faculty this year: professor Ran Libeskind-Hadas, associate professor Khurram Afridi, associate professor Mujdat Cetin, professor Yehudit Dori, and senior lecturer Babak Ayazifar.

AY2014 marked the loss of three beloved faculty members.

Amar Bose, 1929–2013, made tremendous contributions to EECS and to the students who were fortunate enough to interact with him—as a truly remarkable educator, researcher, and mentor. Professor Bose’s passion for research in audio and acoustics led to the development of the corporation that bears his name as a premier audio products company.

Kenneth Stevens, 1924–2013, became internationally known for his lifelong research on acoustics and the fundamental roots of speech and language. He was awarded the National Medal of Science in 1999. Professor Stevens came to MIT in 1948 as a doctoral student in electrical engineering and spent the next 59 years at the Institute, joining the EECS faculty in 1954 and retiring in 2007 at the age of 83.

James K. Roberge, 1938–2014, a member of the MIT faculty since 1967, spent nearly his entire professional career at MIT. Earning his SB, SM, and ScD degrees at MIT, Professor Roberge performed research in electronic circuits and systems—specifically in space communications, instrumentation, and optical communications at Lincoln Laboratory. He was revered for his teaching and mentoring, encouraging a number of students who are now continuing on his academic and research path.

Faculty Appointments

Career Development Chair Appointments

Thomas Heldt was selected as the Hermann L.F. von Helmholtz career development assistant professor.

Vivienne Sze was named the Emanuel E. Landsman (1958) career development assistant professor.

Vinod Vaikuntanathan was appointed as the Steven G. (1968) and Renee Finn career development assistant professor.

Chair Appointments

Jeffrey Lang was selected as the Vitesse professor.

Ronald Rivest was named the Vannevar Bush professor.

Daniela Rus was selected as the Andrew (1956) and Erna Viterbi professor.

Faculty Awards and Honors

Anant Agarwal was selected as a distinguished alumnus of the Indian Institute of Technology Madras and was elected to the American Academy of Arts and Sciences.

Marc Baldo, Regina Barzilay, Samuel Madden, and David Perreault were awarded 2013 Faculty Research and Innovation Fellowships.

Tim Berners-Lee shared the 2013 inaugural Queen Elizabeth Prize for Engineering, recognizing his creation (25 years ago) of the World Wide Web.

Erik Demaine was named the 2013 Steven and Renée Finn Innovation Fellow.

Srinivas Devadas won the IEEE Computer Society's 2014 Technical Achievement Award "for pioneering work in secure hardware, including the invention of Physical Unclonable Functions and single-chip secure processor architectures." In addition, he and three of his former students shared the ASPLOS (International Symposium on Architectural Support for Programming Languages and Operating Systems) Most Influential Paper Award for their 2004 work titled "Secure Program Execution Via Dynamic Information Flow Tracking." Also, two of his papers published in the proceedings of the International Conference on Supercomputing (ICS) in 2001 and 2003 were selected for the 25th-anniversary volume comprising the best papers published in the ICS proceedings between 1987 and 2011.

Mildred S. Dresselhaus, Institute Professor emerita, received the Materials Research Society Von Hippel Award in recognition of her work and close association with Professor von Hippel. She was also the recipient of an honorary doctorate from the Hong Kong Polytechnic University and an honorary fellowship from the Royal Microscopical Society (United Kingdom).

William T. Freeman won the Test of Time Award at the 2013 International Conference on Computer Vision and the 2013 IEEE Automatic Face and Gesture Recognition Conference.

James Fujimoto, cited for "pioneering the development and commercialization of optical coherence tomography for medical diagnostics," received the 2014 IEEE Photonics Award.

Polina Golland won the Electrical and Computer Engineering Department Heads Association 2014 Diversity Award for her leadership role in creating the new annual Rising Stars in EECS workshop for women.

Shafi Goldwasser and Silvio Micali received the 2012 Turing Award at the annual Association for Computing Machinery (ACM) awards event in June 2013 for their pioneering work in the fields of cryptography and complexity theory. Their work in cryptography—developing new mechanisms for encrypting and securing information—is widely applicable today in communications protocols, Internet transactions, and cloud computing.

Qing Hu won the 2013 Inventions and Inventors Award from the Boston Museum of Science and the Boston Patent Law Association for his work on terahertz quantum cascade lasers and real-time terahertz imaging.

Piotr Indyk was selected as a 2013 Simons Investigator and received the 2012 ACM Paris Kanellakis Theory and Practice Award (the ACM award was presented in 2013).

Dina Katabi was selected as a 2013–2014 MacArthur Fellow. She also received the 2013 Grace Murray Hopper Award from ACM and was elected as a 2013 ACM Fellow.

Charles E. Leiserson received the IEEE Computer Society 2014 Taylor L. Booth Education Award and the 2013 ACM Paris Kanellakis Theory and Practice Award. Professor Leiserson was also elected a fellow of the American Association for the Advancement of Science.

Andrew W. Lo was elected to the American Academy of Arts and Sciences.

Tomás Lozano-Pérez was named an MIT 2014 MacVicar Faculty Fellow.

Timothy K. Lu received a CAREER Award from the National Science Foundation.

Marvin Minsky, who established the Artificial Intelligence Lab at MIT, received the BBVA Foundation Frontiers of Knowledge Award and the 2014 Dan David Prize in the category “Future: Artificial Intelligence, The Digital Mind.”

Sanjoy Mitter was selected as a 2013 fellow of the International Federation of Automatic Control.

Tomas Palacios received the 2013 Augustín de Betancourt Award from the Royal Spanish Academy of Engineering.

Pablo Parrilo won the 2013 INFORMS Optimization Society Farkas Prize.

David Perreault received a Prize Paper Award and a Second Prize Paper Award from the IEEE Power Electronics Society.

Jeffrey S. Shapiro was named a 2013 fellow of SPIE, the International Society for Optics and Photonics. He also received the 2013 Best Paper Award from Lincoln Laboratory.

Nir Shavit was selected as a 2013 ACM fellow.

Henry I. Smith was selected as a 2014 fellow of the National Academy of Inventors.

Vivienne Sze won the Jonathan Allen Junior Faculty Award from the Research Laboratory of Electronics.

Vinod Vaikuntanathan was selected by Microsoft Research as a 2014 faculty fellow.

Alan S. Willsky was selected for the 2013 IEEE Signal Processing Society Award.

Teaching Awards

The following faculty received awards at the annual EECS spring awards ceremony held in May.

Frans Kaashoek and David Karger were winners of the 2014 Jamieson Prize for excellence in teaching.

Ron Rivest was presented the Best Instructor Award by Eta Kappa Nu.

Asuman Ozdaglar and Wojciech Matusik received the Ruth and Joel Spira Award for distinguished teaching.

Karl Berggren won the Jerome Saltzer Award for outstanding recitation teaching in undergraduate core subjects.

Seth Teller was presented the Best Advisor Award by MIT’s IEEE/ACM student group.

Gerald Sussman received the Graduate Student Association Graduate Counselor Award.

Student Awards

The following awards were presented to EECS students at the May 2014 EECS spring awards ceremony.

- Carlton E. Tucker Teaching Award: Vahid Montazerhodjat
- Harold L. Hazen Teaching Award: Robert McIntyre
- Frederick C. Hennie III Teaching Awards: Aliaa Atwi, Eduardo Sverdlin Lisker, and Hayden C. Metsky
- Departmental Teaching Award (honorable mention): Clarice Aiello
- School of Engineering Graduate Student Extraordinary Teaching and Mentoring Award: Clarice Aiello
- Undergraduate Teaching Award: Max Dunitz
- Robert A. Fano UROP Award for Outstanding UROP in EECS: Sarah A. Weir
- Anna Pogosyants UROP Prize: Qinxuan Pan
- Morais (1986) and Rosenblum (1986) UROP Award: Gil Goldshlager
- 2014 SuperUROP Outstanding Research Presentation Award: Chelsea Finn and Anvisha Pai
- 2014 SuperUROP Outstanding Research Project Award: Caelan Garrett and Rishi Patel
- 2014 SuperUROP Outstanding Research Technical Report Award: Francis Xinghang Chen and Erika Ye
- Northern Telecom/BNR Project Award for Outstanding 6.111 Laboratory Project: Woo Hyeok Kang, Ariana J. Eisenstein, and Tarun Malik for their project "Real-Time Animated Video"
- George C. Newton UG Lab Prize: Katharine Daly and Jack C. Hutchinson for their project "Rubik's Cube Solver"
- David A. Chanen Writing Award for the best paper in the subject 6.033: Eeway Hsu
- Charles & Jennifer Johnson CS MEng Thesis Prize:
 - Robert L. McIntyre for "Recognizing Actions Using Embodiment & Empathy" (Patrick Winston, supervisor)
 - Zachary Kebelac for "3D Tracking via Body Radio Reflections" (Dina Katabi, supervisor)
- David Adler Memorial Electrical Engineering MEng Thesis Prize: Rui Jin for "Circuits and Systems for Efficient Portable-to-Portable Wireless Charging" (Anantha Chandrakasan, supervisor)
- Morris Joseph Levin Award for Best Master Works Thesis Presentation:
 - Hijung Valentina for "Uncovering Centuries of Balance: Computation and Visualization of Equilibrium in Masonry Structures" (Fredo Durand and John Ochsendorf, supervisors)

Rui Jin for "Circuits and Systems for Efficient Portable-to-Portable Wireless Charging" (Anantha Chandrakasan, supervisor)

J. Francis Reintjes Excellence in 6-A Industrial Practice Award:

Timothy Galvin, Draper Laboratory

Shijie "Kevin" Zheng, Analog Devices

Paul L. Penfield Student Service Award: Cody Coleman and Joy Johnson

EECScon Oral Presentation Awards: Ishwarya Ananthabhotla and Abubakar Abid

EECScon Poster Presentation Awards: Sarah Guthrie, Caelan Garrett, and the team of Michele Chen and Qui Nguyen; Nitya Subramanian for "crowd favorite" poster

Staff Awards

Danielle Festino, Gim Hom, and Krista Van Guilder were presented 2014 Department Head Special Recognition Awards.

Janet Fischer and Patricia Sampson received 2014 Richard J. Caloggero Awards.

Anantha P. Chandrakasan

Department Head

Joseph F. and Nancy P. Keithley Professor of Electrical Engineering