

# Spectrum



**HOME**  
**@MIT**



Athletics are a major part of life at MIT. Approximately 20% of undergraduates participate in MIT's 33 varsity sports (including softball, pictured). The Institute's 33 club teams draw more than 800 participants. And 4,000 students, faculty, alumni, spouses, and partners play intramural sports.

PHOTO: DOMINICK REUTER

## Wide Angle

- 2 Design Earth's *After Oil*

## Subjects

- 4 24.00x: an instructor-graded philosophy MOOC
- 5 A (how not to) crash course in electric vehicles

### SPECIAL SECTION

## Home at MIT

- 8 An interview with dean for student life Suzy Nelson
- 9 Alumni supporters of student life recall their own MIT years
- 12 Photographed: students in their favorite campus spots
- 16 How an address becomes a community
- 18 Play along at MIT
- 19 Building traditions: a roller coaster, a puzzle room
- 20 A day in the life of a resident grad family
- 22 The magnetism of a digital-era campus
- 23 Acquaintance by algorithm
- 23 Student support and well-being

### FRONT COVER

Students at Simmons Hall begin work on a "mega-puzzle" with tens of thousands of pieces, which was collectively assembled in the dorm's mailbox lounge over the course of a month.

PHOTO: ERIC KEEZER

### BACK COVER

Bamboo Frame-making Workshop, MIT International Design Center, January 2017. Instructor David Wang, a graduate student in the School of Architecture and Planning and MIT Sloan School of Management, is the founder of Bamboo Bicycles Beijing.

PHOTO: PETER GUMASKAS

## Breakthroughs and Insights

- 24 Aging Brain Initiative researchers discover a potential Alzheimer's therapy
- 26 Predicting the movement of hidden tides
- 28 Catherine Turco analyzes a managerial experiment from the inside out
- 29 Bruno Perreau examines challenges to the status quo in his native France

## Inside the MIT Campaign for a Better World

- 30 Updates: Kendall Square transformation, West Campus dorm
- 31 Close-up on volunteers: advocating for MIT
- 32 Next stops for the Better World tour
- 32 Brian Daniels '81, SM '81: from MIT to biotech and back again
- 33 Ron '64, SM '65, PhD '67 and Barbara Cordover: a new chapter for the MIT Museum

## Spring 2017

**MIT Spectrum** connects friends and supporters of the Massachusetts Institute of Technology to MIT's vision, impact, and exceptional community.

### Contact Us

617.324.7719  
spectrum@mit.edu

spectrum.mit.edu  
betterworld.mit.edu  
giving.mit.edu/spectrum

**Vice President for Resource Development**  
Julie A. Lucas

**Executive Director of Communications, Events, and Donor Relations**  
Whitney Espich

**Director of Marketing and Communications**  
Aimée Jack

**Editor**  
Nicole Estvanik Taylor

**Art and Web Director**  
Barbara Malec

**Associate Art and Web Director**  
Elizabeth Connolly

**Design**  
Stoltze Design

**Contributing Writer**  
Stephanie Eich

**Copy Editor**  
Evanthia Malliris

**Spectrum Online**  
Stephanie Eich, Jay Sitter

The Office of Resource Development gratefully acknowledges the leadership of the MIT Corporation in the MIT Campaign for a Better World.



## At Home Under the Dome

In 1980, when I arrived at MIT as a young faculty member, I experienced what I can only describe as a culture shock. I had visited the campus only once, for an interview, and I knew almost no one. Cambridge was a long way away from my family in Venezuela and, unlike my graduate school's campus on the West Coast, MIT's palm tree quotient was... well... zero.

I felt anxious and had questions that are not uncommon for many arriving on our campus: Would my work be good enough? Was my English strong enough? Would I fit in? And what would I do when it started to snow?

I quickly found that my concerns were unwarranted. To a degree I had never experienced anywhere else, I felt an immediate sense of welcome, acceptance, and belonging among an extended family of curious, intense, creative individuals collaborating to advance MIT's mission. I found my home.

In the decades since, I have been reminded again and again what MIT means as a home to so many, and why. As much as we love our classrooms, labs, residences, libraries, and courts, there's no secret to what makes MIT so special: It's the people. It's the senior who helps a freshman with a problem set, the faculty member who hosts product design finals in a top hat and tails, and the alum who reaches out to a student stranded overseas. It's every one of us, and all of us.

If you haven't been to campus in a few years, I hope you'll find time for a visit. Chalk up the blackboards in the new Simons building, marvel at the gleaming MIT.nano building coming out of the ground, and ask a student or faculty member what MIT means to them. We'd love to remind you that MIT's brilliance—its strength—is drawn from a remarkable community of passionate, playful, and caring people working towards a common goal: to make a better world. In short, we'd love to welcome you home.

L. RAFAEL REIF



**(7)**  
LEARN MORE  
betterworld.mit.edu



**ROMAN CITY**  
 The Romans used a rectilinear street grid anchored to a central forum in building hundreds of cities across their empire.

**TOKYO BAY**  
 Kenzo Tange's 1960 plan for Tokyo proposed expanding the Japanese capital across Tokyo Bay to accommodate the city's swelling population.

**TETRAHEDRAL CITY**  
 In the early 1960s, Buckminster Fuller proposed building floating cities in the shape of giant tetrahedrons, which provide a high proportion of surface area in relation to volume.

**MANHATTAN**  
 Architect Rem Koolhaas has described late-19th-century Manhattan as a laboratory for the invention and testing of a metropolitan lifestyle.

**SAVANNAH**  
 Named for James Edward Oglethorpe, founder of the Georgia Colony, the Oglethorpe Plan for the city of Savannah created a balanced mix of private and public spaces.

**RADIANT CITY**  
 First presented in 1924, Le Corbusier's Radiant City project envisioned an abundance of green space and sunlight that would foster well-being.

# Energy Endgame

The Strait of Hormuz is one of Earth's most strategic transit nodes: the only sea passage between the Persian Gulf and the open ocean. Roughly 20% of the oil traded worldwide passes through the ribbon of water, 34 miles across at its narrowest, that divides Iran, the United Arab Emirates, and Musandam (an enclave of Oman). The potential blockage of tanker traffic becomes a risk whenever political tensions run high with the West or within the region, including in relation to the contested ownership of three islands: Abu Musa, Greater Tunb, and Lesser Tunb.

Two MIT researchers set out to ask, what might this regional rivalry and its landscape, shaped so decisively by oil, look like when the world no longer relies on fossil fuels? "Our project is a response to a crisis of environment and a crisis of imagination," says Rania Ghosn, assistant professor at MIT's School of Architecture and Planning (SA+P). Along with El Hadi Jazairy, she is a founding partner of Design Earth, a creative design practice that works to envision future built environments—with a particular focus on the Middle East. "Most of what we saw were either stale technocratic solutions or apocalyptic technophobic nightmares."

Sponsored by the Kuwait-MIT Center for Natural Resources and the Environment and SA+P, and first presented at the Kuwaiti Pavilion at the 2016 Venice Architecture Biennale, Design Earth's proposal, *After Oil*, is a series of nine speculative illustrations exploring the post-oil potential of the region. This image is one of three that wrestle to repurpose the transit choke point between Iran and the UAE into a venue for real estate competition. Its imaginary chess board spans the gulf, incorporating the disputed islands, and serving as a platform for a "greatest hits" of Western utopian urban projects. "The chess board conveys that this is a game, a game about power and domination," says Ghosn. "In the context of the board, the contested islands and utopian visions become geopolitical features set in an abstract grid."

While these visions of ideal cities have their provenance in the West, they find fertile soil in this Middle Eastern context. "Utopian projects tend to be realized more often in the Gulf than anywhere else," says Jazairy, currently a research scientist at SA+P's Center for Advanced Urbanism. "This is due both to the nature of the site, and the nature of the entrepreneurs there. They are trying to chart a new world, and using architecture to define both collective space and national identity."

IMAGE: DESIGN EARTH

UNITED ARAB EMIRATES

# Automation and Interpretation

Behind the syllabus of an instructor-graded philosophy MOOC

## TITLE

24.00x Introduction to Philosophy: God, Knowledge, and Consciousness

## INSTRUCTOR

Caspar Hare, professor of philosophy

## PLATFORM

edX, adapted from 24.00 as taught to MIT undergraduates

## AVAILABILITY

Archived course materials are currently available on edX. The next offering is planned for summer 2017.

"You can still achieve scale through partially automating courses, but keeping some bits of human interaction that are really important, like the interaction between you and the person you are writing a paper to.... There's no automating that." —Hare to *Inside Higher Ed*, September 2016

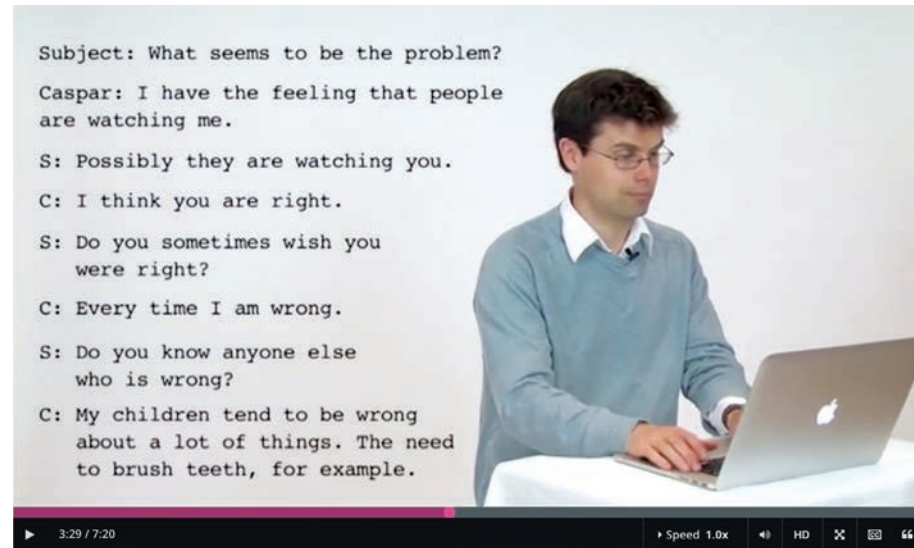
(image above, from Lecture 12: Thinking Machines)

"Suppose there were an observation you could make that would enable you to rule out the possibility that you were dreaming. Would this weaken or strengthen Descartes's skeptical argument?" (Problem 7.3.1)

"There are capabilities implicitly required to pass the Turing Test which a thinker might not have. An infant thinks, yet could not pass the Turing Test." —posted by gregorycgs / "Yes, good point. Just because something is unable to pass the Turing Test doesn't mean that thing isn't thinking. But what about the converse?" —posted by Ryandoody, staff (Discussion Question 12.1.2)



TAKE THE COURSE  
edx.org/school/mitx



## DESCRIPTION

This course has two goals. The first is to introduce you to the things that philosophers think about. We will look at some perennial philosophical problems: Is there a God? What is knowledge, and how do we get it? What is the place of our consciousness in the physical world? Do we have free will? How do we persist over time, as our bodily and psychological traits change? The second goal is to get you thinking philosophically yourself. This will help you develop your critical and argumentative skills more generally. Readings will be from late, great classical authors and influential contemporary figures.

## BACKSTORY

Launched in fall 2012, this is the first introductory philosophy MOOC offered by an American university. Its instructor, Caspar Hare, was named a 2017 MacVicar Faculty Fellow for exceptional undergraduate teaching, mentoring, and educational innovation. Over the first three runs of 24.00x, 109,800 learners have enrolled. The most recent run, in fall 2016, included an unprecedented feature for an MITx humanities course: **instructor grading**, carried out by course staff Ryan Doody PhD '16. This option was available to Verified Students, a \$300 add-on to an otherwise free registration (the organizers aim to reduce this cost going forward).

## COMPONENTS

- **Video lectures.**
- **Assigned readings:** Organized by lecture.
- **Problems and survey questions:** Each lecture contains several brief (usually multiple choice) problems to help instructors assess whether you are absorbing essential material. These problems will also aid in your understanding of the material covered in the lectures.
- **Online discussion forum:** We encourage you to discuss your answers to questions included alongside each lecture with your peers on the forum. The best—and perhaps only—way to learn philosophy is to *do* it. You will also have much more fun this way.
- **Written assessment questions:** There will be three of these spaced through the course. These questions will ask you to write a brief essay response to a prompt. Auditor Students are asked to do a self-assessment of their own papers. Papers by Verified Students are graded and commented on by a philosophy instructor.

"In this paper I shall define a thesis I shall call 'determinism' and argue that it is incompatible with the thesis that we are able to act otherwise than we do (i.e., it is incompatible with 'free will')." —Peter Van Inwagen, from *Philosophical Studies* (background reading for Lecture 13)

"Hume says that there is a problem with inductive reasoning. What is the problem? Can you see a solution to it?" (Assessment Question 2: Epistemology and Mind, Topic 2)

## A (How Not to) Crash Course in Electric Vehicles

Students explored the building blocks and design of electric vehicles—and considered how such transport could change the world—during the January 2017 Independent Activities Period.

The class was comprised of two parts. Faculty and researchers from the mechanical engineering and electrical engineering departments, as well as a roster of industry experts from Optimus Ride, Google[X], Zipcar, and more, lectured on topics ranging from battery

pack design and motor controllers to market trends and cost challenges. The lectures also delved into areas for future application of such technologies—urban mobility, autonomous vehicles, and energy storage.

But it was in the hands-on lab segment of the class where the rubber met the road, so to speak. A smaller cohort of engineering students met on five mornings to tinker with the elements of electric vehicles using lithium-ion batteries, as well as both ride and take apart small EVs such as scooters and skateboards. A second lab option organized teams over the course of a few weeks to build and race electric go-karts on an indoor track. Instructor Lennon Rodgers SM '06, PhD '13, a research scientist at the MIT International Design Center, promised students at the outset: "Through this you'll learn the basics of DIY electric vehicles. It's not a huge stretch to go from here to a car—just a lot more time and money."

PHOTO: PETER GUMASKAS



# HOME @MIT



When do students begin to think of MIT as home? Is it when they discover the dorm-selection process involves ice cream frozen with liquid nitrogen, applied knot theory, and life-sized board games—or is it that first late-night bonding over p-sets? Perhaps it's the moment students imagine something new, then realize they're surrounded by tools to make it and people to make it with. Or maybe it happens gradually, each time they leave the classroom or lab and the conversation keeps right on going. Students come here to learn. And the process by which MIT becomes their home is the same process that prepares them to leave it—to take what they learn out into the world, and make the world a better home for everyone.

# Investing in the Other Classroom

An interview with Dean for Student Life Suzy Nelson

In summer 2016, Suzy M. Nelson became the vice president and dean for student life at MIT, where she supports students in all aspects of their MIT experience. Together with Chancellor Cynthia Barnhart SM '85, PhD '88, Nelson is working to ensure the Institute's continued commitment to a well-integrated student life program that values both formal and informal learning. *Spectrum* asked Nelson to reflect on her first year in the role and share how MIT is working to create the best possible home for students.

—Tracey Lazos

### How has MIT defied your expectations?

**SN:** Every school says its students are engaged, but MIT students are *really* engaged, and that was a pleasant surprise. It's a great strength of MIT that is aligned with the very hands-on curriculum. Students are partnering with me on a number of projects—an "architectural principles" document for the dorms, the New House renovation and West Campus residence hall planning [see page 30]—and are contributing valuable feedback for a review of our food and dining program.

### You often refer to the residential experience as the "other classroom."

#### How does living at MIT amplify learning?

**SN:** When students and faculty collaborate outside of the classroom around something meaningful that can be tied back to the curriculum, it can have a profound impact on learning. Consider a student and a faculty member thinking together about improving food and dining.

It involves looking at research and data. It incorporates financial modeling, because you have to consider cost, quality, affordability, convenience. And all this can be applied to, say, an economics class.

Nelson with students at the Stata Center.

PHOTO: JAKE BELCHER PHOTOGRAPHY



### Why is it so important that MIT students are active in the governance of their dorms and FSILGs [fraternities, sororities, and independent living groups]?

**SN:** We are so lucky to have a culture here that engenders a sense of belonging, identity, and community. Shared governance gives students agency, which makes them feel empowered, which in turn makes them happier and more invested.

### In this time of aggressive expansion of online learning technologies, why does a residential campus still matter?

**SN:** A residential campus allows for human interaction, and there's really no substitute for that. Things students learn on campus—how to communicate, how to lead, how to work as a team, how to compromise—help them grow and develop as humans. And these are skills that have tremendous value in the workplace. Important, too, are opportunities to engage with people from different backgrounds—learning more about what ties us together.

### How is MIT ensuring that the student living and learning experience grows and evolves, yet remains as robust as it is now?

**SN:** First, we are investing in the buildings that can sustain MIT's phenomenal residential system. We want to make sure that these crucial "other classroom" experiences are not an afterthought, which means students have well-maintained spaces where they can feel safe, secure, and comfortable, and where they can work, socialize, engage, and relax. Our students aren't fussy. They want things like blackboards and wide dorm hallways to gather in. For graduate students, there is a real need for increased support and community building, especially for our international families. We're thinking a lot, too, about FSILGs, our first living-learning communities. We want to ensure these students are also in safe, well-maintained, and managed facilities.

If I could look ahead 10 years, I would like to see MIT as a place where health and well-being are at the forefront, which is happening now with the MindHandHeart Initiative. We don't want just to give our students the tools to go out and create a better world, to be kind to others, but also to help them learn how to be kind to themselves. We're also focusing more than ever on public service and social justice issues, as well as making our campus the most welcoming and inclusive it can be.

“Things students learn on campus—how to communicate, how to lead, how to work as a team, how to compromise—help them grow and develop as humans.”



# Setting a Place

Alumni anchor their support of student life in the highlights of their own MIT years

“I wanted to go to MIT since I was 12 years old living in Tehran.” So said Fariborz Maseeh ScD '90 in 2011, recounting how those dreams were postponed. At last, when he decided to pursue a doctorate in civil engineering, “MIT was the only school I wanted to apply to.”

Maseeh was sharing this story at an event celebrating the dedication of Fariborz Maseeh Hall, thus named to honor his pivotal gift toward renovating the new undergraduate residence. That project, which allowed the Institute to increase undergrad enrollment, was achieved through the gifts of numerous donors—several of whom were, like Maseeh, once MIT students themselves.

The new Maker Lodge program helps train students to use the equipment they'll find in more than 40 makerspaces scattered across MIT, such as the Pappalardo Lab (pictured).

PHOTO: DOMINICK REUTER

Through the years, in ways both monumental and cumulative, MIT's alumni community has united in generosity to enhance

the lives of current students outside the classroom. Often, alumni giving reveals a direct connection to the elements that improved their own campus experience—setting a place for others at the table where they themselves were made welcome. In recent years, for example, donor Nancy Lukitsh '78, who made lifelong friendships in the welcoming, all-female living community of McCormick Hall, created a fund to support special dorm activities. Lou Odette SM '78, EE '78, PhD '81, for whom hockey was a fortification against the demands of academics, is spearheading an effort to ensure the sport's permanence on campus. And John Helferich '79, SM '11, who embraced the Institute's hands-on culture, is helping to put the tools of MIT's growing network of makerspaces into the hands of the current generation of students.

### A supportive community

The first student Nancy Lukitsh met upon arriving at her new home in McCormick Hall in 1974 remains one of her closest friends today—and that's just one of several dorm mates still in her life. She remembers McCormick as a place of support and mutual respect. “Whether it was conscious or unconscious, I really liked being in a women's dorm at an institution that at the time had fewer than 20% female undergraduates,” Lukitsh says.

When Lukitsh, a regular annual donor, thought about increasing her MIT giving, she realized that she wanted to bolster something that had been so integral to her own life there. She went back to McCormick to meet then heads of house Charles Stewart III and Kathryn Hess, and found it “a bit like stepping back in time,” she marvels. Lukitsh is a member of the Council for the Arts at MIT, and serves on the Visiting Committee



for the Division of Student Life (one of 30-plus committees that advise the MIT Corporation and administration on Institute departments and programs). Observing the landscape for today's students, she sees a continued need for support networks like the one she found at McCormick: "The academic pressures were intense then, and they're intense now. A lot of the things that we discuss on the Visiting Committee have to do with building community."

By endowing a discretionary fund for McCormick's heads of house, Lukitsh says, she aimed to enrich life there in ways that would match student need at any point in time. Stewart, who is the Kenan Sahin Distinguished Professor of Political Science, used the fund to take the house government on retreats. It's a tradition that McCormick's current heads of house—Raul Radovitzky, a professor of

aeronautics and astronautics, and Flavia Cardarelli, a staff member at the MIT Portugal Program—have continued each semester.

When Lukitsh reflects on her time at MIT, she recalls the rigor of her coursework in meteorology, from which she pivoted to business school and an investment management career. But just as vivid are her memories of McCormick

**"I am here because others built the physical and intellectual infrastructure that gave me and others a chance to succeed."**

camaraderie, along with her involvement in the student TV station and a theater group. "The academic skillset with which I came away from MIT, the problem solving and the analysis, the discipline of the science and math, made me a stronger professional," she says. "But what I did outside the classroom made me a more well-rounded person."

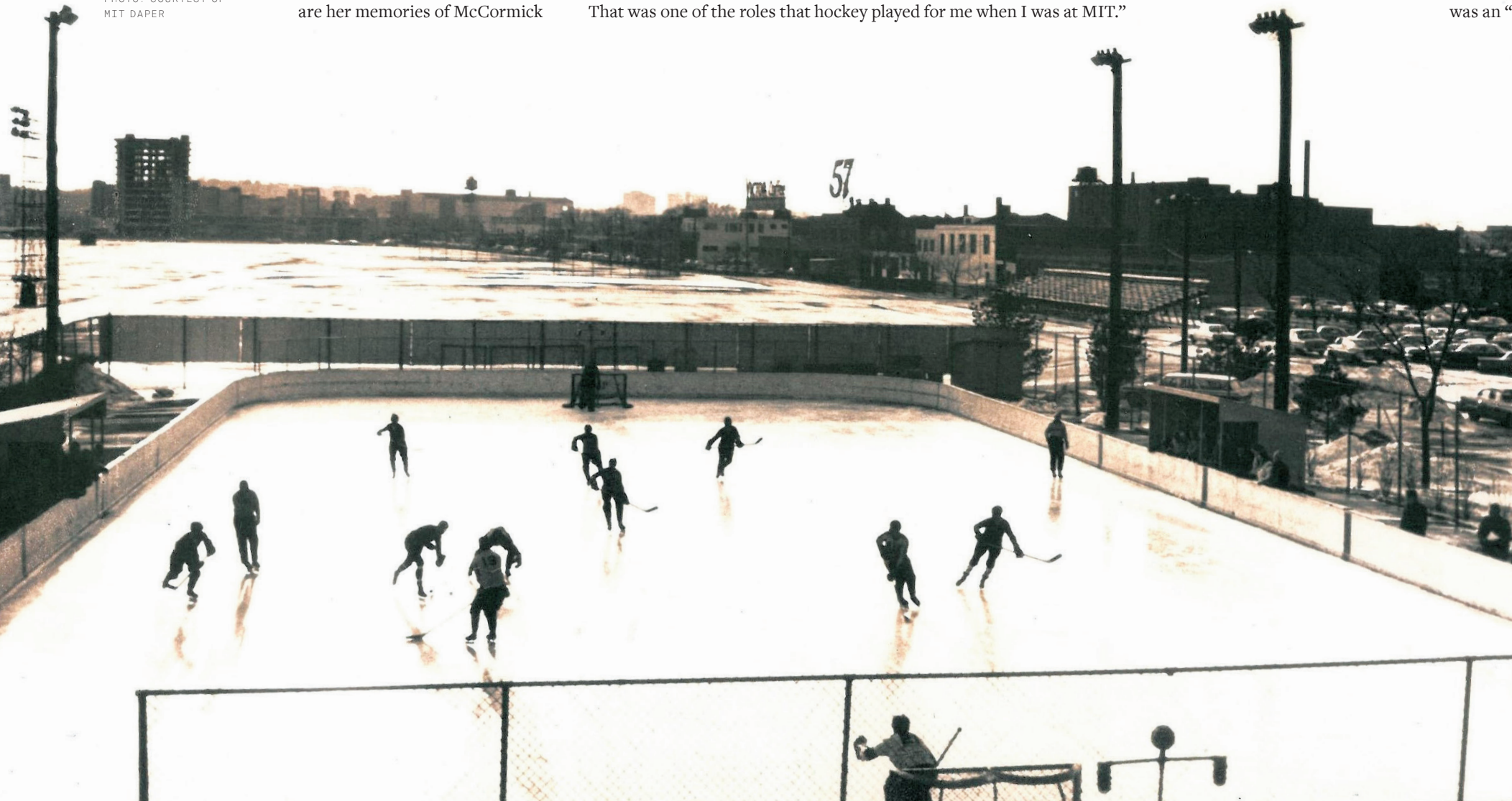
#### Balance on the ice

Perhaps not surprisingly for a native Canadian, Lou Odette felt right at home on MIT's outdoor ice hockey rink, joining the varsity team soon after he began his graduate degree. "All that time in the lab and the classroom could get to be too much after a while. I would skate for two hours a day, six days a week, except for the days we had a game. Then we'd get one day off, and keep going. It was always a shock when we got to the end of February and had to stop," he recalls.

Despite the enormous investment of time the team required, Odette believes it was a critical ingredient in the academic success that started him on the path to founding seven companies during his four decades in the Boston area, followed by his "encore career" in Toronto at Deloitte Advanced Analytics. Embarking on a PhD in the electrical engineering department with bachelor's and master's degrees in zoology, he found he had to pour extra effort into picking up the fundamentals underlying his coursework. "Hockey made it easier to balance everything. Sometimes when you're stuck thinking something through, it helps to take a break and go do something completely different for a while and let the old subconscious work on the problem. That was one of the roles that hockey played for me when I was at MIT."

Before the construction in the 1980s of the indoor ice rink in the Johnson Athletic Center, MIT had an outdoor ice rink adjacent to Briggs Field, where Odette and his hockey teammates played.

PHOTO: COURTESY OF MIT DAPER



Now, hockey is one of the things that keep Odette connected to MIT. He is a frequent player in annual East and West Coast alumni games. When the men's ice hockey team switched from varsity to club level in 2009, Odette and fellow alums set up a group called The Friends of MIT Hockey, Inc., and he has led the way in endowing funding to ensure the team's future. "I think we all want to see hockey available to as many people as want to play it at MIT," Odette says, and to "support the students to go as far as they could possibly go, not just in the lab, but also on the playing fields."

#### A yen for building

John Helferich has an unusual perspective on then-and-now MIT. In 1979, he earned his undergraduate degree in chemical engineering. Now he is an MIT student once again, close to wrapping up his PhD in systems engineering with a focus on food safety through the Institute for Data, Systems, and Society. Then, he was a member of Theta Chi fraternity. Now, he is VP of its Alumni Corporation. "I've not only returned to my educational base but my living base," he remarks, "which is interesting after 40 years."

With a long career in R&D at the Mars candy company under his belt, Helferich will be looking for a way to apply his doctoral expertise to continued research in the food industry. But he is also about to open a brewery in Andover, Massachusetts. "So I'm splitting my days between research and teaching, and dumping malt in the tanks and brewing and cleaning equipment," he explains. For someone steeped in MIT's "mind and hand" philosophy, that feels about right. Helferich arrived on campus already well versed in carpentry and plumbing, thanks to his grandfather and father. Realizing he enjoyed tinkering with the equipment for high school biology experiments more than actually performing them was an "aha" moment in his decision to become an engineer, and MIT fulfilled that yen for building. "We didn't really have a thing called maker culture" in the '70s, he notes, "but a lot of what we did as researchers was actually maker culture. You made things, and ran them, and saw what happened."

Today, Helferich worries that while the urge to design and create remains strong on campus, too much of the execution is migrating to keyboards and screens. He is encouraged by the Institute's commitment—through Project Manus, led by "maker czar" Martin Culpepper SM '97, PhD '00—to expand MIT's network of maker-spaces and improve student access to them. A gift from Helferich and his wife, Lynn, helped to establish MIT's new Maker Lodge, where incoming students are trained on the equipment they will find throughout campus, and to put "Maker Bucks" in students' hands so they have the resources to put those skills to use. "You can model your ideas," Helferich says, "but I think there's still an innate need to use your hands and make physical prototypes."

#### Because there was a spot

Every MIT journey is different. And Fariborz Maseeh's journey, as he told his audience six years ago, almost ended before it began. Having deferred his start date, he

arrived in Cambridge uncertain if he would still have a place on campus. Fortunately, his department agreed to readmit him, and the housing office found him a room in Ashdown House, the oldest building on campus—the same edifice later reborn as Maseeh Hall.

Maseeh went on to become a pioneer in the custom design, development, and manufacturing of microelectromechanical systems devices. Today, his philanthropic investments, through the Massiah Foundation, are driven by a vision for long-term social impact. In Maseeh's view, supporting the MIT student body can have powerful returns: "This institution is one of the best economic drivers of our nation and the world. There is no better place to invest with such high economic multipliers."

Maseeh closed his remarks at the 2011 dedication with a statement of gratitude that may well resonate with other alumni supporters of today's students: "I am here tonight because there was a spot open for me," he said. "I am here because others built the physical and intellectual infrastructure that gave me and others a chance to succeed."

—Nicole Estvanik Taylor



The renovation of the oldest building on campus, rededicated as undergraduate residence Maseeh Hall in 2011, allowed MIT to expand its undergrad enrollment.

PHOTO: BRUCE MYREN

**Through the years, in ways both monumental and cumulative, MIT's alumni community has united in generosity to enhance the lives of current students outside the classroom.**

# Habitat

MIT students share their favorite spots on campus

## LATINO CULTURAL CLUB LOUNGE

Stephanie Nuñez Dominguez '19, Course 11 (Urban Studies and Planning)

I love coming here to nap, work, or find my friends, including fellow residents of La Casa (Spanish House). When I first visited the lounge and saw the walls—covered in the most beautiful mural, along with pictures of LCC members and flags of Latin American countries—I immediately felt a connection to my life back home in California. Having this space in addition to La Casa has made dealing with homesickness a lot easier. I'm able to maintain a connection with my Latina identity while forming strong connections with others in the Latino community.



## SIDNEY PACIFIC MULTIPURPOSE ROOM

Sungil Kim, graduate student, Course 6 (Electrical Engineering and Computer Science)

When I stop by the SidPac multipurpose room, I always find familiar faces. As a resident and outreach chair here, I've made tremendous friends through the community's activities: weekly coffee hours, monthly brunches, outings to the movies, volunteering at a shelter, and scholarly seminars. We cook together in the common kitchen and talk about our lives and the uncertain future. The most important thing we have in common is that we embrace diversity, and we support each other. That makes SidPac feel like home.



## HAYDEN LIBRARY

Colin Gray, graduate student, Course 14 (Economics)

The chairs facing the windows, overlooking the river, are the best chairs on campus. I used to go here almost every day when I was taking classes, usually in mid-afternoon. The bright atmosphere keeps me awake in the sleepy part of the afternoon, but the environment is calm enough to enjoy a good study session. It's crowded enough that you don't ever feel alone, but it's still a quiet place that lets you focus.



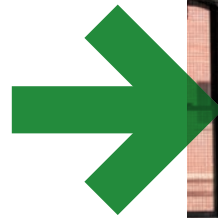
## GELB LAB

Rachel Harris '17, Course 16 (AeroAstro)

While I was part of the Design/Build/Fly group, I spent a lot of my time in the Gelb Lab. Working on planes down here with the club, with music blasting, is one of my favorite things I've done as an MIT student. The first time I walked into the space, I remember feeling a little intimidated because everyone else seemed to know so much about building planes already. I never would have thought that two years later I would have absorbed so much information, or that it would be me leading the club.







### ZESIGER CENTER AND DUPONT ATHLETIC CENTER

Jeffrey Zhang '19, Course 18 (Mathematics) with Computer Science

During water polo season, when I'm investing around two hours per day for practice and strength conditioning, the pool and locker room at the Z Center are like a second home. Off-season, my friends and I started an informal basketball league and we've played countless games at duPont. Athletics has definitely shaped my experience at MIT for the better. It is a great stress reliever in the face of so much coursework, and it has introduced me to some of my closest friends whom I might not have met otherwise.



### SITEMAN DINING ROOM AND ROBERTS FAMILY FORUM

Jayesh Kannan, graduate student, Course 15 (Management)

This cafeteria means much more to me than just a spot to grab a bite. Spending time here gives me a sense of belonging to the Sloan community. I stop by at least twice a day. It's a place where I meet classmates for team project discussions, grab coffee with visiting prospective students, or sometimes even make new friends. The space also plays host to poster presentations, or to tables that market new courses. In fact, we just had a flash mob here to promote a Sloan community event.

### SIMMONS DINING HALL

Molly Brennan '18, Course 10 (Chemical Engineering)

I eat dinner here almost every day. It's nice having a dining hall right in my dorm, to come home and be able to check in with friends and laugh after a stressful day. It's also been great to get to know the people who work here; I've become friends with the guy who does stir-fry most nights. The dining hall is usually more relaxed than the rest of MIT, and Simmons itself is a really welcoming place. You can always find a group of people you fit in with.



### W20 CERAMICS STUDIO

Simona Dalin, graduate student, Course 7 (Biology)

The studio is a peaceful place, filled with friendly people. Usually there's music on in the background, mixed with the sound of the wheels turning and the teacher giving tips. There's an almost meditative focus on creating. I can get messy with clay and make real things with my hands, which is a great break from my lab work. I study vulnerabilities that tumors develop when they become resistant to chemotherapy, and I enjoy research and analyzing data, but sometimes I need to get out of the lab and actually see the product of my work.



# Live, Learn, and Lead

## How an address becomes a community

Those unfamiliar with MIT's housing system might be surprised to know that undergraduates select their own living situation when they arrive on campus and may choose to remain in the same place for multiple years. This choose-your-own-adventure approach has shaped MIT's unique undergrad residential culture: the distinct character and lore of each dorm or group and the affinity its members feel; and the connections forged among students of different years, and even with live-in faculty and grad students, that can only come from the day-to-day business of sharing a home. *Spectrum* asked five undergraduates and three house staff for an inside view of their living communities.

“When choosing where to live, I was motivated more by the people than any other factor.”

### Coming home

**SIQUEIROS:** WILG is a seven-minute walk from Lobby 7, but it gives me just the amount of space I need from school. It feels most like home when we get together for dinner six nights a week. We have women from so many different places and of many different majors and activities (for example, I'm part of the Asymptones, an a cappella group that sings fun and nerdy music). But when you come to dinner, everyone just feels like a friend.

**ANAGBOGU:** When choosing where to live, I was motivated more by the people than any other factor. At Chocolate City [a brotherhood of students who identify with urban culture], I'm surrounded by people who understand me on a level deeper than others on campus, and it truly feels like my home at MIT. Coming back to Chocolate City is one of the most cathartic things I feel in a day.

**HANSFORD:** I had heard through alumni that joining a fraternity would be beneficial to my overall experience at MIT. After going to Sigma Chi during rush, I knew instantly it was a good fit—there was a diverse range of interests, including athletic (squash and lacrosse have been a large part of my MIT experience). Over the past three years, after a long day at MIT, nothing was more enjoyable than crossing the bridge to come home to 532 Beacon Street. I tried to make a point of keeping campus a study-focused area, and the house a more living-focused environment.

**ACEVEDO:** What makes Burton Conner feel most like home is how inviting everyone is. It becomes such second nature to bounce around between suites that my friends and I joke that we spend more time in each other's suites than our own.

**ORIOLE:** One stereotype is that Simmons is very easy to get lost in, but I think that architecture is conducive to our sense of community—many lounges span two floors and some sections have short hallways that make it easier to get to know your neighbors.

Students come together over a “mega-puzzle” in the Simmons Hall mailbox lounge.

PHOTO: ERIC KEEZER

**ALEXANDRE:** I wanted to put my fingers on the pulse of what's going on with students at MIT, outside of the classroom, by joining a house team. Once you get tenure as a professor, I think you reach a sort of existential moment where you want to shape how exactly you situate yourself in the place that you may end up working in for the rest of your life. I felt like this opportunity would enhance my teaching in the classroom and enliven my experience of MIT through active participation in a vibrant community.

**MILLER:** Before I was faculty, I was an MIT undergraduate myself, and I lived at East Campus [EC]. So I have an affection for this particular dorm, and for how student-centric MIT's housing system is in general. A crucial part of EC's identity is user modifications. For example, we have a hall-wide stereo system, like a juke box, with a scrolling LED display in one of the lounges that tells you what song is playing.

**HUSSAIN:** I became a Maseeh GRT [graduate resident tutor] through a matching process: you interview at multiple dorms and rank them, and they rank you. What I like most about Maseeh is the inclusive environment. Our motto says it all: “Be you with us.”

### Making connections

**ORIOLE:** One of my favorite things about MIT housing is that freshmen and upperclassmen live together. I'm thankful that as a freshman I got to know upperclassmen who were able to help me with my p-sets, talk to me about their majors, and be positive role models for me—and each year, I get to be that for the new class of freshmen.

**ANAGBOGU:** Members generally keep their doors open. When things get tough, bros are extremely responsive, from just listening to how you feel, to studying with you, or being the shoulder for you to lean on. When one of our members had a death in the family and was torn by it, the bros all stepped up to support him without hesitation.

Brothers at Sigma Chi.

PHOTO: PETER GUMASKAS



Maurizio Diaz '20 shows off the LEGO mural he created on his hallway at East Campus.

PHOTO: PETER GUMASKAS

**SIQUEIROS:** At WILG we have a designated “member at large” who looks for extra ways we can support each other. One semester, for example, she compiled a book of compliments so each member could see why other members liked us. We also have the sweetest GRT who is always inviting members to come chat with her if they need to vent or just want to hang out.

**HUSSAIN:** The GRTs lead weekly study breaks in our apartments, and I'd say 30 to 60 students usually come by. Leading up to the election, we watched and talked about the debates together. I have students from all over the world living together on my hall. It is always rewarding to see my students debate and learn from one another, not just about math and science, but also about how they see the world.

**ALEXANDRE:** I have no shame in plugging literature classes to EC students! And when I'm thinking about organizing events in the dorm, my impulse is to incorporate what I do professionally: read, interpret, analyze, and make meaning from artful language. This is not a literary example, but for instance: I was really enjoying a book called *Gifts of Imperfection*, and I figured I'd send out an email and see who would be interested in reading some of it out loud together over the course of a few weeks.

**HANSFORD:** Learning goes so far beyond the classroom—there are always classmates and upperclassmen at a fraternity who are more knowledgeable than you are in any given topic.

## The Undergrads

**Lisbeth Acevedo Ogando '19**  
Course 4 (Architecture)  
Resident, Burton Conner

**Chukwunenyé Anagbogu '18**  
Course 2 (Mechanical Engineering)  
Resident, Chocolate City

**Dominic Hansford '17**  
Course 15 (Management)  
and Course 18 (Mathematics)  
Resident, Sigma Chi fraternity

**Alexis Oriole '18**  
Course 18 (Mathematics)  
and 24 (Philosophy)  
Resident, Simmons Hall

**Cecilia Siqueiros '19**  
Course 8 (Physics)  
Resident, Women's Independent  
Living Group (WILG)

## The House Staff

**Sandy Alexandre**  
Associate professor of literature  
Associate head of house,  
East Campus

**Fatima Hussain '11**  
PhD candidate, Course 1 (Civil  
and Environmental Engineering)  
Graduate resident tutor,  
Maseeh Hall

**Rob Miller '95, MNG '95**  
Professor of computer science  
and electrical engineering  
Head of house, East Campus





Sigma Chi's small house allowed everyone to get to know each other well. Brothers were willing to share their true opinions, opening me up to new viewpoints and ways of thinking.

#### Stepping up to lead

**ACEVEDO:** As a floor chair for Burton 5, there are formal parts of my role, involving logistical things like outings and budgets. But my informal role is to go around to different suites and ensure everyone is engaged with what is happening on the floor, especially if they're new, making it easier for people to feel like they are a part of something outside of academics.

**ORIOLE:** I've always been interested in house government and finding opportunities to help improve life in Simmons. I was previously the historian, and I'm currently the library chair and an associate advisor for freshmen. I'm also an intramural player on a number of Simmons sports teams, and I am the biggest fan of March Madness; I organize bracket tournaments and put the basketball games on the downstairs TV.

**SIQUEIROS:** Each WILG member has house chores each week, and we have Work Weeks in the fall and spring where we clean up the house for rush. We also have a large number of house government positions—house managers, food stewards, rush chairs, membership coordinators, social chairs—each one essential to the well-being of the house.

**ANAGBOGU:** I think that helping promote and protect the organizations that you participate in is paramount to securing their future success. I've served as a co-chair for Chocolate City, a member on the renovation committee for New House [in which Chocolate City is located], and New House's security chair. When not an officer, I like to advise others and contribute to discussions about important decisions.

**MILLER:** I think I had forgotten since my student days how incredibly organized East Campus is, what a committed core of students it has who are willing to put their time into big daring projects like the roller coaster [see page 19], or making Campus Preview Weekend a fantastic experience, or just keeping their hall communities friendly and fun. You have to picture 30 or 40 siblings living together who mostly love each other, and occasionally get on each other's nerves. But they are very good at resolving their own conflicts. Taking responsibility for leading your hall or your dorm builds a lot of intellectual courage in our students, a lot of

autonomy. I think it really prepares them for being the leaders out in the world that people are going to expect MIT alumni to be.

#### (7)

##### WATCH VIDEO

Inside a graduate dorm with head of house and robotics professor Julie Shah  
spectrum.mit.edu/livelearnlead



## Play Dates

Plenty of universities claim their students “work hard and play hard.” At MIT, definitions of the two can be hard to separate. Curiosity, humor, experimentation, intensity—you'll find these qualities in the lab, in the classroom, and in the unabashed pursuit of fun. Below: a sampling of ways alumni and friends of MIT can play along throughout the year.

#### WINTER

Compete against thousands to find the “coin” in MIT's internationally famous **Mystery Hunt**, held every January since 1981, and win the right to design next year's elaborate, esoteric series of puzzles. Prior themes include Monopoly, the ocean, and the (mostly fictionalized) history of the hunt itself.

#### SPRING

View an exhibit of students' paper creations for the annual **OrigaMIT** competition, with award categories ranging from “tessellation design” to “cuteness.” Or stop by any of the club's weekly Sunday meetings, open to the public, to fold structures ranging from a prickly cactus to a spouting whale.

#### SUMMER

Develop your playful tech startup through **Play Labs**, a new incubator/accelerator open to MIT alumni as well as students, run by Bayview Labs in partnership with the Seraph Group, and hosted by the MIT Game Lab. “Playful tech” encompasses virtual and augmented reality, artificial intelligence, 360 video, and more.

#### FALL

Bring the whole family and contribute a segment to the MIT Museum's **FAT (Friday After Thanksgiving) Chain Reaction**—celebrating its 20th anniversary this year—or just step back and watch the collectively constructed contraption unfold in all its

Rube Goldbergian glory throughout the Rockwell Cage Gymnasium.

A 2015 Mystery Hunt participant works on one of the game's 160 puzzles.

PHOTO: DOMINICK REUTER

#### (7)

SEE MORE  
spectrum.mit.edu/playdates

## Building Traditions

With power tools and imagination, students turn residence halls into campus destinations

MIT students spend a lot of their time in the campus's labs, studios, and maker spaces, designing and building. So what do they do when it's time to head back to the dorm and relax? Build more stuff. Each year, the students of the East Campus residence hall create a massive structure, such as a fort or amusement park, in their courtyard to welcome first-year students for Residential Exploration (REX) week.

The entirely student-run tradition dates back to 2004, when residents spontaneously decided to build a fully functioning roller coaster in the courtyard; after a few years of drawing increasing crowds (and official scrutiny), the coaster went on hiatus. August 2014 marked its triumphant return, featuring a 130-foot-long wooden track complete with two hills. This time, the plans were created on a 3-D printer, reviewed by a professional architect, and awarded a building permit from the City of Cambridge—along with approvals from MIT's Facilities Department and the Environment, Health & Safety Office.

“We start informally in January or February scoping out what we are going to build,” says Henry Shackleton '18, one of the REX co-chairs from last year. For 2016, the dorm eschewed the coaster in favor of a three-story wooden fort,

complete with a large netting for students to lounge on, bean bags, and such amusements as a carousel swing ride and a giant seesaw. “We were focusing on making it more of a place that people would come and hang out,” says Shackleton, a physics and philosophy major.

The two-week project consumes about half of the dorm's annual \$20,000 REX budget, but it's worth it, says Shackleton, who remembers his own experience as a first-year student. “It was a great bonding experience where I got to know the upperclassmen and they got to know me,” he says. “And then you have this really cool thing to show off at the end.”

That bonding takes a creepier turn at Next House every October, when residents transform the building's basement into Next Haunt, a two-story “escape the room” horror adventure. Entering a dark space, visitors confront a series of puzzles they must work through to find the exit. The project fits the character of Next House, says Brenda Stern '17, a civil and environmental engineering major and producer of this year's

Haunt. “We have a strong build culture, as well as a lot of interest in acting and art,” she says.

East Campus courtyard, REX 2015.  
PHOTO: M. SCOTT BRAUER

For 2016, the dorm eschewed the coaster in favor of a three-story wooden fort, complete with such amusements as a carousel swing ride and a giant seesaw.

The project offers residents a creative framework for meeting their neighbors and blowing off steam around midterms. The challenge: create a traversable wooden structure, full of puzzles and props, in a tightly confined space of only 240 square feet with a budget of \$3,000. Beginning over the summer, several dozen students take on all of the roles of a theater production—including makeup, costumes, and sound design—as well as tapping build directors and a six-person puzzle team.

This past year's challenge centered around a search for a family heirloom inside a tomb, incorporating word puzzles and physical challenges such as opening an intricately designed puzzle box. Along the way, visitors met zombies played to hair-raising effect by Next House denizens. “We do a zombie training session where we teach people how to walk and stay in character,” notes Stern, “but mostly it's a cathartic experience where you get to put on makeup and grunt a lot.”

Next Haunt has been a hit on campus; last October, it took 10 minutes to fill 300 spots for walkthroughs. Behind the scenes, some students find the experience of working with a team on a complicated construction project to be great training for the future. “It's been one of the most creative projects I've worked on at MIT,” says Stern, who plans to pursue sustainable building design after graduation this year. “It's funny now to think of building houses for real.”

—Michael Blanding





# A Day in the Westgate Life

For a resident grad student, the campus encompasses work, family, and community

**6:34 am**

Ankur Chavda SM '16 fumbles for his glasses and rolls out of bed. He yawns a good morning to his wife, Sarah Andries. He exits the bedroom and bumps into his four-year-old son. Leonidas usually gets up first, but he's not supposed to wake his parents up prematurely (or else he can't watch his TV show about cars). The 40-year-old Ankur—a PhD candidate in the Technological Innovation, Entrepreneurship, and Strategic Management Group at MIT Sloan School of Management—gets dressed and tidies up. A few minutes before 7, he knocks on the kids' bedroom door to rouse his eight-year-old daughter, Dido. She groans.

Sarah is Belgian, and considers eating chocolate anytime, all the time, to be her cultural heritage—so it's no surprise that her daughter dusts her bowl of Cheerios with chocolate sprinkles before wolfing it down. Once Ankur runs Dido to the school bus stop across the street at 7:20, he's back in the kitchen pouring cups of coffee for Sarah and himself.

Ankur, Sarah, and Leonidas sit down for breakfast, and as Ankur eats his eggs, he looks around the apartment. Toys and books are everywhere. The kitchen is decorated with Dido's drawings of mermaids and ponies and a page from Leonidas's Hot Wheels coloring book. This is the third floor of Westgate, an MIT residence for graduate students with families. Ankur appreciates the community in this building—the fact that, say, the parents here babysit each other's kids. The families in this building rely on each other.

Dido, Sarah, Leonidas, and Ankur at home in Westgate.

PHOTO: SARAH BASTILLE

Sarah drops Leonidas off at Westgate's childcare facility before heading up to Salem, Massachusetts, where she works as a public defender. Ankur grabs his backpack, unlocks his bike, and starts pedaling.

**8:31 am**

Ankur lowers himself into the pool at MIT's Zesiger Sports and Fitness Center. He's taking a beginner's swimming class, and today the instructor is reviewing the forward crawl.

**9:35 am**

Ankur hops off his bike and enters E62, MIT Sloan's newest building. He grabs the elevator to the fourth floor and walks into the office he shares with two other graduate students. Ankur has the spot near the window. On his desk, scattered notebooks and papers intermingle with books like *Statistical Inference* and *Mostly Harmless Econometrics*. Next to his computer screen is more of his kids' artwork and a framed family photo in which he and Dido are competing for the biggest smile.

Ankur sifts through his emails from the night before, and then opens a statistical analysis program on his computer and tumbles headfirst into his dataset—a sea of information he thinks about all the time. These are the casts, crews, and ratings of many of the pilot episodes and full seasons aired by major television networks from the 1940s until the present. Ankur's interested in how innovation happens, broadly, and he's using these data from the entertainment industry to figure it out. A recent discussion with his advisor got him thinking about a different way to organize his data, so he's shifting the numbers around now, getting them in place to answer a new set of questions.

**10:32 am**

Ankur sits at the front of his applied econometrics class. His professor—Joshua Angrist, a world-renowned economist—fires up a video clip. It's an *ABC News* special report, anchored by a young Peter Jennings, about the fall of the Berlin Wall and the lifting of travel restrictions on East Germans. Once it's over, the professor immediately starts firing questions at the class. He wants to know why the clip is relevant to the paper they're discussing today. A student responds that the paper compares the earnings of those who served in the military to those who haven't, and the fall of the Berlin Wall meant—among other things—a decline in militarization. The class continues at a rapid clip, professor and students working their way together through the math and analysis in the paper.

**12:27 pm**

Ankur heads to the Siteman Dining Room in E62's Roberts Family Forum, picks up a falafel pita sandwich, and joins five other graduate students in a conference room to discuss a paper on entrepreneurship.

**1:35 pm**

Ankur is back at his desk working through his dataset, sipping a mug of ginger tea. He glances over at that family photo—the one where Dido is beaming for all the world to see. When asked how he's found a way to balance being a dad and a husband with being a graduate student, Ankur says it comes down to focus. He makes sure almost everything he does during the workday is in service of his dissertation, expanding his understanding of economic theory, or advocating within the student government for the needs of student families. That allows him when he's at home to be fully invested in his family. And he's proud of that.

**3:52 pm**

Ankur knocks on the door of MIT economist Scott Stern, one of Ankur's two graduate advisors. Scott has his feet up and he's staring intently at his laptop. He clicks his attention over



Ankur appreciates the community in this building—the families here rely on each other.

to Ankur, swings his feet below his desk, and the two pick up right where they left off—discussing a manuscript they're co-authoring and submitting for publication. Soon, Ankur's at the white board sketching out a probability distribution in green marker. Scott interjects at regular intervals, asking Ankur a set of clarifying questions and jabbing the air in front of him as he drills into the meat of the issue. Ankur loves these discussions. Scott's style of mentorship is to trust Ankur to come up with solid research questions, then to help Ankur figure out which of those questions are most interesting and how to shape them into an exciting research project.

**5:08 pm**

Ankur is back on his bicycle, whipping west along the Charles River.

**6:37 pm**

Back at Westgate, the whole family is gathered around the table for dinner: roasted carrots and asparagus with barley, and vanilla yogurt with—yes—more chocolate sprinkles. Dido shares details of her day at her Chinese immersion school in Cambridge. Leonidas wants to talk about “duck buses,” the amphibious World War II-era vehicles that now give tours of Boston on land and in the Charles River.

After dinner, Dido and Ankur bring out their guitars. Dido picks out single notes of the Beatles' “Mean Mr. Mustard” while Ankur sings along and strums the chords. Then Ankur cracks open a fantasy book called *Quest*, and Dido and Leonidas snuggle up on either side of him while he reads aloud.

One by one, everyone heads to the bathroom (where glow-in-the-dark sea creatures parade across the walls) to brush their teeth. Dido and Leonidas settle into bed. Ankur and Sarah share a bit more about their days, but it won't be long before they're asleep as well—recharging to do it all over again tomorrow. —Ari Daniel PhD '08

Ankur picks up Leonidas from MIT's Westgate Cooperative Preschool, on the ground floor of their apartment building.

PHOTO: SARAH BASTILLE

## Housing a Growing Graduate Population

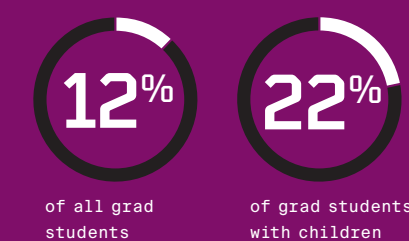
GRADUATE STUDENT ENROLLMENT AT MIT

1,992 (1956)  
6,804 (2016)

CURRENT POPULATION OF ON-CAMPUS GRADUATE HOUSING

1,925 single students  
408 married students and families

GRAD STUDENTS LIVING OFF-CAMPUS WHO WOULD PREFER CAMPUS HOUSING\*



To learn about MIT's plans for a new graduate tower in Kendall Square, see page 30.

\*SOURCE: 2014 SURVEY

# The Magnetism of a Digital-Era Campus

A graduate student analyzes MIT's physical pathways of collaboration



I am from California, and one of the first things people (incredulously!) ask is why I ended up in the northeast. If you were here during the winter of 2014, I would bet that you asked yourself the same thing.

Once we enroll at MIT, we migrate to Cambridge, and then trek to campus almost every day. We spend our hours in these buildings—despite that an entirely successful dissertation year could probably

be spent in pajamas, from the comfort of an IKEA Fågmy mattress.

There must be a certain magnetism that drew us to campus. It's an air that we've been breathing from day one, co-respiring with some of the brightest minds of our generation and previous ones. We brush shoulders with our peers and mentors and heroes—that's the magic of being here. It's large enough for a panoply of ideas, perspectives, passions, and proficiencies, but close enough for a spark of serendipity—in this intellectual density, you can't help but stumble upon people doing wildly fascinating things. Discovering those ideas causes you to reconsider your own work in a new light, and in some cases, redirect its course. Whether implicitly, explicitly, or by proxy, we've all experienced this richness of the campus ecology.

Campuses have been around for a long time. It's an effective spatial unit for collaborative knowledge. Cambridge (the older one) has been a university for over 800 years, and for most of that history, productive communication was almost exclusively in person. The campus was necessary. Participating in and advancing human knowledge meant making a pilgrimage, of sorts, to the mecca of academia.

And what about today? I can take any MOOC online or Skype any collaborator or VPN my way into any library archive, from anywhere in the world. It's usually easier to schedule a meeting by phone than down the hall. In short, the question that motivates my research is, what is the importance of the campus in a digital era? To answer this, I set out to empirically map how physical space defines collaboration at MIT.

What seems at first like a qualitative observation, in fact, has quite a bit of data behind it, and analytical tools in front of it. I had the opportunity to work with the Office of Institutional Research, the office of facilities, and the MIT Data Warehouse to bring together bibliometric data (papers and patents), directory data (affiliations and office numbers), and spatial data (campus GIS maps). With these datasets linked together, I applied statistical analysis (to understand department-level and building-level patterns), spatial analysis (to define the individual and relative positioning for each person), and network science (to understand collaboration).

The topology, or community structure, of the collaboration network reveals a proximity bias for patenting within the MIT community. Heterogeneous teams from multiple disciplines tend to form within the



From Claudel's thesis, a detail of communities in MIT's co-authorship network.

IMAGE: MATTHEW CLAUDEL

same building. When it comes to co-authoring papers, however, there is more of an affiliation bias: co-author teams tend to be of a single discipline. This suggests that co-inventors collaborate around projects, benefitting from a breadth of expertise or assets like specialized equipment, while co-authors collaborate within domains of scholarship, working to advance the knowledge of a particular subject.

The second interesting result is an exponential relationship between proximity and collaboration. You could think of it like dandelion seeds—there is a higher likelihood of finding a seed close to the flower, and the likelihood decays exponentially as the distance increases. MIT faculty are more likely to find a collaborator close by. This “collaborative pollination” model is consistent for papers, patents, and for specifically cross-disciplinary work.

Returning to that first intuition about the campus—the magnetism that brought us here—it's clear that proximity and space influence scientific collaboration. The campus defines our community structures and the way knowledge is produced. This research is a first step toward understanding science in space—and could ultimately point to new policies and spatial planning that support collaborative innovation. We were drawn to this campus, and now we're entangled in its knowledge network.

—Matthew Claudel SM '16

*Matthew Claudel is a PhD candidate in MIT's Department of Urban Studies and Planning, the inaugural Innovation Scholar at the Lab for Innovation Science & Policy, and head of partnerships for DesignX, MIT's new entrepreneurship accelerator for innovation in design and the built environment. This essay originally appeared as part of the “Grad Life” series on the MIT Alumni Association's Slice of MIT blog (slice.mit.edu).*

PHOTO: CHRIS GREEN

## Acquaintance by Algorithm

When Tuka Alhanai SM '14 and Mohammad Ghassemi launched MIT Connect in 2015, their goal was simple: to connect people on campus who otherwise might not meet. Neither co-creator imagined how quickly the program would catch on.

Participants fill out a basic form at [connected.mit.edu](http://connected.mit.edu) with their interests, availability, and lunch preferences. Alhanai and Ghassemi, both grad students in the Department of Electrical Engineering and Computer Science, developed an algorithm to match individuals for lunch encounters. Introductory emails set a time and place, and even offer conversation icebreakers.

Fueled by grants from the Office of the Dean for Graduate Education and the MindHandHeart Innovation Fund, with additional development support from MIT Sandbox and the Legatum Center for Development and Entrepreneurship, MIT Connect has been a resounding success: more than 90% of users—many of whom participate weekly—have given it positive feedback, and around half report they've formed lasting friendships through the program. Now in its second year, it continues to thrive on campus, where the 800-plus users are a mix of undergraduate and graduate students, postdoctoral researchers, faculty, employees, and alums.

The program is also rapidly expanding in other directions. After being approached by Boston-area universities, Alhanai and Ghassemi opened participation in MIT Connect to people at nearby schools such as Harvard, Boston University, and Tufts, and they recently launched their first out-of-state program at Ohio's University of Toledo. They are currently working on adapting MIT Connect for tutoring programs on campus.

“There are so many people who could teach us things,” Ghassemi says, “but what makes us ultimately receptive to learning from those people is a match not only between the skill sets we need, but also the personalities of the people involved.”

After a year and a half of working behind the scenes, Alhanai recently experienced the power of MIT Connect firsthand. She was matched with a fellow PhD student, and the pair met for tea. They swapped research stories, uncovered a shared passion for ceramics, and discovered that for the past five years, they've been working in neighboring buildings.

“Even though she's right across the street from me,” says Alhanai, “under any other circumstances I don't think I would have had the chance to meet such an interesting person.” —Catherine Caruso SM '16

Mohammad Ghassemi, left, and Tuka Alhanai.

PHOTO: BARBARA LIPOHAR-STAPLES

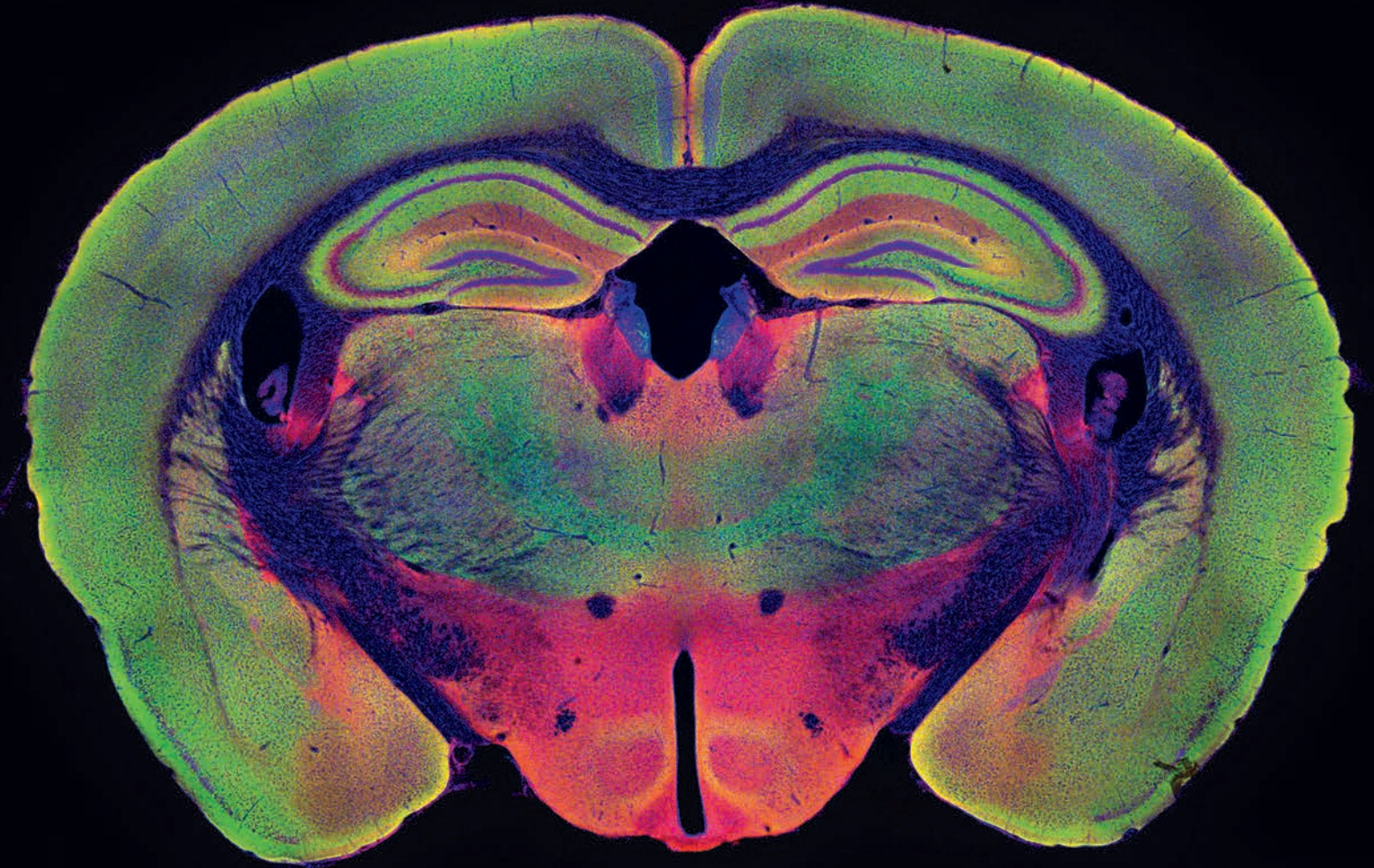
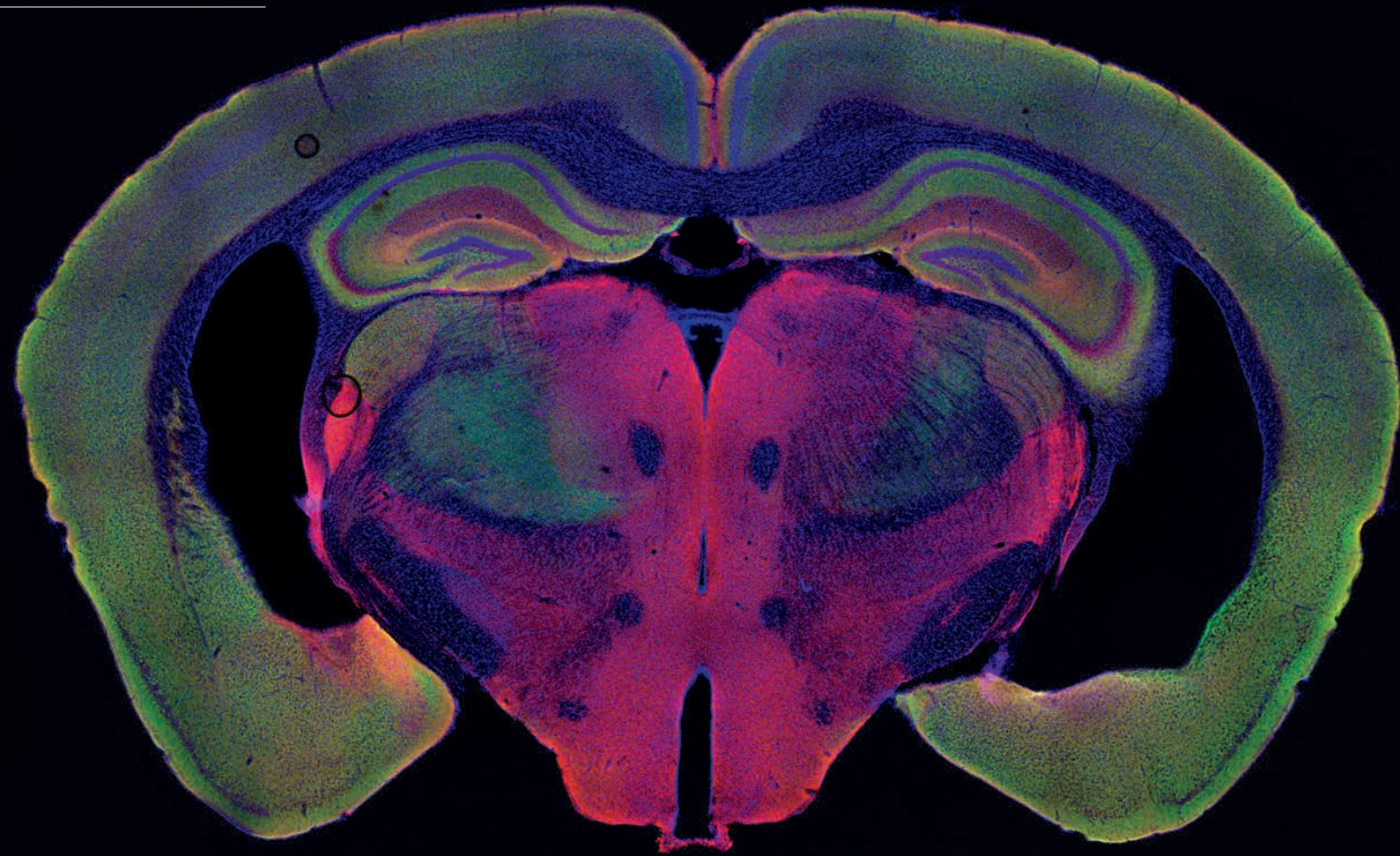


## Strengthening Connections: Student Support and Well-being

In 2016, Chancellor Cynthia Barnhart SM '85, PhD '88 announced the realignment of key student support organizations into the Division of Student Life. “Our network of support is strong but I believe it can be stronger,” Barnhart wrote. “We must make it easier for students to access support resources; we must strengthen the connections between residential life and student support; and we must proactively reach the students we know are more likely to need our help.” The reorganization enables closer collaboration among Student Support Services (S3), Violence Prevention and Response (VPR), Student Disability Services (SDS), and Community Development and Substance Abuse (CDSA), united under the leadership of senior associate dean for student support and well-being David Randall.

Behind the acronyms, some key points:

- **A new “CARE” (Coordination, Assistance, Response, and Education) Team will become the thread woven through the support network.** For students experiencing acute difficulties such as hospitalization or a family tragedy, the CARE Team will serve as their central MIT point of contact, coordinating as needed with additional resources such as MIT Medical, Mental Health and Counseling, Undergraduate Education, Student Life, and the Office of the Dean for Graduate Education (ODGE). Support can range from retrieving clothes and study materials, to connecting campus resources, to working with families, to tracking follow-up care—all while providing emotional support to the affected student. Randall emphasizes that students remain in control of the process: “We prioritize trust and transparency.”
- **Student Support Services serves almost 70% of undergraduates at least once during their MIT experience.** (Grad students receive similar support via ODGE.) S3 handles approximately 6,000 student contacts per year. It's a low-barrier access point for help and referrals on a range of issues, Randall says, but one issue above all: “What MIT students care about first and foremost is academics.” With MIT's quick pace, even a brief absence can disrupt coursework. S3 has developed solid relationships with professors so it can advocate for students in cases where they must step away from academics to prioritize their well-being.
- **Faculty are requesting more guidance on how to support students.** Says Randall: “We are developing a handbook for faculty on how to recognize and respond to students in distress, along with online training modules. I want to create a menu of options for academic departments to educate their faculty in a way that's kept current with the Institute's processes.”
- **Redefining “help” is part of the process.** MIT students, says Randall, “like to solve problems on their own”—whether those are engineering challenges, or bumps in life's road. One of his office's goals is to reframe that inclination. “The message that we try to get across consistently to the students is that reaching out for help is a sign of strength,” he says. “It's something that we all need to do.” —Nicole Estvanik Taylor



# SEEING

# THE

# *light*

A mouse model of Alzheimer's disease shows the differences in the thickness of cortex in mice that have (at right) and have not (at left) received the MIT researchers' noninvasive light flickering treatment.

IMAGES: COURTESY OF THE RESEARCHERS

A startling experiment, a cross-disciplinary hunch—how MIT researchers discovered a potential new Alzheimer's therapy

When graduate student Hannah Iaccarino saw her results, she didn't believe them. She'd induced brain waves at a rate of 40 oscillations per second in mouse models of early stage Alzheimer's disease. According to her analysis, the intervention had cut by half a toxic protein associated with the disease.

The reduction was just too dramatic to be true. So she repeated the experiment. Others did, too. The results remained the same.

"We'd thought it was a fluke," says graduate student Anthony Martorell, who worked with co-first author Iaccarino on the study in the lab of MIT neuroscientist Li-Huei Tsai, director of the Picower Institute for Learning and Memory and the Picower Professor of Neuroscience. "It's been very hard to reduce any Alzheimer's disease pathology at all in mouse models or in humans, so our results were really surprising."



As has now been widely reported, the experiments that followed built a body of evidence pointing to the potential therapeutic benefits of shining flickering light into the eyes of patients with Alzheimer's disease. Advancing silently over decades, ultimately robbing people of memory and identity, the disease and related forms of dementia affect more than 46 million people worldwide, according to the 2015 World Alzheimer Report, and the worldwide cost is expected to rise to \$2 trillion annually by 2030. Currently, there are no effective treatments for Alzheimer's disease.

Because of the urgent need for new ideas addressing Alzheimer's and dementia, MIT formed the Aging Brain Initiative, with an emphasis on interdisciplinary approaches. Tsai credits the initiative for bringing together senior investigators with complementary talents to dream up creative ways to advance her lab's research. "I would not have thought to do a lot of what we did without the input of our colleagues. Their thinking was completely out of the box and they brought fresh perspectives," says Tsai. "We work together because we care about brain aging, but we think differently."

"I would not have thought to do a lot of what we did without the input of our colleagues," says Tsai. "We work together because we care about brain aging, but we think differently."

#### A gamma gambit

A lot is known about the molecules involved in Alzheimer's disease and the genes that increase its risk, but less is known about how it affects the brain as a system. Prior to this study, it was known that in later stages of the disease, when sticky amyloid plaques have already built up in the brain, the brain's gamma waves lose their strength. Gamma waves

ripple across the brain about 40 times per second and appear when the brain is doing attentive work, such as forming memories or solving problems.

Tsai's team wanted to know if gamma waves are also diminished in early stage disease. They chose to study a mouse model with five human genes associated with a risk of Alzheimer's. The young mice have elevated levels of the toxic amyloid protein, but no plaques. The team also partnered with a fellow member of the Aging Brain Initiative, Ed Boyden '99, MNG '99, professor of biological engineering and brain and cognitive sciences at the MIT Media Lab and the McGovern Institute for Brain Research. Boyden develops technology to record brain signals.

Recordings of neural signals in the mice performed by co-first author Annabelle Singer showed weak gamma signals compared to mice without the disease. "The first thing we asked when we saw that was, what happens if you bring gamma back?" says Tsai.

Tsai's lab had already induced gamma waves in mouse brains using optogenetics back in 2009, so the researchers knew how to do it. Using the same mouse model of early stage Alzheimer's, they engineered neurons in the hippocampus, the seat of memory in the brain, to respond to laser light. Then they stimulated these cells with light passed through fibers implanted in the brain, testing different rates of flickering. When the light flickered at 40 flashes a second, the stimulated cells responded and induced gamma waves in the brain.

After repeated experiments, the team found that those oscillations reduced toxic amyloid levels in the brain by 50%. Not satisfied, they wanted to understand how gamma was driving these dramatic reductions. "We can be surprised by the phenomenon, but mechanistic insight makes the data much more valuable," says Tsai.

They confirmed that gamma reduces the production of toxic amyloid, which is governed by one specific process. But to understand changes in the clearance of amyloid, they cast a wide net. For instance, they used RNA sequencing to look at expression profiles of all of the genes in all of the cells in the hippocampus to see how gene expression differs in brains with weak gamma from those with induced strong gamma oscillations.

Such an approach is sometimes called discovery science. It is unbiased and does not rely on a preformed hypothesis. Rather, the idea is to collect vast amounts of information and look for patterns that form new hypotheses. "This is our lab culture," says Tsai. "We want to look at the big picture because we don't want to miss anything."

What they found was that gamma oscillations change the behavior of immune cells called microglia, which are responsible for clearing proteins such as amyloid. These cells increase in number with increased gamma strength and become bigger and more active. "This experiment really paid off," says Tsai.

#### The eyes are the window

Shortly after the team had learned that induced gamma oscillations reduce amyloid, they discussed the results with Emery Brown, Edward Hood Tapin Professor of Computational Neuroscience at MIT, who is a member of the Picower Institute and the Aging Brain Initiative. Brown, who is also a physician, was impressed. But he encouraged the team to find a way to induce gamma that wasn't as invasive as optogenetics, which requires that optical fibers be implanted in the brain.



From left, Aging Brain Initiative faculty members Emery Brown, Li-Huei Tsai, and Ed Boyden.

PHOTO: SARAH BASTILLE

He even suggested a method: Shine flickering light into the eyes instead of piping it deep into the brain. "Up to that point it never occurred to me to go this one step further to try out noninvasive stimulation," says Tsai. "We decided to give it a shot."

Brown's idea had precedent. Neuroscience experiments done years ago—and considered classics in the field today—had shown that the visual cortex adopts the activity patterns of light signals entering through the eyes. "This has been known for decades," says Tsai lab postdoc Chinnakkaruppan Adaikkan, who joined the project midway. "But to use it to amplify aberrant oscillations in the Alzheimer's brain was an interesting idea."

Boyden's team used their engineering expertise to fashion a controllable flickering LED. Tsai's team studied the effects of the strobe on the visual cortex. "At this point, the project had become very multidisciplinary," says Tsai.

The intervention not only halved amyloid levels in mice with early stage Alzheimer's—it also reduced plaques that form in later stages. This finding, which was published along with the team's other results in *Nature* in December 2016, makes the intervention potentially relevant for humans. Alzheimer's symptoms typically do not appear until after plaques have formed. "Most human patients will have plaques in their brains already," says Tsai.

Looking forward, the researchers have many avenues they'd like to explore. First, though, they'd like to determine how long the effects of the intervention last and whether other modes of sensory stimulation, such as sound or touch, have similar effects on the regions of the brain that process those inputs. Ultimately, the goal is to find multiple ways to noninvasively stimulate the brain so that the induced gamma waves propagate strongly throughout it. "If we can activate gamma in many different brain regions, perhaps we can get a huge area of the brain involved," says Tsai. "Treating the whole brain will be important for people with Alzheimer's disease."

—Elizabeth Dougherty

## Hidden Tides

The effects of ordinary ocean waves on ships, beaches, and shoreline structures are well known, but there's another kind of huge, slow, undersea wave that's almost undetectable at the surface. Associate professor of mechanical engineering Pierre Lermusiaux and his MSEAS group (Multidisciplinary Simulation, Estimation, and Assimilations Systems), along with researchers at the Woods Hole Oceanographic Institution (WHOI), are part of a team that has modeled the

motion and interactions of these internal tides. As reported by MIT News, the team has successfully predicted the speed and direction of movement of internal tides near the US Atlantic Coast as they are generated off the shelf break—a seabed feature where the ocean bottom suddenly drops off—and interact with the Gulf Stream and other ocean features.

These internal tides may be hidden, but their effects are not. The applications of the research go deep:

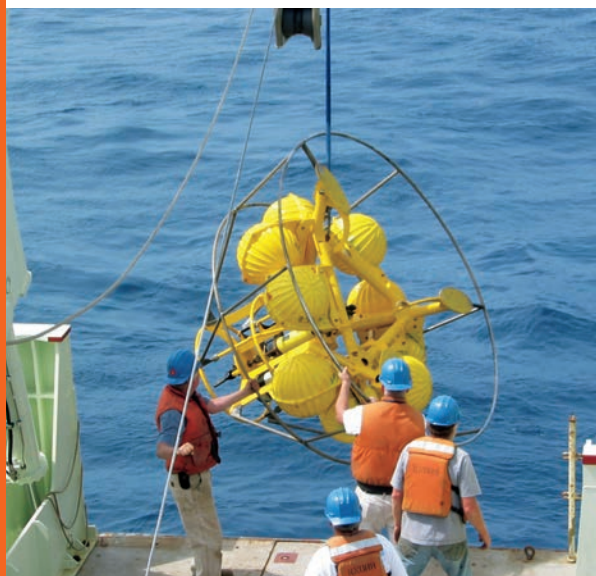
- **Sonar accuracy:** When a ship emits sonar waves, the echoes aid navigation by revealing contours of solid objects and the sea bottom—but internal tides are one factor that can distort the echoes. "If you know how those [undersea] waves mostly evolve, and you know something about their uncertainties and probabilities, you can get better sonar performance," Lermusiaux says. MSEAS is also working on a related project using real-time forecasting, simulations, and analyses of underwater sound speed variability to develop underwater GPS.
- **Deep-sea oil rig stability:** The large, slow waves can interact with currents at the same frequency and create resonance, which exacerbates a wave's potentially destructive

effects. Even in the absence of storms, internal wave and current action of varying strengths and directions can cause damage to rig structures and underwater pipes.

- **Insight into marine ecosystems:** The waves in internal tides, which can be hundreds of feet high, are also instrumental in moving water from the depths of the ocean to areas closer to the surface. That movement delivers deep-sea nutrients for phytoplankton and zooplankton that in turn attract fish that feed on them. More quantitative understanding of this dynamic of ocean life could be particularly useful to fisheries, says Lermusiaux.
- **Climate science:** Because some internal tides can travel a long way without dissipating much, they carry energy over long distances. "As those waves get created, where they interact, break, and ultimately dissipate is important for climate because that's where their energy goes," Lermusiaux explains. —Alice Waugh

WHOI's Timothy Duda, Lermusiaux, and their fellow ocean scientists and engineers used this bottom-resting instrument system for their research.

PHOTO: TIM DUDA/WHOI



**“If you think about an anthropologist going off and living in a remote village, I do that inside companies or an industry.”**



of one such embedded research stint. She spent almost a year observing an anonymous firm (which she labels “TechCo” in the book) as it attempted to reinvent its own management structure, transitioning from a hierarchical chain of command into something more transparent and adaptable. She also observed TechCo’s ongoing efforts to assimilate the unique expectations of its millennial employees.

One thing that intrigued Turco was the unexpected conflict between TechCo’s two goals. “There has been a ton of talk for years in the press about millennial workers not wanting rules and hierarchy,” Turco explains, “and yet these 23-year-olds [at TechCo] were often telling me, ‘I just want more hierarchy.’”

Turco’s efforts to resolve this apparent paradox informed Turco’s theory of a “conversational firm.” Neither a traditional top-down bureaucracy like such 20th-century corporate giants as GE or Ford, nor a radically “flat” organization such as game developer Valve (whose boss-less employees produced the blockbuster *Portal* game series), TechCo combined aspects of both. The executives maintained a traditional decision-making hierarchy while also instituting a culture of radical transparency for internal communications.

Turco’s first book, *The Conversational Firm*, is based on the year she spent embedded at a fast-growing tech company.

PHOTO: KEN RICHARDSON

In Turco’s words, TechCo separated its “decision rights” from its “voice rights.” Employees weren’t expected to democratically ratify every corporate decision, “like communes in the 1960s where consensus was key,” Turco says. But they weren’t shut out of the conversations that drove those decisions, either. In fact, every employee was invited to participate in them in an ongoing manner, through channels ranging from an internal wiki to all-staff Q&A sessions.

This fusion of decisive control with open-ended communication allowed TechCo to adapt to seemingly paradoxical pressures. For example, the executives resisted instituting a human resources department because they felt it made TechCo operate less like a nimble startup. However, as the company grew to employ several hundred people, workers began demanding more internal clarity and support. “You had this millennial workforce screaming for an HR department, which was not necessarily what I expected to walk into on the first day,” Turco recalls. “The executives didn’t want to do it because they thought it was going back on their commitment to running a non-bureaucratic company. But the commitment employees cared about was to them having voice. And they were using their voices to call for an HR department because they felt it was now necessary.”

Turco believes this conversational mode can improve any organization, not just a tech company—precisely because it allows an organization “to become self-aware,” she says, and therefore become more adaptable to the unexpected challenges and tradeoffs that every company inevitably faces. “A very wrong lesson to take from my research is that ‘if we get a wiki, then we’ll be a conversational firm,’” Turco cautions. “It’s about a genuine commitment to voice and dialogue.” HR department optional. —John Pavlus

## Radical Transparency

**Catherine Turco analyzes a managerial experiment from the inside out**

Catherine Turco investigates social puzzles. This may not be surprising, given that she appears to be one herself. Turco launched her career on a business-world fast track—she ran a thousand-employee company as a Harvard undergraduate, then worked as a technology-focused investment banker at Morgan Stanley—before pivoting to earn her PhD in sociology. Now Theodore T. Miller Career Development Professor and Associate Professor of Work and Organization Studies at MIT’s Sloan School of Management, Turco still describes herself as having a “quantitative mindset,” even while her ethnographic style of research seems to have more in common with Margaret Mead than with Wall Street. “If you think about an anthropologist going off and living in a remote village, I do that inside companies or an industry,” Turco explains. “I try to embed myself in a social world that I want to study as deeply as possible.”

Turco’s first book, *The Conversational Firm: Rethinking Bureaucracy in the Age of Social Media* (Columbia University Press, 2016), is the product

## The Foundation of Democracy

**Bruno Perreau examines challenges to the status quo in his native France**

A specialist in critical theory, gender studies, and French politics, Bruno Perreau examines the messy work of democracy, where majorities rule and minorities fight to be heard.

The Cynthia L. Reed Professor of French Studies and Language in MIT’s Global Studies and Languages section, Perreau particularly zeros in on the political conflict contemporary France has faced over gay marriage, adoption, and bioethics. The mirror he holds up to his home country is not always flattering; nevertheless, the nation has recognized its importance. In 2016, Perreau was named a Chevalier in the Order of Academic Palms, a prestigious award that recognizes exemplary academic contributions to French education and culture.

“Discrimination is constantly changing,” says Perreau, whose most recent book, *Queer Theory: The French Response* (Stanford University Press, 2016), explores the arguments made against gay marriage in France. “You always have to be one step ahead in terms of the legal struggle.”

Perreau writes about political conflict over gay marriage, adoption, and bioethics.

PHOTO: BRYCE VICKMARK

*Queer Theory* builds on a body of research Perreau began as a PhD student in political science at the Sorbonne

in the late 1990s. At the time, France was hotly debating two laws related to gender: civil unions for gay couples and a parity law that requires political parties to nominate equal numbers of female and male candidates. Both debates revolved around the idea that the law should reflect nature, a point that fascinated Perreau. “In the late 20th, beginning of the 21st century, why do we still need to pretend we make decisions that are mimetic of nature?” he says.

To explore this question, Perreau investigated the rules and regulations surrounding adoption, a process that is inherently artificial, yet in France remains centered on imitating biology (the process even takes nine months). “Adoption does not need nature to function,” he says. “[Thus,] adoption makes obvious the fact that any family is a social construct. Even if in some cases indeed it is based on nature.”

The result of this research was Perreau’s 2014 book, *The Politics of Adoption: Gender and the Making of French Citizenship* (The MIT Press), in which he argues that French identity is tied to traditional gender and family roles in a way that makes it challenging to address the issues of minorities, such as gay couples. “The more I delved into studying adoption, the

more I discovered how important this fantasy of nature was in the way France imagined its own identity,” he says.

Perreau examines another aspect of French identity in *Queer Theory*. Noting that protesters of gay marriage characterized the bill as an “invasion” of France by an American academic theory, Perreau says *Queer Theory* points out that “playing the anti-American card” resonated, even though the theory in question is actually rooted in a late-20th-century French philosophical movement called post-structuralism.

What these stories have in common, Perreau asserts, is an “imagined Frenchness” that is monolithic and thus not open to reinvention—an idea that is explored further in *Les défis de la République: Genre, territoires, citoyenneté* (Presses de Sciences Po, 2017), a volume of essays Perreau co-edited with Joan W. Scott on the challenges that minority agendas pose to the French foundational belief in universal equality. The book’s eight contributors address the impact of demands for voting rights for noncitizens, gay rights, and gender parity in access to political office.

The takeaway point, Perreau says, is that efforts to expand the social contract to include new groups challenge the status quo and therefore require new ways of thinking about majority rule—the foundation of democracy both in France and in the United States. “Majority rule is made possible by the principle that supposes that if you delegate your voice, you think your voice will survive in the person to whom you’ve delegated it. If you are a minority, this is not that obvious,” Perreau says. “Something needs to be reinvented.” —Kathryn M. O’Neill

**Efforts to expand the social contract to include new groups, says Perreau, require new ways of thinking about majority rule.**







# Five New Landmarks to Watch for in Kendall Square

The evolution of Kendall Square is the story of a once-thriving industrial strip, turned urban wilderness, turned crucible of innovation. Now, it is home to one of the greatest concentrations of innovative companies in the world, particularly in the biotech and high-tech sectors. Fueled by its proximity to MIT, the neighborhood's connection to the Institute deepened as recently as January, when MIT signed an agreement to redevelop the 14-acre parcel of land on the north side of the square, currently home to the John A. Volpe National Transportation Systems Center. MIT has agreed to construct a new federal building on the site and will acquire and develop the balance of the property in ways designed to benefit both MIT's mission and the Cambridge community.

A rendering of new buildings planned for Kendall Square.

Meanwhile, south of Main Street, MIT is forging ahead with the Kendall Square Initiative: a bold vision to create a greater sense of place for both the Institute and its neighbors and more seamlessly integrate academic pursuits with industry. Seven years in the making, the plan has broken ground and will continue to gather momentum thanks to current and future supporters.

Amid new research and development facilities and retail spaces, five landmarks will stand out on a future walking tour of Kendall Square:

## 1 Graduate residence tower

New residential spaces will give MIT's growing population of graduate students, including those with families (see page 20), a campus home at the nexus of academia and industry. The new residence tower—which will take its place as the tallest building in Cambridge—will feature roughly 450 living units; a host of common areas including study spaces, a playroom, and a terrace; and a new childcare center to benefit the entire MIT community.

## 2 MIT Museum

For 45 years, the MIT Museum has occupied a converted factory on Massachusetts Avenue, from which it has told the story of science and technology through MIT's unique perspective. A new purpose-designed building will provide 200% more programmatic space for the museum, including galleries, classrooms, and meeting rooms. It will welcome the public as a literal and figurative entranceway to the Institute.

## 3 Open space

Three acres of new and repurposed open space will invite the MIT and the Cambridge communities to come together and unwind, connect, and discover. Pockets of activity programmed by MIT—such as an interactive art installation, a participative science experiment, or an invention being tested out by students—will draw in passersby and infuse the area with a vibrant energy.

## 4 Admissions office and forum

The modernized MIT Admissions Office, housed beneath the graduate tower, will be the new face of the Institute for prospective students. Within the same building, the MIT Forum will provide a flexible pavilion for admissions programming, as well as for a range of presentations from the wider MIT and Cambridge community.

## 5 Innovation and entrepreneurship hub

This new hub will house the MIT Innovation Initiative and other key partners in the Institute-wide innovation ecosystem. The top four floors will become open, multiuse spaces for makers and students, researchers and staff—powering the exchange of ideas between the problem solvers of MIT and the broader innovation community of Kendall Square.

# Roadmap for New Residences

MIT has identified the West Garage parking facility (W45) as the preferred site for a proposed new undergraduate residence hall. The project requires permitting and approvals from the City of Cambridge but is tentatively slated to welcome students in fall 2020. "This decision has the potential to place more students closer to the heart of our campus," Chancellor Cynthia Barnhart SM '85, PhD '88 said in a February announcement. "It also presents us with two key revitalization opportunities: to enhance the quality of our housing stock for all students and to further unlock the potential of the Vassar corridor of West Campus."

The Division of Student Life and Office of Campus Planning has convened a New Residences Working Group to help develop conceptual design options for the dormitory. Its efforts are guided by the Architectural Principles Document (APD) completed by another team of students, faculty, and staff in fall 2016 as a road-map for the design, construction, and programming of new and renovated undergraduate residence halls. The APD's key recommendations include designing dorms around a "cluster" of about 30 students and one graduate resident tutor in a mix of single rooms, double rooms, and shared community space. The APD also urges consideration of how the path each resident takes to his or her room intersects with community-building spaces. In addition to enhancing student experience, new housing will provide MIT the capacity and flexibility necessary to continue to address renovation needs in other dormitories. One such project kicks off this summer, when New House (W70) begins a phased renovation.

# The Motivators

Why do thousands of alumni and friends devote their hours to building engagement with MIT? Four standout volunteers explain what drives them.

### INSPIRED BY CLASSMATES: Breanna Berry '12

Throughout my time at MIT, I was able to participate in so many opportunities. MIT Dance Troupe kept me sane. The Electric Vehicle Team taught me important life skills—the willingness to ask for help, the desire to iterate, and how to be involved. However, I need to look no further than Facebook for my inspiration to volunteer. My classmates are my inspiration. To give a few examples, which don't even scratch the surface: Gabe Blanchet '14 cofounded Grove, which helps teach hydroponic farming and makes it easier to grow your own garden at home. Ashli Davis-Polanco '12 cofounded Gique, a nonprofit that inspires STEAM education. Many others are influencing their communities and their networks. MIT is amazing because, while you leave the edifices and the grounds, you get to take lifelong connections with you.

### INVENTING TRADITION: Jennifer Yang '97

I always knew I'd stay involved with MIT, just not to what extent. I was very active as an undergrad—with the Undergraduate Association, Alpha Chi Omega, the track team, even Charm School. During our senior year, a classmate joked, "Why wait five years for a reunion? How about Pi years from now?" Well, the comment stuck, and the class officers thought, "Let's do it!" I chaired the planning committee, and it turned out to be a bigger event than we set out to do. Keep in mind, when we graduated, social media wasn't prevalent, the Internet was nascent, and email was a new thing. The Class of 1997 was the first to ever have a Pi Reunion. Thinking about how the Pi Reunion is now an integral part of the young alumni experience is awesome. We didn't expect this to become a legacy.

"My classmates are my inspiration. MIT is amazing because, while you leave the edifices and the grounds, you get to take lifelong connections with you."

### Breanna Berry '12

### THE DYNAMIC DUO: Doug Bailey '72 and Riccardo Di Capua '72

**BAILEY:** The friendships I formed in my living group, Sigma Chi, the oldest continuous fraternity at MIT, kindled an enduring appreciation of MIT and its community of exceptional people. Those early fraternity bonds have now lasted for nearly 50 years. My collaborator in all things volunteer, Riccardo, is a friend for life as well. He is a true gentleman, a motivator, and someone who can always be counted on to deliver. I hold him in the same regard as if he were my brother, yet I liken him to my father: the humble skill that they both share is the rare ability, when in conversation, to make you feel that you are the most important person in the room.

**DI CAPUA:** Many alums want nothing else to do ever again with their nemesis MIT courses. Instead, I've taken some two dozen MOOCs, mostly in math and physics. When I mention this at alumni gatherings, inevitably, the other person is surprised I would choose to voluntarily take on those courses ever again! Doug and I have had the pleasure of working together over the decades on many MIT volunteer projects. We spend considerable time together discussing overall goals and the right strategy. I've learned that our minds operate identically; Doug and I being "interchangeable" when it comes to anything to do with MIT. A unique friendship and shared experience that's grown over the past decades—and more to come in the future!

MEET MORE VOLUNTEERS  
spectrum.mit.edu/motivators



BRIAN DANIELS

# From MIT to Biotech and Back Again



PHOTO: MARC LONGWOOD

As a high school senior in Skokie, Illinois, Brian Daniels '81, SM '81 was thrilled to receive an MIT acceptance letter in 1977. Decades later, he considers his MIT years a pivotal time in his life. "The rigor and academic demands made MIT exceptional," he says, but the personal dimension was also important. "Forty years later, my MIT classmates are still some of my best friends."

After completing MIT degrees in biology, and nutritional biochemistry and metabolism, Daniels followed his growing interests in biology and medicine to Genentech, then to medical school at Washington University, St. Louis. After training as a rheumatologist/immunologist, he had a 20-year career in biotechnology. He helped develop innovative treatments for cancer, HIV, diabetes, rheumatoid arthritis, and other serious conditions. In 2014, he retired as a senior vice president at Bristol-Myers Squibb. "I've traveled a lot in my professional life," Daniels observes, "and I've seen that MIT is recognized all over the world for excellence."

When asked about the connections between MIT and the biotech industry, Daniels describes the path of powerful ideas, from inspiration to the patient's bedside. "We often focus on final outputs, like new drugs or better medical devices, but before each output there's a long journey." That journey, he notes, requires investment. "It all ties back to basic scientific research and technology advancement," Daniels says, and MIT is making two invaluable contributions: powerful ideas, and individuals trained to develop those ideas to their full potential. "What you learn at MIT is that discoveries are fundamental, but they're not enough. You need both 'mind and hand.' People at MIT have a desire to move things out of the labs and technology suites and make them applicable."

Daniels has found two meaningful ways to remain engaged in MIT education: as a mentor in the Undergraduate Practice Opportunities Program (UPOP), and as a donor. Many of the gifts that he and his wife Paula have made to MIT are unrestricted, a decision based in trust—and experience. "I've managed large organizations," he explains, "and I know budgets are complex. An unrestricted gift provides flexibility to address the greatest need at that point in time. I have full faith in MIT to decide how best to use our gifts."

As a UPOP mentor, Daniels has helped students examine "what good looks like" after graduation. "If you made it to MIT, you've been successful academically. But success after MIT is different. You're working in teams with greater diversity of thought and capabilities, and projects are open ended. It's not simply, 'Here's a problem set and it's due in three days.' You also need skills like management, collaboration, and decision making." Daniels says he has greatly enjoyed working with undergraduates to cultivate those skills.

Today, Brian and Paula Daniels are enjoying semi-retirement in Sonoma, California, which he calls "a great place to live." In 2014, he joined 5AM Ventures as a venture partner, identifying promising new biotech enterprises. "Every day I'm exposed to new science and technologies," he says with satisfaction. "To me, that's lifelong learning." —Kris Willcox

RONALD AND BARBARA CORDOVER

# The Art of Understanding

While a student at MIT, Ronald H. Cordover SB '64, SM '65, PhD '67, an electrical engineer by degree and a lover of science and technology by nature, came to understand the power of art to communicate big ideas to the world.

Ron—who with his wife, Barbara, has given generously to the Institute, including important support for the MIT Museum—shares two relevant anecdotes from his student days. In one, he was a freshman thrilled by the work of M.C. Escher during the artist's 1960 visit to MIT. As Ron recalls, Escher's intricate, mathematically inspired designs generated "an amazingly sympathetic appreciation for graphic art, and the way in which it could help present scientific thought." The Dutch artist would go on to be a meaningful presence in the Cordovers' life. After acquiring a number of Escher's pieces, the couple built a wide-ranging art collection from which they regularly lend works to exhibitions around the world.

In the other reminiscence, Ron describes an educational "aha" moment from his time as a PhD candidate researching atomic spectra under the late visionary physicist Charles H. Townes. Addressing a particularly complex concept, Townes sketched a "beautiful" drawing of the atomic phenomena rather than using words or formulas. This reinforced for Ron the notion "that artistic visualization can be a critically useful element for processing information."

These examples are just two of many, Ron notes, that illustrate how championing the integration of science and art came to be "a kind of purpose" for him and Barbara. Ron is also an overseer at the Museum of Fine Arts, Boston,



PHOTO: JOCK FISTICK

where he and Barbara sponsored an exhibition of a unique 17th-century Flemish cabinet painting that celebrates the moment when science began to replace ancient dogma as the methodology to understand our universe. Additionally, they have provided important support for Science Gallery International, a worldwide network of university-based exhibition centers that aims to excite young people about the intersection of science and art.

Ron and Barbara believe strongly in art as a vehicle for broadening the experiences of students and happily acknowledge that, more than ever, creative activity is flourishing at MIT. To help encourage this development, they established an arts-focused MIT scholarship fund in the 1990s, and are longtime supporters of both the MIT Council for the Arts and the MIT Museum. The latter, Barbara remarks, has continued to perfect its mission, and is a "very special place."

As the museum prepares to move from its current location to a custom-built space in the heart of Kendall Square, part of MIT's expansion and reimagining of the neighborhood, the Cordovers have given a significant gift to contribute to the facility's next chapter. Excited that the museum is poised to become a major presence in the new gateway to MIT's campus,

the couple hope that their gift will enhance what they view as the museum's principal purpose—"to present complex and critically important research in a way that is inspirational for the students and faculty doing the work, and to make it accessible to the public at large."

Barbara, who has a background in fine art and education, notes that in directing their support, she and Ron considered a number of worthy people and projects at MIT but decided that the museum could best realize the spirit of their gift. Ron offers that "if the MIT Museum, in its presence in Kendall Square, can be a beacon to communicate the aesthetic beauty and the inherent relevance of science, it would make us very happy for all who would benefit."

—Tracey Lazos

# Next Steps on the Better World Tour

The momentum continues as alumni and friends come together to celebrate MIT, our vibrant global community, and our mission to build a better world. President L. Rafael Reif has already shared his vision for the future of MIT at community gatherings in New York, San Francisco, Hong Kong, London, Tel Aviv, Los Angeles, Mexico City, and Washington, DC. And that's just the beginning. The tour continues this fall with a stop near home in Boston, then heads west.

PHOTO: BRIAN CHING

9.28.17

## Boston

1.19.18

## Houston

2.20.18

## Seattle

(7)

LEARN MORE, RSVP, AND WATCH FOR NEW LOCATIONS  
betterworld.mit.edu/events-spectrum

QUESTIONS?

alumni@mit.edu  
617.253.8243

## A special invitation for MIT Sloan alumni

Building on the Campaign for a Better World tour, MIT Sloan alumni are invited to join Dean David Schmittlein for additional events that will highlight the school's impact in the world. After gatherings earlier this year in San Francisco, New York, and Boston, MIT Sloan is crossing the ocean this fall:

SÃO PAULO 9.13.17

SINGAPORE 10.16.17

LONDON 12.6.17

(7)

LEARN MORE  
mitsloan.mit.edu/campaign/events



# Spectrum

600 Memorial Drive W98-300  
Cambridge, MA 02139-4822

address service requested

Non-Profit Org.  
U.S. Postage  
PAID  
Cambridge, MA  
Permit No. 54016

[spectrum.mit.edu](http://spectrum.mit.edu)

[betterworld.mit.edu](http://betterworld.mit.edu)

 [@MIT\\_Spectrum](https://twitter.com/MIT_Spectrum)

 [facebook.com/Spectrum.MIT](https://facebook.com/Spectrum.MIT)

## ASSEMBLY REQUIRED.



A group of MIT students came together on campus this winter to construct bamboo bikes—the basis of a community organization the workshop's instructor, graduate student David Wang, founded in Beijing. By working side by side, exploring sustainable materials, and building with their own hands, participants ride away with a greater sense of ownership over their mobility. Bonus: no two frames are the same.



CAMPAIGN FOR A BETTER WORLD