Department of Electrical Engineering and Computer Science

The Department of Electrical Engineering and Computer Science (EECS) is MIT's largest department, with 120.5 faculty conducting research in four affiliated labs: the Computer Science and Artificial Intelligence Laboratory (CSAIL), the Laboratory for Information and Decision Systems (LIDS), the Microsystems Technology Laboratories (MTL), and the Research Laboratory of Electronics (RLE). EECS is also home to a growing portion of MIT's student body. In AY2017, 1,270 undergraduate students, 227 master of engineering (MEng) students, and 667 graduate students were enrolled in the department as of October 7, 2016.

Department Leadership Changes

Nancy Lynch and Asu Ozdaglar became assistant department heads, replacing Silvio Micali and David Perreault, respectively. In late June 2017, Ozdaglar was named interim department head during the search to replace former department head, Anantha Chandrakasan, who was appointed dean of the School of Engineering, effective July 1, 2017.

The Future of Electrical Engineering Committee

In September 2016, motivated by the decline in undergraduate enrollments in electrical engineering, EECS department head Anantha Chandrakasan convened a committee charged with "evaluating the current state of electrical engineering (EE) and exploring ideas for major changes to the EE program with the goal of revitalizing electrical engineering." The committee, co-chaired by Chandrakasan and Associate Department Head Asu Ozdaglar, included EECS faculty members Elfar Adalsteinsson, Marc Baldo, Dennis Freeman, Adam Hartz, Tomas Palacios, Pablo Parrilo, David Perreault, Joe Steinmeyer, Christopher Terman, John Tsitsiklis, and Joel Voldman. In addition to regular weekly meetings, the committee hosted weekly EE faculty meetings to discuss the revitalization effort. The committee also collected detailed data through individual faculty interviews as well as through student surveys and discussion groups (with students, alumni, and industry leaders) in collaboration with Institutional Research.

One major finding was the narrow perception of EE by students (who viewed the field as "circuits"). Another key piece of feedback: the Electrical Engineering and Computer Science major (Course 6-2), which enrolls a large fraction of EECS undergraduates, was viewed as a random collection of EE and CS subjects and as lacking a coherent identity. Course 6-2 students also expressed an interest for "building systems," highlighting a unique opportunity to rebrand the Course 6-2 major.

Based on this data, the Future of Electrical Engineering committee proposed focusing on the Course 6-2 program. Specifically, the committee recommended emphasizing a systems focus and developing new foundation and header classes that better connect with design and current applications, enhance hands-on experience, and generate a balanced interest in EE, CS, and areas at the interface. The committee also proposed introducing new advising tracks focusing on data science, autonomous systems, medical systems, energy, and hardware and software that allow students to connect with and specialize in their areas of interest. The development of new foundation courses is well underway, with plans for offering them in AY2018.

The Computer Science Excellence Committee

Clearly, the EECS computer science (CS) program is excellent. In various rankings, it is generally rated as number one, or tied for number one, among PhD-granting computer science programs worldwide. Still, important issues need to be addressed in order to improve and maintain that level of excellence. In fall 2016, Anantha Chandrakasan appointed the Computer Science Excellence committee (CSX) to provide input on maintaining and improving excellence in computer science. The committee, co-chaired by Frans Kaashoek and Nancy Lynch, included faculty members Regina Barzilay, Shafi Goldwasser, Dina Katabi, Tomas Lozano-Perez, Samuel Madden, Aleksander Madry, Wojciech Matusik, Robert Miller, and Armando Solar-Lezama.

The CSX committee met weekly during the semester. Members interviewed past and present leaders of computer science at MIT and elsewhere and conducted extensive discussions both within the committee's membership and among the general CS and EECS faculty. The committee discussed issues related to computer science visibility at MIT, leadership, endowment and fund-raising, faculty hiring, teaching and advising load, space, PhD recruitment, and curriculum.

Because CSX was an internal EECS committee, we tried to focus on what could be done within our own department. The committee recommended the following changes (on which the department has made good progress):

- Hiring more lecturers to help teach and manage high-enrollment CS undergraduate courses, and securing additional teaching-assistant slots for those courses

- Persuading EE faculty to help in teaching high-enrollment CS courses

- Raising graduate student stipends

- Increasing the CS faculty size

- Working closely with CSAIL to secure funding for space renovations, as a short-term solution to overcrowding

- Allowing the CS and EE faculty search committees to operate mostly independently, and with more autonomy than before

- Agreeing that the CS and EE curriculum committees could operate more independently, in managing Course 6-3 (Computer Science and Engineering) and Course 6-1 (Electrical Science and Engineering) curricula, respectively. A combined committee should be responsible for the Course 6-2 (Electrical Engineering and Computer Science) curriculum.

The CSX committee agreed that some of the issues—including visibility, fundraising, resources, and leadership—will require further discussion, both inside and outside the department. We believe an Institute-wide computer science initiative could be an important step forward and that such an initiative should try to nurture computer science as a core discipline at MIT, as well as develop strategies for CS research and education across campus.

Educational and Outreach Initiatives

Over the past several years, EECS has launched about 30 key initiatives designed to enhance the student, postdoctoral, and faculty experiences as well as strengthen the department's outreach and impact. During the past academic year, we continued supporting and developing these programs, which have grown beyond EECS and are attracting participation from other departments, the Institute, and beyond. Following are some highlights:

SuperUROP: Undergraduates as Researchers

SuperUROP (the advanced Undergraduate Research Opportunities Program) is designed to provide a more in-depth experience for juniors and seniors who have already completed a traditional Undergraduate Research Opportunity Program (UROP) project. Through participation in graduate-level research and weekly guest lectures from distinguished speakers, the advanced year-long program prepares students for work in academia, industry, and startups. The 12-credit 6.UAR Seminar in Undergraduate Advanced Research, offered in conjunction with SuperUROP, teaches students valuable technical communication skills. SuperUROP participants present their results at live events, such as the fall SuperUROP poster session and the spring EECScon event; many go on to present at professional conferences or publish in top journals in their fields. Each student is eligible to receive a named stipend that is generously funded by gifts from industry sources and alumni.

Launched by EECS in 2012, SuperUROP is now offered to all School of Engineering departments and is being extended to the School of Arts, Humanities, and Social Sciences as well. The AY2017 SuperUROP class included more than 140 students from EECS and four other departments: Aeronautics and Astronautics, Biological Engineering, Chemical Engineering, and Civil and Environmental Engineering. During a lively certificate ceremony in May 2017, many students shared their enthusiasm for the experience. "You get to build something that actually matters," one student noted. Another summed it up this way: "I really loved the program. I wish I could do it twice."

More than 140 undergraduates from EECS and four other School of Engineering departments completed in-depth SuperUROP projects during AY2017. Photo: Gretchen Ertl

StartMIT: A Boot Camp for Aspiring Entrepreneurs

AY2017 was the fourth for StartMIT (previously Start6), an Institute-wide program designed to provide a crash course in innovation and entrepreneurship. Students learn about start-up culture and ethics, team building, intellectual property issues, concept development and pitching, and, of course, raising money.

The intensive program includes a for-credit workshop held during MIT's winter Independent Activities Period (IAP), site visits to start-ups and other companies, and meetings with MIT alumni and other entrepreneurs. In addition, StartMIT students can leverage the MIT Sandbox Innovation Fund, a program offering tailored educational experiences, mentoring, and seed funding of up to $25,000 for qualified teams.

Participants in StartMIT 2017 heard from nearly 70 leading innovators. Special sessions included a "fireside chat" with Dropbox founder Drew Houston '05 and an all-female Innovation Night panel featuring six accomplished academics and entrepreneurs.

During the 2017 spring break, some StartMIT participants traveled to California, where they visited leading companies in San Francisco and Silicon Valley, and networked with MIT alumni and local professionals. The program is sponsored by EECS with support from the MIT Innovation Initiative.

Nicola Corzine, executive director of the Nasdaq Entrepreneurial Center in San Francisco, spoke with StartMIT participants during their intensive two-day trip to San Francisco and Silicon Valley. Photo: Mary Ellen Sinkus

USAGE: Helping Shape the Student Experience

The department continues to benefit from the contributions of the Undergraduate Student Advisory Group in EECS (USAGE). Founded by Anantha Chandrakasan in 2011, the student advisory committee meets regularly with EECS leaders to share insights into how the department's nearly 1,500 undergraduates view a variety of educational issues.

The AY2017 USAGE committee had a busy year; its 30-plus members weighed in on everything from training for teaching assistants to a proposed new interdisciplinary major to the design for a new undergraduate student lounge, and more. Members also surveyed their peers about issues such as workload, curriculum, and advising, then discussed their findings with the department's biennial Visiting Committee in April— input that Chandrakasan called "extremely valuable." Meanwhile, students described their USAGE involvement as well worth the time commitment. As one long-time member put it: "It's a way for me to contribute and make Course 6 a better place. I'm a member of this community and it's great to see it growing and becoming better."

During AY2017, USAGE members provided input on department concerns ranging from training for teaching assistants to the system for flagging students based on academic performance. Photo: Anne Stuart

COMM6: Building Critical Communication Skills

Effective communication skills are in high demand among employers today, so EECS continues to strengthen its offerings in that area. In addition to 6.S977 Technical Communication Skills for Graduate Students, the department has increased its emphasis on the EECS Communication Lab.

All EECS students and postdocs have access to the Comm Lab, where trained peer advisors provide free coaching and feedback. Since September 2016, the lab has scheduled more than 300 appointments with 180-plus advisees, providing help with everything from giving oral presentations to formatting resumes to drafting reports. In addition, more than 270 advisees have attended Comm Lab workshops on posters, pitches, proposals, and preparing for the Research Qualifying Exam.

In January 2017, the lab provided a training session for graduate students presenting at an annual MTL conference. The result, according to a conference organizer: "Industry members and faculty commented that the quality of pitches showed marked improvement this year." Some faculty members also credit the initiative with helping students do better work. Meanwhile, feedback from the lab's first annual survey indicated strong "customer" satisfaction as well: of those who had used the Comm Lab, *all* said they would recommend it to a friend.

Graduate students Samantha Dale Strasser and Greg Stein are among the advisors in the EECS Communication Lab.

Photo: Alison F. Takemura

Postdoc6: Enhancing the Postdoctoral Experience

Dozens of postdoctoral associates and researchers work in the four EECS-affiliated labs (CSAIL, LIDS, MTL, and RLE). EECS's ongoing Postdoc6 initiative provides this widely dispersed community with opportunities for mentoring, peer networking, skills training, and socializing.

Several times annually, EECS offers two-day, offsite workshops to help small groups of postdocs learn leadership, management, and communication skills. Workshop sessions are tailored to meet the needs of participants interested in both academic and nonacademic careers. EECS professor Nir Shavit serves as Postdoc6 coordinator. Postdoc feedback has been overwhelmingly positive.

Follow-up peer groups allow postdocs to continue networking after workshops end. In addition, EECS and the labs sponsor regular social hours to help postdocs meet their colleagues.

Women's Technology Program

Founded by EECS in 2002, the Women's Technology Program (WTP) marked its 16th summer during 2017. The WTP's mission is encouraging 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 over four weeks in June and July.

WTP added a mechanical engineering curriculum track in 2006. The two tracks have separate classes, staff, and budgets, but operate as one interdepartmental program. WTP director Cynthia Skier '74, SM '81 manages the many administrative operations shared by both tracks.

For summer 2017, 60 students (40 for WTP-EECS and 20 for WTP-MEng) were selected from a record applicant pool of 623 (up 25% from 2016) high school juniors nationwide. WTP attempts to select students who have not had prior opportunities to explore engineering or computer science as possible career directions. WTP allows these students to learn more about their potential interest in and aptitude for these fields, and introduces them to exciting research being done at MIT.

The WTP-EECS curriculum includes hands-on, lab-based, college-level classes introducing topics in electrical engineering, computer science, and mathematics, all designed and taught by a dedicated staff of female graduate and undergraduate students from both MIT and Wellesley. WTP provides a unique professional development experience for these instructors and tutors, encouraging them to pursue academic careers. In addition, the program connects high school students with women mentors.

Since its inception, WTP-EECS has had 626 student attendees. The 40 summer 2017 students are still finishing high school; 586 are college age or older. Of the 503 who have declared college majors or earned undergraduate degrees, more than 64% are in engineering or computer science fields (half of those are in EECS). Another 22% majored in math or science fields. The 82 students without declared majors are mostly college freshmen and sophomores.

Typically, WTP-EECS students often develop an interest in MIT (though this is not a stated goal). Of the 586 college-age WTP-EECS alumnae, 234 (39%) have chosen to attend MIT. These students sometimes return as WTP staff to mentor current WTP students: for summer 2017, three WTP-EECS staffers and two WTP-MEng staffers had attended WTP when they were in high school.

Entrance and exit surveys given to WTP-EECS students indicate that the four-week program provides significant short-term impact. One 2017 student noted that that the program provided her with new confidence as she overcame challenges and moved beyond her usual comfort zone. "I know with enough hard work I can do anything," she wrote. "After I finished the heart-monitor lab in EE class, I called my parents and told them that I want to be an electrical engineer. I had this feeling come over me that this is what I want to do with my life, what I need to do with it."

Rising Stars Workshop

EECS launched the Rising Stars workshop in 2012, bringing 38 of the world's top young women electrical engineers and computer scientists to MIT for two days of scientific discussion and informal sessions. The goal: helping demystify what many young female faculty describe as the "black box" of academic hiring and the tenure process. In 2013, the workshop attracted 40 women graduate students and postdocs considering academic careers, and other schools asked to participate. In 2014, University of California at Berkeley hosted the workshop (with MIT as a co-sponsor); in 2015, MIT again hosted the event, attracting 61 participants. Carnegie Mellon University hosted the 2016 workshop; the 2017 workshop is scheduled for November 5–7 at Stanford University. During the most recent academic year, EECS began planning for the event's return to MIT in 2018.

Undergraduate Program

Enrollment

In AY2017, 1,270 undergraduate students and 227 MEng students were enrolled in the department as of October 7, 2016, according to the Registrar's Office Y Report. Undergraduate enrollment was split across the four majors offered by the department: 78 students (about 6%) in Course 6-1 (Electrical Science and Engineering); 440 students (about 35%) in Course 6-2 (Electrical Engineering and Computer Science); 667 students (about 52%) in Course 6-3 (Computer Science and Engineering); and 85 students (about 7%) in Course 6-7 (Computer Science and Molecular Biology).

Implementing Curriculum Revision

In 2015, new undergraduate degree requirements were approved for EECS majors beginning with the Class of 2020 (students entering MIT as freshmen in fall 2016). Current majors have the option of switching to the curriculum if they wish. The new curriculum puts more choice in students' hands while providing a solid grounding in the essential elements of an education in electrical engineering and computer science.

As of May 2017, 915 majors were still following the old curriculum, while 698 had switched to the new curriculum.

Minor in Computer Science

A knowledge of computer science is becoming more important to other fields, including the physical sciences, the humanities, and economics. It's clear from the significant increase in enrollment of core CS classes in recent years that students majoring in fields outside of EECS feel the need to learn computer science. Introduced by EECS in fall 2016, the CS minor provides a structured, simple, and flexible program to students who want to major in other fields but become proficient in CS.

Seven students were certified as having completed the CS minor during AY2017. Another 63 have declared the minor but not yet completed the requirements. These students are majors from 14 different departments and are equally divided between sophomores and juniors.

Contributions to MITx

Over the past year, EECS has offered a variety of classes through the MITx online portal. Subjects ranged from 6.002x Circuits and Electronics to 6.341x Discrete-Time Signal Processing. Among the most popular were 6.00.1x Introduction to Computer Science and Programming Using Python; 6.00.2x Introduction to Computational Thinking and Data Science; and 6.005.1x Software Construction in Java. A full list of subjects follows, with the enrollment and completion numbers for each.

Course	Term	Registered	Explored	Completed
6.00.1x Introduction to Computer Science and Programming Using Python	Summer 2016	113,132	11,382	4,245
6.00.1x Introduction to Computer Science and Programming Using Python	Spring 2017	69,420	7,889	3,061
6.00.2x Introduction to Computational Thinking and Data Science	Summer 2016	16,989	1,254	755
6.00.2x Introduction to Computational Thinking and Data Science	Fall 2016	18,376	1,883	1,101
6.002.1x Circuits and Electronics 1: Basic Circuit Analysis	Self-study	53,758	5,178	166
6.002.2x Circuits and Electronics 2: Amplification, Speed, and Delay	Self-study	14,565	1,226	60
6.002.3x Circuits and Electronics 3: Applications	Self-study	14,404	781	23
6.004.1x Computation Structures 1: Digital Circuits	Summer 2016	22,296	1,380	262
6.004.2x Computation Structures 2: Computer Architecture	Fall 2016	11,820	460	139
6.004.3x Computation Structures 3: Computer Organization	Summer 2016	5,328	462	204
6.004.3x Computation Structures 3: Computer Organization	Spring 2017	7.722	188	84
6.005.1x Software Construction in Java	Fall 2016	49,079	2,808	850
6.005.2x Advanced Software Construction in Java	Spring 2017	20,563	790	276
6.008.1x Computational Probability and Inference	Fall 2016	18,127	2,724	355
6.041x Introduction to Probability: The Science of Uncertainty	Spring 2017	23,967	1,492	428
6.302.0x Introduction to Control System Design: A First Look	Summer 2016	16,067	416	90
6.302.1x Introduction to State Space Control	Summer 2016	5,805	1,462	26
6.341x Discrete-Time Signal Processing	Summer 2016	9,925	300	0

Department Teaching Laboratories

The EECS Department Teaching Laboratories supply faculty, students, and staff with the necessary workspace and resources to apply theory from research and classes directly to practical implementation.

The past academic year has continued the trend of growing the number of classes in the laboratories as EECS continues to revamp its course offerings, supplementing existing curriculum with new classes such as 6.S08 Interconnected Embedded Systems. These new classes are designed to expose undergraduates early on to the techniques and challenges of debugging physical hardware in addition to traditional problem sets and exams.
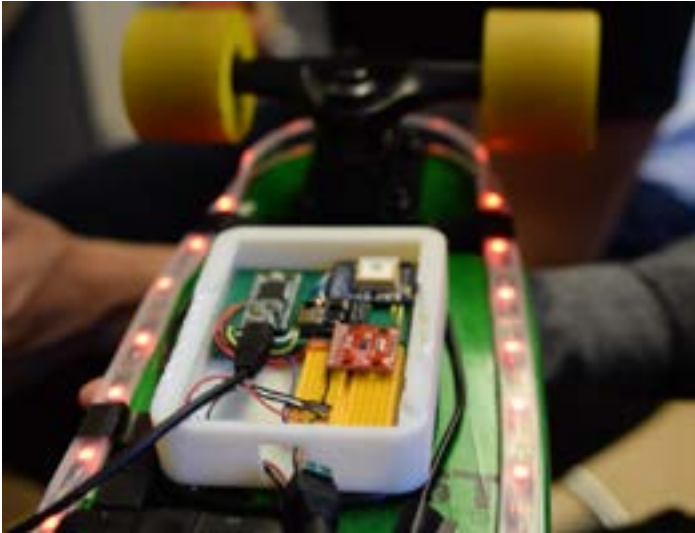
An example of a final project from 6.S08 Interconnected Embedded Systems: an internet-connected skateboard, with LED turn signals actively navigating its rider through real-time access to the Google Maps API.

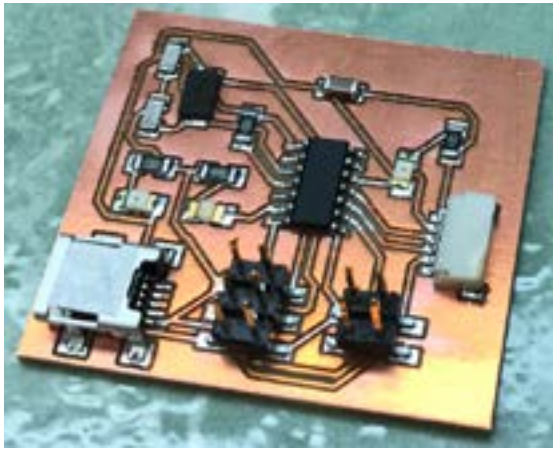*Photo: Department Teaching Laboratories*

More than 30 classes across the EECS spectrum use the Teaching Laboratories, with most students utilizing the space several times per week. The 25,378 square feet remain open and staffed with instructors more than 14 hours a day, six days a week, and serve as a regular classroom location and study area.

EECS often highlights the Department Teaching Laboratories through alumni donor and prospective student tours, community outreach efforts, and industry events. The lab area continues to be used during IAP with technical competitions such as MASLAB (Mobile Autonomous Systems)—an autonomous robotics competition—which provides students across campus an outlet to develop extensive systems that integrate both hardware and software. The Office of Engineering Outreach offers several workshops and seminars during IAP and over the summer to engage local middle- and high-school students; the Minority Introduction to Engineering and Science program continues to use EECS laboratory space throughout the summer for workshops and seminars introducing introductory robotics, circuits, and programming.

Engineering Design Studio

The Engineering Design Studio (EDS) within the Teaching Laboratories remains a campus hub for students who want to design and fabricate those ideas that require professional and high-power equipment. As a machine shop tailored toward EECS education, EDS continues to develop its in-house capabilities with additional 3D printers and milling machines for full printed circuit-board design and manufacturing.

EDS has also begun hosting a new section of the highly popular class, 6.S976 How to Make (almost) Anything. This 18-unit class delves into technologies ranging from laser cutting to embedded programming. With the addition of this new section (given under the subject number 6.943J in fall 2017), EECS students and others from the School of Engineering are able to participate in an intensely demanding course that began in the Program for Media Arts and Sciences and quickly became oversubscribed. The class meets weekly in the fall with three other class sections across campus and at Harvard University, giving School of Engineering students exposure to peers with a variety of academic backgrounds.

A printed circuit board designed as an assignment in 6.943J—milled, populated, and soldered in-house in the Engineering Design Studio.

Photo: Department Teaching Laboratories

Through MIT's Project Manus and the Mobius mobile application, EDS has its full equipment catalog and capabilities available for any user to explore. EDS has steadily received new visitors from EECS and beyond, with 800 unique users signing in to use the space since June 2016.

Graduate Program

The EECS graduate program offers high-quality academics with a broad range of advanced course offerings. Our graduate students make important contributions to a wide range of research activities in all areas of science and nanoscience, health care and medical instrumentation and imaging, energy and energy efficiency, business, manufacturing, robotics, big data management, and technology advancement. In areas impacted by computer science, implementation of machine learning with data from science, business, social networks, technology, medicine, and environmental sensing and monitoring is under intense investigation. The exciting research opportunities for our graduate students continue to attract outstanding and highly accomplished applicants striving to change the world in collaboration with their student peers and our faculty and research staff supervisors.

The 2017 admissions season drew 2,959 applications from all over the world—202 more applications than we received in 2016. Ultimately, 221 students (7%), were admitted into our graduate program. Our EECS Visit Days event invited all admitted graduate students to campus in early March to meet the faculty and current students. In fall 2017, 136 new students will join our doctoral graduate program; this class includes 34 women and six underrepresented minority students.

Nearly half (46%) of the new students will be funded by prestigious fellowships. These include MIT Presidential Fellowships, departmental fellowships sponsored by EECS alumni, externally awarded fellowships such as National Science Foundation (NSF) Graduate Research Fellowships, and fellowships from industrial sponsors or from other countries. These internally and externally funded fellowships are important for financial support, but also give incoming graduate students additional flexibility to select the research groups and projects that best meet their interests and career goals. All admitted graduate students receive full financial support via fellowships, research or teaching assistantships, or through financial support provided by the department. Financial support includes tuition, a monthly living allowance or stipend, and medical insurance for the first year of graduate education; subsequent years are typically funded by research supervisors.

The current EECS graduate student population includes 667 active students, with 142 women (21% overall). Of the current students, 57% are international citizens. The graduate student body is 53% electrical engineering (25% women) and 47% computer science (18% women). Our graduate student body is highly accomplished, receiving a wide assortment of fellowship awards; roughly 209 current students are supported by fellowships, training grants, and internships. In addition to the fellowships awarded at the time of admission (11% MIT Presidential; 8% EECS departmental; and 4% Institute), EECS graduate students receive fellowships from the US government (31%), from US industry (6%) and training grants (2%), and from foundations (5%). Seventeen percent receive fellowships from other countries. (Percentages are approximate as some students receive multiple fellowship awards.)

Our graduate students have won many scholarship awards, including the prestigious Hertz and Howard Hughes Medical Institute fellowships, five Siebel Scholarships, and two Dimitris N. Chorafas Foundation prizes. In addition, EECS graduate students have received highly competitive industrial fellowships from IBM, Microsoft, Facebook, Google, and Qualcomm.

From September 2016 to June 2017, 355 students obtained advanced degrees from EECS, graduating in September, February, and June. Degrees awarded include 170 master of engineering degrees, 89 master of science degrees, 95 PhDs, and one electrical engineering degree. EECS also awarded numerous joint master of science degrees, including five with the Technology and Policy Program, three with Leaders for Global Operations and Architecture, two with Mechanical Engineering, and one each with the Center for Biomedical Engineering, Civil and Environmental Engineering, Computation for Design and Optimization, Health Sciences and Technology, Materials Science and Engineering, and System Design and Management.

In addition to supporting a graduate student body representing a broad range of nationalities, EECS strives to achieve diversity in terms of gender, ethnicity, and race. To encourage applicant diversity, Graduate Office staff and faculty regularly participate in MIT's Institute-wide recruiting efforts. EECS supports MIT's Minority Summer Research Program, the GEM Grad Lab, and the CONVERGE graduate preview weekend held in the fall semester. Networking and mentoring seminars are offered each fall (with reunions in the spring) for women and for any individuals who might benefit from weekly group meetings and discussions. Three different networking seminars are currently offered for various types of groups of incoming graduate students.

Visit Days

EECS Visit Days allow admitted applicants to envision themselves as graduate students working on their research and academics, and to view firsthand the multitude of opportunities available at MIT and throughout the greater Boston area. During the visits each March, applicants meet and interact with potential research supervisors, view laboratories, chat with researchers and potential classmates, and tour graduate dormitories and living spaces. One-on-one interactions are viewed as especially important and are emphasized during the visit.

EECS Visit Days guests arrive on campus on Thursday evening for a dinner and reception organized by the current EECS graduate student body, led by the EECS Graduate Student Association (GSA). Formal sessions begin on Friday morning and include a research exchange dubbed "three-minute madness." This is when EECS faculty and researchers each share their research goals and philosophies as quickly and concisely as possible (in a maximum of three minutes), introducing visitors to an impressive range of activities. One-on-one meetings with faculty and research staff follow as admitted applicants have their first experience with navigating the "infinite corridor" of MIT, moving from office to office to meet prospective research groups. Friday afternoon includes lab tours and a reception hosted by faculty and lab directors. Friday closes with dinners arranged by research areas or groups, offering more opportunities for informal interactions and discussion about research activities.

On Saturday, the EECS graduate officer describes the program's academic requirements. Next, a panel of current students discusses graduate life and responds to visitors' questions. Over lunch, the EECS Fun Fair highlights the many ways that faculty, students, and staff enjoy MIT, Boston, and New England. Graduate dormitory tours, campus tours, and an MIT Coop shopping spree all occur on Saturday afternoon, followed by an evening party at the MIT Museum with music, refreshments, and conversation. Admitted applicants depart MIT on Sunday with all the information necessary to make important decisions regarding graduate school and their research direction.

All current graduate students are invited to participate in activities hosted by the Graduate Student Association and the Graduate Women in Course 6 (GW6). As one example, the GSA offered an informational panel discussion on preparing thesis proposals. During the summer, the GSA organizes activities such as rock climbing outings and movie nights. GSA volunteers also assist with EECS Visit Days in March and new graduate student orientation activities in August. Meanwhile, GW6 offers numerous activities for socializing, networking, and learning. During the past year, GW6 invited EECS faculty to join in conversation at a Women in Tech breakfast series. In collaboration with the EECS Communications Lab, GW6 members learned the art of the elevator pitch and practiced their communication skills. GW6 also sponsored activities such as painting and jewelry-making sessions, a movie night, an outlet mall shopping excursion, and a homemade waffle breakfast for newly admitted women graduate students during EECS Visit Days. In addition, for the third consecutive year, the GW6 organized the Graduate Women's Community Dinner in memory of Erin M. Aylward SM '06. The dinner promotes community and networking for graduate women in EECS.

6-A Master of Engineering Thesis Program

The department's 6-A Master of Engineering Thesis Program, now in its 100th year, is a partnership between MIT and some of the world's most innovative companies. It allows students to work on industry projects while simultaneously completing their MEng theses at MIT. Students typically join the program as EECS juniors and seniors, completing three- and six-month assignments at their companies. Each participant is assigned both a faculty advisor and an industry mentor, and students' work for their companies is used toward their MEng theses. In most cases, the program also covers the full tuition for the MEng degree and pays competitive salaries during students' time on the job. Students receive academic credit for assignments and are able to graduate with their classes.

More than 2,500 students have completed the program over the years. Current core and affiliate partners include Analog Devices, Cadence, Cambridge Mobile Telematics, Cell Signal Technology, Draper, First Republic Bank, Intel, MIT Lincoln Lab, NetApp, PillPack, Western Digital/SanDisk, Silicon Labs, and Uber.

Sixty-two EECS students applied to this program in AY2017, with 20 students admitted.

The J. Francis Reintjes Excellence in 6-A Industrial Practice Award was presented in May to two outstanding 6-A students at EECS Celebrates, the department's annual spring awards ceremony. Both students—Joseph Griffin (MIT Lincoln Laboratory) and Chad Uyehara (Linear Technology)—demonstrated outstanding performance in their 6-A work assignments.

EECS professor Tomás Palacios serves as director of the 6-A program.

Faculty Notes

Promotions

Associate professor without tenure

> Thomas Heldt
>
> Aleksander Madry
>
> Daniel Sanchez
>
> Vivienne Sze

Associate professor with tenure

> Timothy Lu
>
> Ryan Williams

Updates

Faculty on sabbatical leave

> Harold "Hal" Abelson
>
> Arvind

Konstantinos Daskalakis

Srinivas Devadas

Frederic "Fredo" Durand

Dirk Englund

Martha Gray

Berthold Horn

Piotr Indyk

Patrick Jaillet

Dina Katabi

Jae Lim

Muriel Medard

Ronald Rivest

George Verghese

Jacob White

Faculty on junior research leave

Daniel Sanchez

Nickolai Zeldovich

Faculty on family release

Mohammad Alizadeh

Michael Carbin

Manolis Kellis

Luqiao Liu

Timothy Lu

Faculty on leave

Randall Davis

William Freeman

Russell Tedrake

Michael Watts

Retired faculty

Dimitri Antoniadis

Jeffrey Shapiro

George Verghese

Loss of faculty

Mildred Dresselhaus (1930–2017)

Robert Fano (1917–2016)

Institute Professor Emerita Mildred S. Dresselhaus, known as the "Queen of Carbon Science," held appointments in both EECS and the Department of Physics. She passed away on February 20, 2017. Photo: Dominick Reuter

New Faculty

Six new faculty members have joined EECS since our last report.

Adam Belay will join EECS as an assistant professor in July 2017. He received a PhD in computer science from Stanford University, where he was a member of the secure computer systems group and the multiscale architecture and systems team. Previously, he worked on storage virtualization at VMware and contributed substantial power-management code to the Linux Kernel project. Belay's research area is operating systems and networking. Much of his work has focused on restructuring computer systems so that developers can more easily reach the full performance potential of hardware. He received a Stanford graduate fellowship, a VMware graduate fellowship, and a Jay Lepreau Best Paper award from the USENIX Symposium on Operating Systems Design and Implementation.

Stefanie Mueller joined EECS as an assistant professor in January 2017. She received a PhD in human-computer interaction (HCI) from the Hasso Plattner Institute in 2016, where she also received a master's degree in IT-systems engineering. Mueller develops novel interactive hardware and software systems that advance personal fabrication technologies. Her work has been published in several HCI venues, such as the Association for Computing Machinery (ACM), the Conference for Human Factors in

Computing Systems (CHI), and User Interface Software and Technology (UIST), and she has received a best paper award and two best paper nominees. Mueller is an associate chair of the program committees at ACM, CHI, and UIST, and was a general co-chair for the ACM SIGGRAPH Symposium on Computational Fabrication at MIT in June 2017. She has been an invited speaker at many universities and research organizations. At CSAIL, she heads the HCI Engineering Group, working at the intersection of HCI, computer graphics, computer vision, and robotics.

Max Shulaker joined EECS as an assistant professor in July 2016. He received his bachelor's degree, master's degree, and PhD in electrical engineering at Stanford, where he was a Fannie and John Hertz Fellow and a Stanford Graduate Fellow. Shulaker's research focuses on the broad area of nanosystems. His Novel Electronic Systems Group aims to understand and optimize multidisciplinary interactions across the entire computing stack—from low-level synthesis of nanomaterials, to fabrication processes and circuit design for emerging nanotechnologies, up to new architectures—to enable the next generation of high performance and energy-efficient computing systems.

David Sontag joined EECS in January 2017 as an assistant professor. He is also part of MIT's Institute for Medical Engineering and Science (IMES) and CSAIL. Before coming to MIT, he had been an assistant professor in computer science and data science at New York University's Courant Institute of Mathematical Sciences since 2011. Previously, he was a postdoc at Microsoft Research New England. Sontag's research interests are in machine learning and artificial intelligence with a recent focus on unsupervised learning, a problem of discovering hidden variables from data, and causal inference, which seeks to estimate the effect of interventions from observational data. At IMES, he leads a research group that aims to transform health care through the use of machine learning. Sontag received CSAIL's George M. Sprowls Award for his PhD thesis at MIT, best paper awards at several conferences, and an NSF CAREER Award. He received a bachelor's degree in computer science from University of California at Berkeley and master's degree and PhD in electrical engineering and computer science from MIT.

Ryan Williams joined MIT as an associate professor in EECS in January 2017. He received a bachelor's degree in computer science and mathematics from Cornell and a PhD in computer science from Carnegie Mellon. Following postdoctoral appointments at the Institute for Advanced Study at Princeton and IBM Research Almaden, he was an assistant professor of computer science at Stanford for five years. Williams's research interests are in the theoretical design and analysis of efficient algorithms and in computational complexity theory, focusing mainly on new connections, and consequences, forged between algorithm design and logical circuit complexity. Along with some best paper awards, Williams has received a Sloan Research Fellowship, an NSF CAREER Award, and a Microsoft Research Faculty Fellowship, and he was an invited speaker at the 2014 International Congress of Mathematicians.

Virginia Williams joined EECS as an associate professor in January 2017. She received a bachelor's degree in mathematics and engineering and applied science from Caltech and a PhD in computer science from Carnegie Mellon. She was a postdoc at the Institute for Advanced Study at Princeton, University of California at Berkeley, and

Stanford. Before joining MIT, she spent more than three years as an assistant professor at Stanford. Her research interests are broadly in theoretical computer science, focusing on the design and analysis of algorithms and fine-grained complexity. Her work on matrix multiplication algorithms was covered by the media and was the most cited paper in algorithms and complexity in the last five years. She received a Sloan Research Fellowship for work done at Stanford, as well as an NSF CAREER Award.

Career Development Chair Appointments

- Thomas Heldt was appointed W. M. Keck Career Development Professor in Biomedical Engineering;

- Stefanie Mueller was appointed X-Consortium Career Development Assistant Professor of Electrical Engineering and Computer Science;

- Max Shulaker was appointed Emmanuel E. Landsman (1958) Career Development Assistant Professor of Electrical Engineering and Computer Science;

- Justin Solomon was appointed X-Window Consortium Career Development Assistant Professor of Electrical Engineering and Computer Science;

- David Sontag was appointed Herman L. F. von Helmholtz Career Development Assistant Professor; and

- Virginia Williams was appointed Steven G. (1968) and Renee Finn Career Development Associate Professor of Electrical Engineering and Computer Science.

Faculty Chair Appointments

- Regina Barzilay was appointed Delta Electronics Professor of Electrical Engineering and Computer Science;

- Duane Boning was appointed Clarence J. LeBel Professor of Electrical Engineering;

- Tommi Jaakkola was appointed as the inaugural holder of the Thomas Siebel Professorship in EECS and the Institute for Data, Systems, and Society; and

- Russell Tedrake was appointed as the inaugural holder of the Toyota Professorship.

Awards and Honors

Faculty Awards and Honors

EECS Faculty received the following awards and honors during the period covered by this report:

- Anant Agarwal received the Padma Shri Award from the Republic of India.

- Mohammad Alizadeh received a Sloan Research Fellowship, a Facebook Faculty Award, a VMware Early Career Faculty Award, and a Google Research Award.

- Hari Balakrishnan was elected to the American Academy of Arts and Sciences.

- Karl Berggren received a Bose Fellowship.

- Tim Berners-Lee received the A. M. Turing Award from the Association for Computing Machinery (ACM).

- Sangeeta Bhatia was elected to the National Academy of Sciences and received an honorary doctorate from Utrecht University.

- Tamara Broderick received a Google Research Award.

- Anantha Chandrakasan received an Electrical Engineering Distinguished Alumni Award from the University of California at Berkeley.

- Randall Davis received the Innovative Applications of Analytics Award from the Institute for Operations Research and the Management Science.

- Erik Demaine was elected an ACM Fellow and received an honorary degree from Bard College.

- Srini Devadas received the Institute of Electrical and Electronics Engineers (IEEE) W. Wallace McDowell Award from the IEEE Computer Society.

- Fredo Durand was elected an ACM Fellow and received the Computer Graphics Achievement Award from ACM's Special Interest Group on Computer Graphics and Interactive Techniques.

- Dirk Englund received the Adolph Lomb Medal from the Optical Society.

- William Freeman was elected an ACM Fellow.

- James Fujimoto received the Fritz J. and Dolores H. Russ Prize from the National Academy of Engineering and shared the 2017 European Inventor Award from the European Patent Office.

- Shafi Goldwasser was elected to the Russian Academy of Sciences and received the Suffrage Science Award from Imperial College London and the Barnard Medal of Distinction from Barnard College.

- Polina Golland was elected a fellow of the Medical Image Computing and Computer Assisted Intervention Society.

- Ruonan Han received an NSF CAREER Award.

- Tommi Jaakkola was selected as a fellow of the Association for the Advancement of Artificial Intelligence.

- Daniel Jackson was elected an ACM Fellow and received the Outstanding Research Award from the ACM's Special Interest Group on Software Engineering, as well as MIT's Arthur C. Smith Award.

- Stefanie Jegelka received a Google Research Award.

- Dina Katabi was elected to the National Academy of Engineering.

- Jae S. Lim was inducted into the Consumer Technology Hall of Fame.

- Barbara Liskov received the Pioneer in Tech Award from the National Center for Women and Information Technology.

- Luqiao Liu received an NSF CAREER Award.

- Aleksander Madry received a Sloan Research Fellowship and a Google Research Award.

- Stefanie Mueller was named one of Forbes 30 Under 30 in Science.

- Tomas Palacios was elected an IEEE Fellow.

- Ronald Rivest received the Electronic Frontier Foundation Pioneer Award.

- Daniela Rus was elected to the American Academy of Arts and Sciences and received the Engelberger Robotics Award from the Robotics Industries Association.

- Henry I. Smith received the IEEE Robert N. Noyce Medal.

- Justin Solomon received an Army Young Investigator Award and was named one of the Forbes 30 Under 30 in Science.

- Vivienne Sze received a Young Investigator Program Award from the US Air Force Office of Scientific Research.

- Peter Szolovits was elected to the inaugural class of members in the International Academy of Health Sciences Informatics.

- Caroline Uhler received a Sloan Research Fellowship and an NSF CAREER Award.

- Cardinal Warde received a Distinguished Alumni Award in Science and Technology from the Stevens Institute of Technology.

- Ron Weiss received a Bose Fellowship.

- Virginia Williams received a Sloan Research Fellowship and an NSF CAREER Award.

Departmental Awards

The following awards were presented at EECS Celebrates, the annual EECS spring awards ceremony, which was held at the Museum of Science in May 2017.

Faculty Awards

Frank Quick Faculty Research Innovation Fellowships

Elfar Adalsteinsson
Karl Berggren
Antonio Torralba

Louis D. Smullin ('39) Award for Teaching Excellence

Antonio Torralba

Jerome H. Saltzer Award

Tamara Broderick

Burgess ('52) and Elizabeth Jamieson Awards for Excellence in Teaching

Charles Leiserson
David Perreault

Ruth and Joel Spira Teaching Award

Patrick Jaillet
Nir Shavit

EECS Outstanding Educator Award

Max Goldman
Adam Hartz

EECS Digital Innovation Award

Ana Bell, John Guttag, and Eric Grimson

ACM/IEEE Best Advisor Award

Joel Voldman

HKN Best Instructor Award

Joe Steinmeyer

Student Awards

StartMIT Competition

First Place: Benjamin Jean-Baptiste Grena, Wen Jie Ong, and Zhengzhen Tan
Start-up: Divaqua

Second Place: Anna Fountain, Rui Song, and Joanna Cohen
Start-up: CommuniCARE

Paul L. Penfield Student Service Award

Alyssa Cartwright
Keertan Kini
Katia Shtyrkova

Carlton E. Tucker Teaching Award

Omer Tanovic

Harold L. Hazen Teaching Award

Shalom Abate

Frederick C. Hennie III Teaching Award

Ariel Anders

Zied Ben Chaouch

Daniel Mendelsohn

Clément Pit-Claudel

Guolong Su

Emily Zhang

Undergraduate Teaching Assistant Award

Kathleen Johnson

Allan Sadun

Jeremy Gerstle UROP Award

Benjamin Eysenbach
Project: Exploring Beliefs in Images and Videos
Supervisors: Antonio Torralba and Carl Vondrick

Morais (1986) and Rosenblum (1986) Award

Rajeev Parvathala
Project: Volumetric Reconstruction of the Nervous System of C. Elegans
Supervisor: Nir Shavit

Anna Pogosyants UROP Award

Jade Philipoom and Andres Erbsen
Project: Systematic Synthesis of Elliptic Curve Cryptography Implementations
Supervisor: Adam Chlipala

Licklider UROP Award

Lilika Markatou
Project: Leader Election in SINR Using Arbitrary Transmission Power Control
Supervisors: Nancy Lynch and Stephan Holzer

Fano Award Outstanding SuperUROP Research Project

William Moses
Project: Performance Engineering in a Parallel Environment
Supervisor: Charles Leiserson

SuperUROP 2016–2017 Outstanding Research Project Award

Suma Anand
Project: Echolocation: Modeling, Simulating, and Fabricating Biomimetic
Ultrasound Receivers
Supervisor: Aude Oliva

Allison Lemus
Project: Reliability of High-Voltage GaN
Supervisor: Jesús del Alamo

Daniel Richman
Project: RABBIT: Secure Wireless Communications Using Ultra-Fast Bit-Level Frequency Hopping
Supervisors: Anantha Chandrakasan and Rabia Tugce Yazicigil

Chengkai Zhang
Project: One-Shot Learning for 3-D Shape Perception
Supervisor: William Freeman

SuperUROP 2016–2017 Presentation Award

Sarah Hensley
Project: Balance and Force Control with NASA's Humanoid: Valkyrie
Supervisors: Russ Tedrake and Michael Posa

Daniel Richman
Project: RABBIT: Secure Wireless Communications Using Ultra-Fast Bit-Level Frequency Hopping
Supervisors: Anantha Chandrakasan and Rabia Tugce Yazicigil

SuperUROP 2016–2017 Technical Report Award

Uttara Chakraborty
Project: Fiber-Integrated InAs Quantum-Dot Single-Photon Sources
Supervisor: Dirk Englund

Dustin Doss
Project: Comparative Analysis of Document Embeddings for Clinical Texts
Supervisor: Peter Szolovits

Ignacio Estay Forno
Project: Temperature-Modulated Superconducting Channels in Parallel with Superconducting Nanowire Single-Photon Detectors
Supervisor: Karl Berggren

Northern Telecom/BNR Project Award Best 6.111 Introduction to Digital Systems Laboratory Project

Henry Love and Yuechen "Mark" Yang
Project: FPGA Beethoven

George C. Newton Undergraduate Laboratory Prize (6.111 Introduction to Digital Systems Laboratory)

Daniel Richman and Jorge Troncoso
Project: Digital Storage Oscilloscope

David A. Chanen Writing Award (for Writing in 6.033 Computer System Engineering)

Sophia Russo
Project: Critique 2: Eraser

Morris Joseph Levin Award for Outstanding Masterworks Thesis Presentation
Peter Florence

> Project: Integrated Perception and Control at High Speed
> Supervisor: Russ Tedrake

> Christopher Poulton
> Project: On-Chip LIDAR with Optical Phased Arrays
> Supervisor: Michael Watts

Charles and Jennifer Johnson Computer Science MEng Thesis Award

> Feras Saad
> Project: A Probabilistic Programming Approach to Probabilistic Data Analysis
> Supervisor: Vikash Mansinghka

David Adler Electrical Engineering MEng Thesis Award

> Yihua Li
> Project: Blind Regression: Understanding Collaborative Filtering from Matrix
> Completion to Tensor Completion
> Supervisor: Devavrat Shah

Francis Reintjes Excellence in 6-A Industrial Practice Award

> Joseph Griffin
> Project: A Compression Algorithm for Taking Advantage of Distributed
> Beamforming
> Faculty Advisor: James Ward
> Company: MIT Lincoln Laboratory

> Chad Uyehara
> Project: High-Voltage Sampling Scheme Independent of Capacitor Voltage
> Coefficient for a Delta Sigma Modulator
> Faculty Advisors: Charles Sodini and Michael Kultgen
> Company: Linear Technology

Staff Awards

Richard J. Caloggero Award

> Anne Hunter, EECS undergraduate administrator

Department Head Special Recognition Award

> David Foss, assistant director for Information Technology Services, Research
> Laboratory of Electronics

School of Engineering Ellen J. Mandigo Award for Outstanding Service

> Lisa Bella, assistant to EECS education officers

Department Leadership

Departmental leadership from July 1, 2016 to June 30, 2017 included:

Department Head
Anantha Chandrakasan (named dean of the School of Engineering, effective July 1, 2017)

Associate Department Head
Silvio Micali (until Sept. 1, 2016); Nancy Lynch (since Sept. 1, 2016)

Associate Department Head
David Perreault (until January 1, 2017); Asu Ozdaglar (since January 1, 2017, named interim department head, effective July 1, 2017)

Co-Education Officers
Robert Miller
Hae-Seung "Harry" Lee

Undergraduate Officer
Christopher Terman

Graduate Officer
Leslie Kolodziejski

Undergraduate Laboratory Officer
Karl Berggren

Anantha Chandrakasan
Department Head
Vannevar Bush Professor of Electrical Engineering and Computer Science