Spectrum

Massachusetts Institute of Technology
Spring 2025

BIG CHANGES COMING TO SPECTRUM

The world is changing — and so are we. We're transitioning to a digital-only format after this issue. Enjoy all the stories about the exceptional work of the MIT community at **betterworld.mit.edu/spectrum**, and please also look out for us in your inbox!

PHOTO: ARTEMISIA LUK

SCIENCE POWERED BY LOVE FOR THE ARTS

Alexa Mallar ’27 connects her work in computer science and molecular biology to a personal passion for visual and performing arts. “I map a diagram in my head of input and output.”

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HEARING THE HUMANITY IN OTHERS

The Center for Constructive Communication designs tools that combine the wisdom of human conversation with digital technologies to promote shared understanding.

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Wide Angle

Subjects

The Human Element

Community Highlights

FRONT COVER
Students participate in an MIT Theater Arts production, *La Vida es Sueño (Life Is a Dream)*, a seventeenth-century Spanish language play. The production incorporated dance as well as technical aspects such as video boards.

PHOTO: TONY LUONG

Spring 2025

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

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"MIT is a community of curious, creative people with a passion for using technology to make a better world—but we also know there are many problems that technology alone can't solve. As we take on the great global challenges of our time, from cancer to climate change, we count on our faculty in the humanities, arts, and social sciences to help all of us, across disciplines and across schools, to ask better questions, arrive at better answers, and prepare our students to explore, synthesize, savor, shape, and thrive in the future that will soon be theirs."

SALLY KORNBLUTH

PHOTO: GRETCHEN ERTL

A Celestial Experience for Undergraduates

It is 3:00 AM at the Teide Observatory in Tenerife, Canary Islands, and a handful of well-caffeinated MIT students are helping to operate a high-powered telescope scanning the heavens for asteroids, exoplanets, and supernovae.

On this island in the Atlantic 180 miles off the African coast, against a dark sky unpolluted by city lights, the Milky Way dazzles.

"Growing up outside New York City and going to school in Boston, I've never had very dark skies, so this is the first time I've seen so many stars," says Kaylee Barrera '26. "Looking up at that every night inspires so much curiosity."

Nine undergraduates from MIT's Department of Earth, Atmospheric and Planetary Sciences spent the entire Independent Activities Period in January participating in an Astronomy Field Camp hosted by MIT and the Institute of Astrophysics of the Canaries (IAC). Also on site were Michael Person '92, SM '01, PhD '06, director of the MIT Wallace Astrophysical Observatory, and a graduate teaching assistant and postdoctoral teaching assistant.

A capstone of the Observational Astronomy Program, the camp allows students to work in a professional astronomical observatory while developing their own research projects.

"The students are using the telescopes during the night and analyzing data during the day, gaining an understanding of the life of an observational astronomer," says Person. "They deal with the weather, they deal with finicky equipment, they have a project and a deadline. At the end they give a presentation to senior faculty at the Institute of Astrophysics of the Canaries."

Much of the work involves photometry, imaging parts of the sky and measuring differences in light emitted from astronomical objects. This year's projects included research into brown dwarfs, celestial bodies larger than a planet but smaller than a star, and the transits of exoplanets beyond our solar system.

"It makes me feel impressed with the grandeur of the creation around us," says Person. "Getting out here and having this experience lets the students know if this is the kind of feeling they want to have in their careers."

The most remarkable thing she saw through the telescope was "definitely" a supernova, or star explosion, says Barrera, adding that her first trip abroad has helped her decide on postcollege plans. "Being here has really solidified for me that I want to go into astronomy research." —Mark Sullivan

The Milky Way galaxy fills the dark sky above Teide Observatory in Tenerife, Canary Islands. MIT students spent three-and-a-half weeks at the Astronomy Field Camp here in January, helping operate MIT's Artemis telescope (left) and the IAC80 telescope (right) while pursuing research projects on astronomical objects.

PHOTO: D. PADRÓN

Unlocking Unique Negotiation Playbooks

TITLE

11.011 The Art and Science of Negotiation

INSTRUCTOR

Bruno Verdini SM ’13, PhD ’15

Bruno Verdini presides over 11.011 The Art and Science of Negotiation, which has become one of MIT's most popular electives.

PHOTO: KEN RICHARDSON

FROM THE CATALOG

Introduction to negotiation theory and practice. Applications in government, business, and nonprofit settings are examined. Combines a hands-on personal skill-building orientation with a look at pertinent tactical and strategic foundations. Preparation insights, persuasion tools, ethical benchmarks, and institutional influences are examined as they shape our ability to analyze problems, negotiate agreements, and resolve disputes in social, organizational, and political circumstances characterized by interdependent interests.

CLASS STRUCTURE

“11.011 was probably the most valuable, impactful educational experience I’ve had at MIT,” says Nicolas Stone Perez ’25, a double major in 6-14 (Computer Science, Economics, and Data Science) and 15-1 (Management). “It has a magical reputation on campus. And it still exceeded my wildest expectations.”

Since lecturer Bruno Verdini SM ’13, PhD ’15 began teaching the class in the Department of Urban Studies and Planning in 2016, 11.011 has become one of MIT’s most popular electives, with hundreds of students applying and a lucky few admitted by lottery. In class, they conduct live negotiations with their peers, compare tactics across debriefs, reflect through written journal entries, and prepare with readings that include political speeches, court cases, and psychological studies.

Students linger after each class for unofficial coaching with Verdini and the teaching assistants, and it's that kind of mutual care and attention, according to Stone Perez, that makes the class so special. His experience in 11.011 led him to become one of the teaching assistants for the class and to enroll in 11.111 Leadership in Negotiation: Advanced Applications, another lottery-enrollment course which Verdini created in 2018 in response to students' desire to continue building their skills.

Class size is capped at 42, so students interact with each other multiple times, becoming more skillful as they apply their insights to real-world negotiations.

"The professor and teaching assistants aren't trying to give the students a playbook for how to negotiate," says Stone Perez. "It's the teaching team's goal to empower students to unlock better versions of themselves and develop their own unique negotiation playbook."

Knowing what you stand for

Verdini received the Institute's first-ever interdisciplinary **PhD** in negotiation, communication, diplomacy, and leadership in 2015. "I had fallen in love with these four fields because they ask for a full presence," he says. "You can't negotiate or lead effectively if you don't know what you stand for, and you can only figure out what you stand for if you're committed in a lifelong process of self-discovery and curiosity about oneself and each other."

During his PhD, Verdini was mentored by Melissa Nobles, former head of the Department of Political Science and current MIT chancellor, and Lawrence Susskind MCP '70, PhD '73, the Ford Professor of Urban and Environmental Planning, who is widely known as one of the founders of modern mediation practices.

Verdini had planned to continue his international diplomacy work after his PhD, but was invited to teach 11.011, which was founded in the 1980s. Its current breakthrough popularity is the result of Verdini's emphasis on tailored coaching and his multifaceted approach, sharpened through collaborations with decision-makers from over 80 countries, to the challenges of our times—and, as he puts it, the trust he places in MIT students to thrive when they are given the responsibility to put an equal focus on ethics and spirituality as on strategy and influence.

"I began my PhD thinking I would continue with international diplomacy work. And I do that, just not on behalf of any specific nation, but instead on behalf of a set of universal skills and virtues," he says. "I've found that when you lead a pedagogical mission, you are in the ultimate ambassador role, partnering with stakeholders to spark ways to unearth what they come to see as the very best of themselves."

The world you want to build

Moeen Razzaque, a Harvard student majoring in electrical engineering who has cross-registered in many MIT classes, wasn't sure what to expect in 11.011. "When I first encountered negotiation, I thought of what happens in hostage situations or a marketplace," he says. "But I've come to understand that negotiation is everywhere, since it's all about how we create the most value out of our differences. As I navigate the next chapter of my life, I'm trying to be conscientious and take classes that help me understand what kind of world I want to build solutions for—11.011 is the culmination of that."

Maya Makarovsky '25, a 6-14 and 15-2 (Business Analytics) double-major, traveled to Ghana as part of an MIT project after taking 11.011 and immediately saw how the course had "altered [her] brain chemistry" for the better. One example: in the midst of passionate, defensive arguments in a business meeting, she was able to steer the discussion back to a more productive place.

"Before speaking, I took a moment to think of how to create value through our different interpretations of reality, and how we could convert an adversarial critical stance to one of mutual respect to work towards progress," she says. "11.011 empowered me to step back in the heated situation and think about what I should prioritize for all stakeholders involved, which was the long-term success of the project rather than short-term ego defense."

That consideration extends to those who do not have a seat at the negotiating table. "Even though you have your own ambitions and values, you want to genuinely consider others affected by the negotiation as well," says Stone Perez. "Whether you're launching your startup, joining a new company, or deciding to run for public office—or even just in your personal **relationships**—you must have moral clarity about how to manifest your voice." –Joelle Carson

A member of the MIT varsity soccer team, Stone Perez sees parallels on the pitch, too: every pass to a teammate is a negotiation "because you're looking for connection, thinking ahead, trying to get them to go somewhere new—somewhere that will produce a better outcome for them and the team as whole."

S.2025

The Human Element

True innovation pushes past technology to encompass the full complexity of the human experience. AT MIT, world-class scholars in the humanities, arts, and social sciences, and researchers from across engineering and other science disciplines, understand the importance of broad perspectives and human-centered discovery in solving some of the world's most important problems. Every technological solution has a human impact, and MIT students learn to always consider the human element of their work.

Clockwise from left: Graduate student Joseph Ntaimo '23 designs digital instruments for newbies; students participate in 11.011 The Art and Science of Negotiation; MIT's Theater Arts Program prepares students to create in new ways; Katherine Hobgood '25 experiences the world through MIT International Science and Technology Initiatives.

PHOTOS, CLOCKWISE FROM LEFT: COURTESY OF JOSEPH NTAIMO, KEN RICHARDSON, TONY LUONG, COURTESY OF KATHERINE HOBGOOD

Supercharging Human-Centered Thinking

Agustín Rayo PhD '01, the Kenan Sahin Dean of the MIT School of Humanities, Arts, and Social Sciences, talks about the creation of the new MIT Human Insight Collaborative and the value of research and teaching that is deeply informed by human understanding

Can you talk about the impact the School of Humanities, Arts, and Social Sciences (SHASS) has at MIT, which is primarily known for its focus on STEM?

To implement emerging technologies, like AI, in thoughtful and meaningful ways, we need knowledge of policy, economics, and ethics. More generally, if you want to make the world a better place, you need to understand how it works. And that requires understanding the full social, economic, political, ethical, human implications of the challenges of our day.

These are human challenges. And that's what SHASS is all about.

At MIT, we also value human-centered research for its own sake. We want our students to become citizens of the world. We want them to think about the best way to live, to experience the agency of artistic creativity, to gain an understanding of shared human history. We want them to discover the profound beauty of poetry and be inspired by philosophy. We want them to be their whole selves.

This is an exciting time for the humanities, arts, and social sciences on MIT's campus, with the launch of the MIT Human Insight Collaborative (MITHIC). How was the initiative conceived, and what did it take to make it a reality?

MITHIC is a way of supercharging human-centered thinking at MIT. It is meant to elevate human-centered research at MIT and is premised on the idea that our ability to impact the world's greatest challenges depends not only on the development of extraordinary new technologies but also on the ability to implement those technologies successfully—and that successful implementation requires a moral compass and an understanding of societal issues.

Something that's important to me is that MITHIC is not a SHASS initiative. Instead, it's a collaboration between SHASS and School of Engineering Dean Anantha Chandrakasan, in his role as MIT's chief innovation and strategy officer. That makes all the difference, not only because Anantha is a great person to work with, but also because it sends the message that all of MIT, not just SHASS, cares about human-centered thinking.

How can alumni and friends of the Institute support MITHIC?

We were able to launch the pilot phase of MITHIC thanks to support from all five MIT schools, the MIT Stephen A. Schwarzman College of Computing, and the Office of the Provost, as well as the generosity of alumni and friends who share a belief in the importance of human-centered thinking at the Institute, in terms of both research and education. Philanthropy will be critical to the program's success. With seed funding in place, we are now striving to secure additional support, including building an endowment to ensure the program can thrive and grow in years to come. We're happy to meet with alumni and friends who might want to learn more and explore how they can support this exciting effort.

Can you share your thoughts about the importance of input from the humanities, arts, and social sciences on evolving, transformational technologies such as AI?

In their new book, *Power and Progress: Our 1,000-Year Struggle over Technology and Prosperity* (Penguin Press), Nobel-prize winning MIT

PHOTO: JARED CHARNEY

economists Daron Acemoglu, Institute Professor, and Simon Johnson, the Ronald A. Kurtz Professor of Entrepreneurship, argue that the impact of AI on society is largely up to us. We can shape the development of AI so as to enhance human jobs, making AI a tool for social good, or we can shape it in a way that replaces human jobs, making AI a cause of inequality.

I think Daron and Simon are right about this, and it's important to me that MIT be not just at the forefront of AI technology, but also at the forefront of understanding what it takes to make AI a tool for societal good.

What do SHASS faculty find to be unique about teaching at a leading STEM university? Some have mentioned in interviews with us that they find the approach of MIT students to course material to be fascinating because they tend to analyze things differently than students who are more steeped in the social sciences.

Teaching at MIT creates extraordinary opportunities for collaboration.

Consider my anthropology colleague Manduhai Buyandelger, who teamed up with nuclear scientist and MacVicar Faculty Fellow Mike Short '05, PhD '10, SM '10 on a student experience aimed at addressing coal pollution in Mongolian households. Mike and his students are testing molten salt thermal batteries that can replace coal-burning stoves as a heat source for dwellings in Ulaanbaatar. In parallel, Manduhai and her students are working on understanding the social context that will determine whether the new technology is likely to be adopted by the relevant population.

Tell us about the new Edward and Joyce Linde Music Building.

The Linde Music Building is nothing short of extraordinary! It's located in the heart of campus—right next to Kresge Auditorium—and its opening in February 2025 marked the beginning of a new era for music at MIT.

It will house our new Music Technology and Computation graduate program [see story on page 11], and it has a rehearsal venue designed specifically for our World Music ensembles. It also has a state-of-the-art concert hall, which seats 390 people—I believe it will have the best acoustics of any concert hall of its size in the United States.

Oh, and the building is absolutely gorgeous. I hope you have a chance to visit next time you're on campus!

give

SUPPORT THE MIT HUMAN INSIGHT COLLABORATIVE AT
giving.mit.edu/mithic

"The decision to adopt the name 'Human Insight Collaborative' reflects our focus on the core value these disciplines bring — fostering creativity, inquiry, and understanding, and amplifying our impact on global issues such as climate change, AI, pandemics, poverty, democracy, cybersecurity, and more."

ANANTHA P. CHANDRAKASAN
CHIEF INNOVATION AND STRATEGY OFFICER
DEAN, SCHOOL OF ENGINEERING

MIT Human Insight Collaborative Faculty Leadership

MITHIC — which incorporates three funds that will support projects over three years plus Faculty-Driven Initiatives to build community and scholarship — is co-led by faculty from across the Institute.

Faculty Lead

Keeril Makan, associate dean, School of Humanities, Arts, and Social Sciences, Michael and Sonja Koerner Music Composition Professor

SHASS+ Connectivity Fund Cochairs

David Kaiser, Germeshausen Professor of the History of Science and professor of physics

Maria Yang '91, deputy dean of engineering, Gail E. Kendall Professor of Mechanical Engineering, Margaret MacVicar Faculty Fellow

Humanities Cultivation Fund Cochairs

Arthur Bahr, professor of literature and Margaret MacVicar Faculty Fellow

Anne McCants, Ann F. Friedlaender Professor of History, director of the Concourse Program, Margaret MacVicar Faculty Fellow, and SHASS Research Chair

SHASS Education Innovation Fund Cochairs

Eric Klopfer, professor of comparative media studies/writing, director of the Scheller Teacher Education Program and The Education Arcade

Emily Richmond Pollock, associate professor of music, Margaret MacVicar Faculty Fellow, and SHASS Undergraduate Education Chair

Faculty-Driven Initiatives Cochairs

Fontini Christia, director, Institute for Data, Systems, and Society; Ford International Professor of the Social Sciences; chair, doctoral program in Social and Engineering Systems, MIT Stephen A. Schwarzman College of Computing

Caspar Hare, associate dean for Social and Ethical Responsibilities of Computing, MIT Schwarzman College of Computing; professor of philosophy, Margaret MacVicar Faculty Fellow

JULIE A. LUCAS, VICE PRESIDENT FOR RESOURCE DEVELOPMENT, TALKS ABOUT WAYS ALUMNI AND FRIENDS CAN SUPPORT MITHIC.
See page 19.

Mens et Manus et Music

A tour of the new Edward and Joyce Linde Music Building

At MIT, music rehearsal rooms have long peppered academic hallways and taken over corners of dormitories, with fliers for student recitals and lectures from visiting masters reliably fluttering along the Infinite Corridor. More than 500 student musicians participate in one of 30 ensembles, chamber groups, or advanced music programs on campus in any given semester—and that's not to mention the more than 1,500 students enrolled in music classes each semester, or the elite musician-scholars in the Emerson/Harris Program for Private Study.

Stray musical notes in non-soundproof spaces may delight passersby, but such conditions can be difficult for musicians—and their neighbors. Similarly, lack of specially designed space for large instruments and music technology equipment has been a challenge on campus.

Now, students, faculty, and appreciators of the arts have their own "clean lab" purpose designed for music-making that provides much-needed musical spaces: the Edward and Joyce Linde Music Building (W18). The building officially opened to the MIT community in February 2025.

MIT chose Kazuyo Sejima + Ryue Nishizawa / SANAA, a Tokyo-based architectural firm, due to their reputation for creating beautiful buildings with special attention to acoustics. The SANAA team consulted with renowned acoustics consultant Yasuhisa Toyota, founder of Nagata Acoustics International. In the new music building, MIT has not only created a place for students to learn and practice together, but also to facilitate further connections. Thoughtfully designed spaces—many of which are supported by generous gifts from MIT alumni and friends—encourage collaboration and friendships through the study, performance, and appreciation of music.

Thomas Tull Concert Hall

With its impeccable, adjustable acoustics and adaptable staging capabilities, the Thomas Tull Concert Hall is the most advanced music teaching and performance space that the Institute has ever constructed. Seating 390 audience members, the hall is the new premier space for musical performance at the Institute.

Beatrice and Stephen Erdely Music and Culture Space

Music and Culture programming at MIT is increasingly popular, including the hands-on workshops for the many sections of 21M.030 Introduction to World Music, one of the music classes with the highest enrollment rates. The program's larger and rarer instruments, such as the Balinese gamelan and drums used by the Rambax Senegalese Drum Ensemble, now have a permanent and more easily accessible storage area in the Music and Culture Space.

Jae S. and Kyuho Lim Music Maker Pavilion

Classrooms, rehearsal spaces, and technical spaces in the Jae S. and Kyuho Lim Music Maker Pavilion, where students will develop state-of-the-art production tools, software, and musical instruments, are outfitted to create a nearly ideal sound environment. A research lab supports the hybrid exploration of music and computation, and a makerspace is outfitted for hands-on construction and rapid prototyping of hardware, facilitating further interdisciplinary collaboration. A recording studio, a new resource for the MIT campus, is also in the building, offering professional-level recording for all types of instruments and ensembles.

Analog Devices Lobby

The lobby that unites the three building sections is a venue for everyday interactions as well as a spacious, light-filled venue for events. This entry point extends a welcome to MIT and the broader community, whether they are seasoned musicians or those newly discovering the power of the arts. "For the students rehearsing and performing, or the students who compose music, or for the students who will develop the hardware and software that engineers will use to produce music, the problem-solving inherent in those activities is very similar to what they do in STEM. Both are creative processes," says Keeril Makan, associate dean for strategic initiatives for the School of Humanities, Arts, and Social Sciences and former head of the Music & Theater Arts Section. "Having this building, right in the middle of our campus, makes it clear that this centering is important to MIT and its mission." —Joelle Carson

PHOTO: GRETCHEN ERTL

Music and Tech Intertwined

Graduate program in music technology and computation brings new dimension to interdisciplinary offerings

An architect, a singer, and a multimedia composer walk into a music technology and computation classroom … can you guess their final group project topic?

Hint: The class is 21M.569 Algorithms and Interactions in Human-AI Partnerships, which debuted in fall 2024 and will be offered in the new, multidisciplinary MIT Music Technology and Computation Graduate Program. Its instructor is Anna Huang SM '08, the Robert N. Noyce Career Development Professor of Music & Theater Arts and Electrical Engineering and Computer Science. Huang is also a composer who created the machine-learning model Coconet that powered the Bach Doodle, Google's first AI-powered doodle (an interactive variation of the Google logo on its homepage), in 2019.

If you guessed that the final project in question explored ways to use the human body as an instrument in both physical and virtual machine-learned spaces, you'd be right. The possibilities for unique research and composition pathways like that, says Huang, are part of what makes the Graduate Program in Music Technology and Computation so exciting—and why it's nearly impossible to anticipate the dynamic work that students will produce.

Eran Egozy '93, SM '95 and Anna Huang in the Thomas Tull Concert Hall.

PHOTO: SIMON SIMARD

A rare, dedicated music technology program

An interdisciplinary collaboration between Music & Theater Arts and the School of Engineering, the program includes two tracks toward a master's degree: one as a fifth-year master's for MIT undergraduates, which will begin study in fall 2025, and one open to all applicants beginning in fall 2026. "There's been a long tradition of musicians working with computers, figuring out how to digitally sample and mathematically create new sounds," says Huang, who holds a shared faculty position between the MIT Music & Theater Arts Section and the MIT Stephen A. Schwarzman College of Computing. But music technology extends beyond using computers to synthesize sounds.

"We also teach machines to listen, so that they can jam with other musicians and respond to what they're playing, respond to the musicians they are working with," she says, noting her time as a student at the MIT Media Lab, where she worked with Professor Emeritus Barry Vercoe, a pioneer in digital audio processing, in his Music, Mind, and Machine Group. Eighteen years later, Huang has started a new research lab at MIT called Human-AI Resonance (HAI-Res, pronounced "high res"). "My current research focus is interaction-driven generative AI. I'm interested in thinking about creativity not through imitation, but as a collaborative process where creative ideas emerge through human-AI interaction," she says. As a composer, she writes both acoustic and electronic music and plays multiple instruments, including the guzheng, a table harp also known as a Chinese zither.

Not many universities have a dedicated music technology program, more typically employing one or two faculty members with area expertise. "Now students will be coming to MIT *because* music tech is their center of focus," she says. "Having that support from MIT is exciting—there are very few universities with this kind of space for music technology and computation."

Eran Egozy '93, SM '95, professor of the practice, looks forward to building the music technology faculty with more multidisciplinary experts like Huang and attracting applicants with unique interests. "We're getting inquiries from potential applicants who are musicians or composers and also have a strong technical sense and computational knowledge," he says. "It will be super cool to see what those people can do when they're on campus, and how it changes the musical and research landscape here."

A musical foundation

"Even before this program started, undergraduates who took my music technology class would oftentimes tell me it's been their favorite class at MIT so far, and I think that's because it employs both sides of their personalities," Egozy says. He had a similar experience as an undergraduate at MIT. While music technology courses were not regularly offered at that time, his experience with musical instruction and music technology at the MIT Media Lab paved the way for him to cofound Harmonix Music Systems, which created the groundbreaking technology behind the video game franchises *Guitar Hero* and *Rock Band*.

He stresses that the strength of the existing music courses and faculty members is what makes it possible to build a high-caliber program, and that the resources in the new Edward and Joyce Linde Music Building create a strong base for the program. Huang appreciates the sense of community in the music building as well. "It's great to be back on campus again, and the social experience with students and colleagues in the new building, even just being able to just walk down the hallway and see who's there and what they're working on, is a big part of that," she says.

The music technology labs and acoustically advanced performance spaces in the new building, Egozy says, in addition to MIT Schwarzman College of Computing and School of Engineering facilities, will be critical to the new program. "The foundation for this new graduate program is music, and adding technology creates exciting new areas for research," Egozy adds. "That's why MIT is the right place. It has both ingredients." —Joelle Carson

Digital Instruments for Musical Togetherness

Engineering graduate student Joseph Ntaimo ’23 builds instruments that “empower people to jam with each other”

Joseph Ntaimo ’23 places a plywood box on his lap. Inside, there’s a colorful array of wires and small computer chips. The top of the box holds four white ridges, each draped with metal strings. When Ntaimo plugs a power cable into the box, red and white LEDs illuminate the ridges. He touches the strings and a transcendent choral sound, akin to a full-bodied digital organ, fills the air.

This is Ntaimo’s “capaci-harp,” a digital instrument he created for 21M.370 Digital Instrument Design during his senior year, inspired by the church music he heard growing up in College Station, Texas. The instrument works through capacitive sensing; charge is stored when someone touches the conductive strings, is measured, and is converted to a sonic output.

Today, as a graduate student in mechanical engineering (MechE), Ntaimo prototypes actuators and motors in the Precision Motion Control Laboratory. He’s trying to improve upon traditional electromagnetic designs to create “better actuators that do more with less.” When Ntaimo was an undergrad, his now advisor, Professor David Trumper, encouraged him to pursue a graduate degree. “He’s really pushed me to become a better engineer,” says Ntaimo.

In addition to that work, he designs digital instruments with the goal of making it easier for a newbie or less practiced artist to perform and produce compelling music. “I want to empower people to jam with each other,” he says. “But to generate music and express yourself, to get to that extension-of-my-body level of expression, tends to take five to 10 years of playing consistently.” He notes the challenges of playing Western music, such as being in the right key—a different framing from a traditional Eastern approach to composition—and music sight-reading abilities.

With the capaci-harp, Ntaimo has reduced the number of possible notes and chords to those of basic Western scales. The result is an instrument that can be picked up and played fairly proficiently in little time.

Ntaimo began his musical journey in the fifth grade when he took up the violin in school. The novelty of being able to make a new kind of sound engaged him, and he stuck with it. Arriving at MIT as an undergraduate, though, he planned to focus on robotics. That’s because in high school, “I spent comical amounts of time in my friends’ parents’ garages just building robots and taking them apart,” says Ntaimo. “I’ve had an affinity for making and breaking things for most of my life.” By freshman year in high school, he was leading a 10-person robotics team. In fact, it was during a robotics competition that he received his acceptance email to MIT.

Ntaimo did take several robotics courses as an undergraduate MechE major. He also took music classes, played in the MIT Symphony Orchestra, and became a respected DJ on campus, routinely mixing pop songs with lesser-known international genres like Brazilian funk and South African amapiano.

He named his self-designed undergraduate major musical robotics. Ntaimo learned how to make sound-reactive LEDs, the precursors of what appear on his capaci-harp, and created the Ferro-Instrument, which produces music when it’s fed sound from another source. This sound can then be manipulated and bent. No sheet music required, just reciprocity. For all of his music projects, “you need math,” he says.

Ntaimo has found MIT to be the perfect place to blend his interests in engineering and music. “As a budding instrument designer, I have access to people who are really good at what they do, and they’re excited about applying that to something new,” he says. In addition, when he takes a class in something like digital signal processing or human-computer interaction, Ntaimo can immediately feed that back into his instrument design process.

Perhaps most importantly, Ntaimo says there’s a real appreciation of music at MIT, which means he doesn’t just have people helping him build his new instruments. He also has people in the audience eager to hear him play. —Ari Daniel PhD ’08

PHOTO: COURTESY OF JOSEPH NTAIMO

The Language of Belonging

Faith Baca ’25 finds her passion in linguistics and AI

PHOTO: SARAH BASTILLE PHOTOGRAPHY

Faith Baca ’25, double-majoring in linguistics and mathematics with computer science, aims to put AI to work for people who are marginalized in society. “AI is a powerful tool that has left underserved communities without representation, and I want to change this,” says the senior from Denver, Colorado, a recipient of the Ashar Aziz Mens et Manus Scholarship. Baca has designed lessons for heritage learners of the Passamaquoddy language in Maine, and helped develop automatic speech recognition for Indigenous communities in North America. She is also developing ways to conduct the Maze task, a word-by-word reading test commonly used by researchers to gauge language processing, in Spanish. Through the English for Speakers of Other Languages Program, she has taught English classes for custodial staff, which she describes as “one of the most rewarding and fulfilling experiences” she has had at MIT, “as well as the most fun.”

Can you talk a little about your work with Indigenous languages?

A research project I’ve been involved with is the First Languages AI Reality initiative, which was created out of a project funded by MIT Solve, and aims to develop automatic speech recognition technology for Indigenous languages. Since large language models and automatic speech recognition technology require tons of data to train, many communities just don’t have the resources to contribute to that amount of data. So we’re trying to help them build their own resources by creating an app that works a little bit like Duolingo and keeps data in the hands of the communities.

I also have done research under [MIT linguistics] Professor Norvin Richards PhD ’97 with the Passamaquoddy community in Maine, investigating what sort of approaches work best for young learners of the language. I helped develop lessons that will be used with kindergartners and young school-age children who are heritage learners of the language.

We went up to Maine and I did some elicitation sessions with the elders. I had to jump in the deep end because I didn’t really know anything about the language before, and I had to be able to transcribe and listen to what they were saying. That was a big challenge. I can’t speak Passamaquoddy fluently, but I can read and get an idea of some of the words.

How has your life story inspired your interest in language?

Language is an integral component of identity. I think I realized that from a really young age. My grandparents spoke Spanish as a first language, but were punished in school for speaking it. I’m of mixed heritage, and part of my family is Indigenous to Colorado and New Mexico. Our Indigenous language was not passed on, which was a colonial tool that was used against many communities. I realized early on that language is a form of resistance and also a source of pride. Learning your heritage language is a way to connect with the community and find belonging. I think that’s a really beautiful thing.

What’s your favorite place at MIT?

I really like the Banana Lounge. There’s something about the vibe, with the dim lights and the plants, and you can always go get some bananas. I like studying and hanging out there. It’s very chill.

What’s an interest you’ve discovered since coming to MIT?

When I was in middle school, my mom had me taking lessons in Latin dance, which I didn’t appreciate enough at the time. I got involved in it again through the MIT Latin Dance Club, and really enjoyed performing. I definitely want to stay involved with dance in the future.

What are your plans after graduation?

I’m currently in the midst of applying to PhD programs. I’m honestly really excited for whatever’s coming. I look at it as if the world’s my oyster and there are lots of different opportunities.

How has the Ashar Aziz Mens et Manus Scholarship made a difference in your life?

I don’t even have the words to describe how grateful I am for that support. I come from a single-parent, low-income household, and I wouldn’t have the opportunity to study at MIT if it weren’t for a scholarship. The first thing that comes to mind is an overwhelming sense of appreciation. Knowing someone recognizes your resilience and hard work and potential and sees beyond your struggles is really inspiring. —Mark Sullivan

"Giving workers more information about their market worth really changes their behavior," says Nina Roussille.

Understanding Workplace Inequality

Nina Roussille uses economic tools to examine disparities in pay and career advancement

While it's a fact of the workplace that women earn less than men, the question remains: Why? Some economists have speculated that women are inherently worse at negotiating or fear they won't get a job or promotion if they advocate for higher pay. Nina Roussille, the Gordon K. Lister and Donald K. Lister Career Development Assistant Professor of Economics, has a different explanation: They simply don't know how much to ask for. "A lot of the story I've been trying to tell is about information—that misperceptions or incorrect beliefs or lack of information have played a big role in labor market inequality," she says.

In a 2024 paper published in *The Quarterly Journal of Economics*, Roussille examines the so-called ask gap in gender pay inequality. Analyzing women's salary requests for software engineer jobs on an online platform, she found that on average they asked for 2.9% less and were offered 2.2% less than men. When supplied with the median offer salary, however, the ask gap fell to zero—showing that women requested the same as men. "At least in the context of software engineers, it looks like when women are told what men are requesting, they are going to match it," she says. "What was missing was information."

Knowledge is power

Roussille has always been sensitive to questions of inequality; she grew up in the French city of Marseille, which lags behind other parts of the country economically. "I saw a lot of brilliant and motivated people around me held back by their circumstances," she says. "I was animated early on by the sense that this wasn't fair." She originally studied for a master's in finance, but found the topic uninspiring. After transferring to the Paris School of Economics and studying economic inequality with social economist Thomas Piketty, she went on to earn a PhD at the University of California, Berkeley. "I realized economics is not just supply and demand curves," she says, "but has something important to tell us about the world and its socioeconomic problems."

Joining MIT's renowned economics faculty in 2023 after a postdoctoral appointment at the London School of Economics, Roussille says she was "at first, a little intimidated! But what prevails," she adds, "is a mix of admiration and gratitude for their supportive and dedicated mentoring."

In another recent study, she looked at the role of information in perpetuating inequality more broadly. Studying a group of German workers, she found that they routinely discounted what they could make by switching jobs, expecting only a 1% raise on average when they could potentially attain a 10% increase. She concluded that workers anchor their beliefs about the wage they could make at other employers on their current wage,

PHOTO: COURTESY OF NINA ROUSSILLE

rather than gaining a broad understanding of the wages in their field. This keeps workers in low-paying firms from searching for other jobs, giving firms the power to keep wages artificially low.

Just as with the gender study, she found that when workers were given information about the median salaries in their field, it corrected their perceptions about wages in the market and their job search intentions, making them more likely to seek a new position or negotiate their current salary. "Giving workers more information about their market worth really changes their behavior," says Roussille. She is encouraged by new transparency laws in more than a dozen US states that require employers to include a range of salaries in job postings, giving workers information with which to negotiate. "It's a bit early to make definitive statements but, from early evidence we have, it seems to work," she says.

Global research

Roussille has recently been examining gender inequality in South Asia. Countries such as Pakistan and India have seen low levels of female participation in the workforce (around 25%), even as the percentage of college-educated women has steadily increased. "When we survey them around graduation, most women intend to work, but when we track them later, very few of them have a job," Roussille says. "It's a huge loss for those countries." Right now, however, the reason is unclear. Does it have to do with incorrect beliefs that women hold about the labor market or are firms discriminating against them? Roussille is collecting her own data and applying tools across several economic fields in search of answers. —Michael Blanding

Golden Age of MIT Economics

The MIT Department of Economics is in the midst of a golden age of research, with six current faculty in the past 14 years winning the most coveted award in the field — the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, otherwise known as the Nobel Prize. With only three dozen total members, the department punches far above its weight, making vital contributions in a range of research areas that include labor markets, global development, and contract law. Three former economics faculty who won the award while serving at MIT bring the total medal count to an astonishing nine. Distinguished winners include:

Peter Diamond PhD '63 (2010)

There's the way the job market functions in theory, and then there is the reality. Institute Professor Emeritus Peter Diamond helped develop models to explain how "search frictions" affect how unemployment, job vacancies, and wages function in the real world, and how labor policy can help individuals and employers get their needs met.

Bengt Holmström (2016)

Contracts are essential in so many aspects of society, defining terms of cooperation and minimizing uncertainty. Professor Emeritus Bengt Holmström developed crucial theories analyzing how contracts work, as well as how they might be optimized for all parties. His work has impacted the way people design and govern companies and other institutions.

Abhijit Banerjee and Esther Duflo PhD '99 (2019)

Pioneers in the field of developmental economics, Esther Duflo and Abhijit Banerjee have conducted innovative field experiments to shed new light on a variety of global development issues — including poverty, health care, education, and agriculture. Now the Ford Foundation International Professor of Economics and the Abdul Latif Jameel Professor of Poverty Alleviation and Development Economics, respectively, they've put theory into practice by cofounding the Abdul Latif Jameel Poverty Action Lab, alongside Professor Sendhil Mullainathan (see story on page 21), in 2003, and developing programs over the years to alleviate poverty and disease around the world.

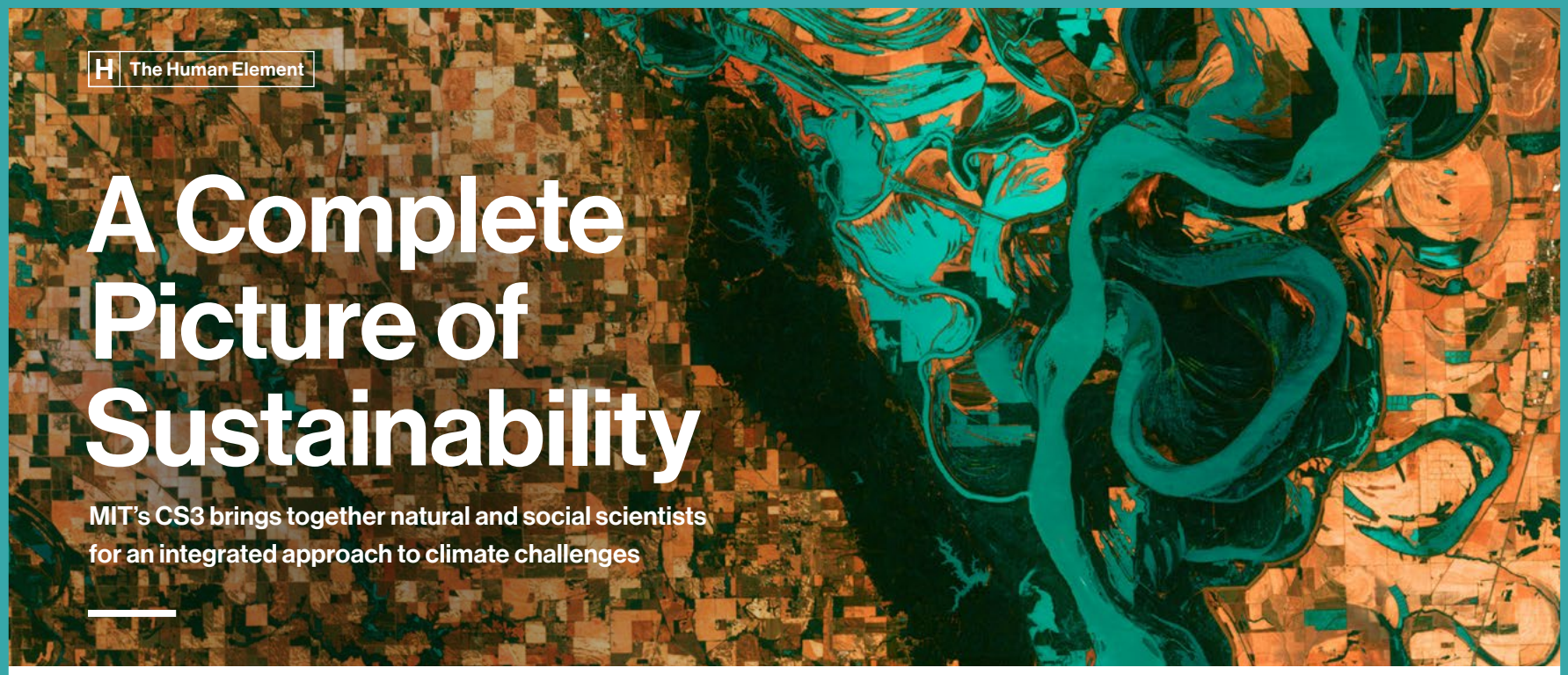
Joshua Angrist (2021)

Natural experiments, in which groups of people are studied in real-world situations rather than laboratory testing, are a crucial tool in economics. Ford Professor of Economics Joshua Angrist helped develop a new methodology for such experiments that better illustrate how people's participation in programs around employment and education cause different outcomes in their lives and allow economists to draw conclusions about the effects of government policy in complex situations.

Daron Acemoglu (2024)

The most recent economics faculty member to join the Nobel Prize ranks, Institute Professor Daron Acemoglu researches global economics history. Winning the prize along with Simon Johnson PhD '89, the Ronald A. Kurtz Professor of Entrepreneurship at the MIT Sloan School of Management, Acemoglu has examined the history of colonization to demonstrate how the strength of societal institutions can affect a country's prosperity, demonstrating the importance of democracy and inclusivity to worldwide economic growth. —Michael Blanding

PHOTOS (ACEMOGLU, BANERJEE, DUFLO, AND HOLMSTRÖM): BRYCE VICKMARK



A Complete Picture of Sustainability

MIT's CS3 brings together natural and social scientists for an integrated approach to climate challenges

In a complex age, the challenges faced by our planet require innovative research and informed decision-making that account for impacts on humans as well as on the environment—whether it's pressure on land and water for food production, the effect of increased emissions on health and climate change, or the social injustices experienced by those who bear the highest burdens. Conflicting interests and the urgent need for rapid action and collaboration make solutions difficult, but they also inspire significant innovation. The newly launched MIT Center for Sustainability Science and Strategy (CS3) aims to address these challenges in a holistic way.

"There's a growing realization at MIT that in order to understand the world we live in, which is very much a goal of science, we can't just think about the Earth in the absence of humans who are living in it," says inaugural faculty director Noelle Selin, a professor in MIT's Institute for Data, Systems, and Society and in the Department of Earth, Atmospheric and Planetary Sciences. "By modeling natural and societal systems in their full complexity, we can obtain a more complete picture of the Earth system—one that provides a more robust basis for decision-making."

Political science, human behavior, technologies

Aligned with MIT's Climate Project, CS3—which is also led by deputy directors and senior research scientists Sergey Paltsev and C. Adam Schlosser, and executive director Anne Slinn SM '91—harnesses interdisciplinary expertise to advance research, develop and leverage new methods of computing and data, and drive global engagement in strategies that help government, industry, and civil society make environmentally and economically sound choices for sustainable development. The initiative unites the work of the former MIT Center for Global Change and the former MIT Joint Program on the Science and Policy of Global Change. Under the leadership of TEPCO Professor of Atmospheric Science Ronald Prinn ScD '71, those initiatives pioneered an interconnected approach to environmental and human systems over more than three decades.

"Expertise is needed across a broad range of social sciences as well as natural sciences and engineering to truly get the picture of this integrated system that we're studying," says Selin. "It's not just economics anymore. It's political science, human behavior, and technologies. It's thinking about how decisions are made, how the Earth system reacts, and then how people react in turn to that."

Community of sustainability scholars

CS3, which hosted the 47th Global Change Forum in March 2025—a gathering of 100 invited representatives of industry, government, nongovernmental organizations (NGOs), policymaking bodies, and research groups—is a community of students, faculty, and researchers focused on comprehensive sustainability science research and its global and regional applications. It also builds on the Institute's strengths in areas like machine learning and AI to address complex sustainability challenges.

For instance, Selin looks at how policies can affect the probability of pollutants being released into the atmosphere and how they cycle in the Earth and impact populations. Other researchers focus on future challenges related to food production, and the knock-on effect on the environment of carbon pricing, she says. Recent CS3 research news includes a study confirming the climate impacts of hydrogen and the development of a new AI tool that generates realistic satellite images of future flooding.

Although they model possible results under different policy scenarios, CS3 researchers aren't in the business of making predictions. Still, their work can help public and private sector decision-makers better assess proposals and mitigate the risks of abrupt changes to critical life-support systems, Selin says. The center also engages stakeholders from governments and corporations as well as NGOs and local communities to develop measurable outcomes that promote equity and justice, especially for those most impacted by environmental harms. For example, researchers created a tool called the STRESS (System for the Triage of Risks from Environmental and Socio-Economic Stressors) platform, which involves overlaying risks from environmental and socioeconomic stressors, such as exposure to airborne particulate matter and the unemployment rate.

"We have to be careful about who bears burdens and who benefits from different actions, and be really explicit about that in our modeling and science," Selin says. "When we talk about humans, humans are not one unit. We have to take account of that and make sure that human well-being is equitably shared across the planet." —Pamela Ferdinand

LEARN MORE ABOUT THE CENTER FOR SUSTAINABILITY SCIENCE AND STRATEGY AT
cs3.mit.edu

IMAGE: UNSPLASH / USGS.GOV

Of Arms and Algorithms

Political science professor Erik Lin-Greenberg ’09, SM ’09 explores issues of the modern military

Are leaders more or less likely to take a military threat seriously when it arrives via a social media platform like X (formerly Twitter)? Does the presence of unmanned aerial vehicles—drones—accelerate or inhibit the progression toward full-fledged conflict? These are the sort of questions that Erik Lin-Greenberg ’09, SM ’09 wrestles with in his research.

“Current technologies like social media and artificial intelligence and drones are increasingly important during times of rising tensions,” says Lin-Greenberg, the Leo Marx Career Development Associate Professor of Political Science. “Because they offer states a way to interact, even forcefully, while still avoiding conflict.”

Born and raised in the suburbs outside of New York City, Lin-Greenberg was first drawn to the military during the attacks on New York’s World Trade Center on September 11, 2001. “There was such a sense of confusion,” recalls Lin-Greenberg, who had just started his sophomore year in high school. “Then we heard fighter jets fly over our building. Hearing those jets gave me a sense of safety. Because I knew they were there for us.”

A Reserve Officers’ Training Corps student at MIT through 2009, Lin-Greenberg served on active duty in the US Air Force for four years, with tours of duty that included Afghanistan, Qatar, and Washington, DC. It was in Qatar that he first glimpsed the contribution he might make to the modern military as an academic. “The colonel I worked for assigned me to escort an academic who was visiting Qatar,” says Lin-Greenberg, who continues to serve in the Air Force Reserve as director of operations for an intelligence squadron. “He was studying the effects of airpower on counterinsurgency operations. I watched him at work, conducting interviews and gathering data. I thought it all looked pretty cool.”

Inspired by the academic’s visit, Lin-Greenberg enrolled in a political science PhD program at Columbia University in 2013, finishing his degree in 2019. He joined the MIT faculty in July 2020, and publishes widely on emerging technology, crisis education, and security strategy in journals including *International Studies Quarterly* and *Foreign Affairs*, as well as the *Washington Post*.

Lin-Greenberg’s research often uses data analysis and wargaming to chart the evolving relationships between civilian and military leaders and emerging technologies. Some of the outcomes are predictable, while others are surprising. His research indicates that national security experts are less likely to take military action when intelligence is analyzed by AI. Yet those same security experts are more likely to retaliate when their troops are killed because of an error caused by a rival’s use of AI than by an error made by a rival human analyst. “It may sound counterintuitive,” he concedes. “But I think these experts may feel angry that the rival had delegated a life-or-death decision to a machine.”

Another surprising result involves social media. Using a series of experiments, Lin-Greenberg and a graduate student co-author observe that security experts will take a threat issued on X just as seriously as one delivered through more traditional channels. “One conclusion here is that policy leaders need to be careful about what they put on their social media accounts,” he observes.

In his forthcoming book, *The Remote Revolution: Drones and Modern Statecraft* (Cornell University Press), Lin-Greenberg explores the expanding role of drones, not just as instruments of battle but as instruments of statecraft. “The prevailing assumption was that drones lower the barrier to using force, because you can order retaliation without risking your people’s lives,” says Lin-Greenberg, who worked on the US drone program during his active military service. “The reality is different. Rivals including Russia and Iran have shot down US drones, and the US has chosen not to retaliate with military strikes as they would have had there been loss of life. These incidents are meant as messages—a warning to us, and as a show of strength for their own populations. Drones provide an arena somewhere between diplomacy and all-out conflict where states can compete and communicate. Where they can do something without doing too much.”

—Ken Shulman

PHOTO: GRETCHEN ERTL

The Test of Democracy

Lily Tsai's research offers insight into what makes democracies work

"For a long time, I've been interested in trust and governance, how to get people from different backgrounds or viewpoints to trust each other and live together," says Lily Tsai, professor of political science and director and founder of the MIT Governance Lab. Pivotal to this fascination was her experience growing up as the child of war refugees in the United States. "I could never take communication and translation for granted because when you're talking with somebody who grew up in a different culture, there's always the possibility that they are unintentionally misreading you."

For decades, Tsai has examined how communities make decisions and why members of those communities accept the results even when they disagree with them. "Exploring these questions," she says, "has taken me to town hall meetings and village assemblies all over the world." Tsai has conducted research in locations as far-flung as Kenya, Tanzania, Liberia, the Philippines, and rural China—and also at town hall meetings in Hagerstown, Maryland. "People's views almost always change at least a little bit when they're talking in person," she says. But increased access to the internet and new technologies, like smart phones, social media, and AI, are changing how people communicate and make decisions as communities. "How trust and technology come together in a way that members of communities accept the results even when they disagree with them is important for living in diverse societies."

Tsai's research will be supported by the political science department's Strengthening Democracy Initiative, which seeks to highlight important research on the democratic process, foster synergies between political science and other disciplines, and ultimately create a leading center for the study of healthy democracies.

A new public square—online

"Social media is often very antisocial," Tsai notes, and how to build trust in online political and civic discussions presents different challenges. "The design of social media platforms prevents people from coming together to figure out situations, the moderate majority disappears, and that just makes the extremes get more extreme."

Online conversation is also easy to leave, Tsai points out. Last year she asked a student, "What do you and your classmates do when you're talking about heated topics?" In online interactions, the student told her, "We just leave the channel. We do that in real life too; we just leave the room."

"But if everyone is just leaving the room," Tsai asks, "how will we understand another person's perspective, develop empathy, and work together to make the collective decisions that affect everyone in society?"

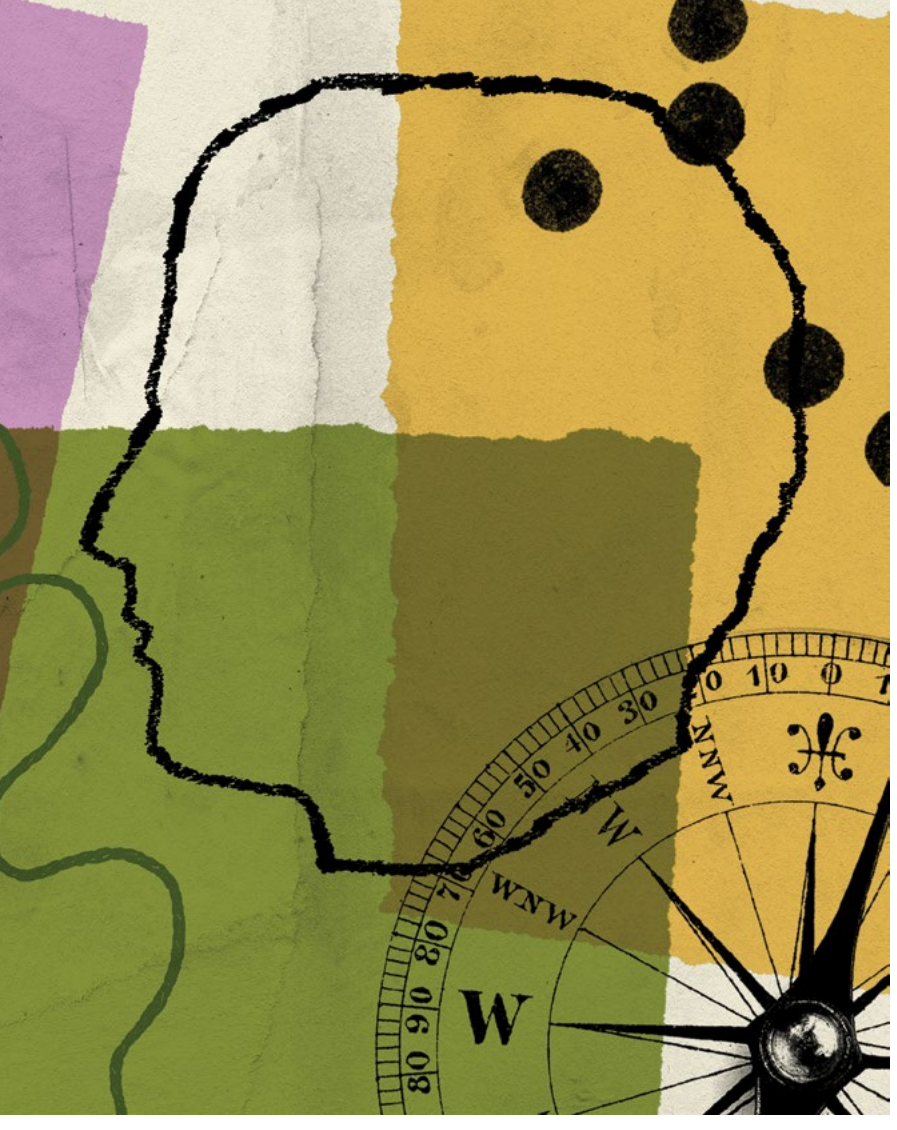
A compass for a new path

One of the many places MIT is tackling this issue is in 21.01 Compass Course: Love, Death, and Taxes: How to Think—and Talk to Others—About Being Human. This new undergraduate class was designed by a faculty working group, chaired by Tsai, from across MIT's School of Humanities, Arts, and Social Sciences with input from colleagues in science and engineering. It tackles big questions: What do we value? What do we know? And what do we owe one another? Incorporating input from a 13-member student advisory board, the group sought ways to help students become more capable citizens. "MIT students see themselves as makers, and we want them to think of themselves as makers of democracy too," says Tsai. "We want to enable our students to go out into the world and have a positive impact there." The Compass initiative plans to have an online version of the class, as well as versions open to alumni, faculty, and staff.

Using AI to facilitate healthier discussions

At MIT and elsewhere, Tsai says, "there's a growing community of scientists and engineers that are thinking about how to create a new digital civic infrastructure." She and colleagues in computer science developed a platform called deliberation.io, applying the lessons Tsai gleaned from her research on town hall meetings and village assemblies. They hope to create online platforms that encourage healthy public discussion and deliberation, "designing and integrating AI in a way that augments rather than substitutes for human participation," she says. "AI is a tool, and we're wondering whether it can help us build our muscles for reasoned reflection and pro-social interaction." The team is testing a "reason-giving" AI assistant, which takes the user's comments and asks, "Why do you think that?"

ILLUSTRATION: ANDREA D'AQUINO



Another strategy using AI: "Some of our pilot research shows that when there are AI moderators in a discussion," says Tsai, "participants are more likely to say that the experience made them think differently and consider new ideas, perhaps because the moderators are seen as impartial."

Tsai and partners at Stanford University are collaborating with the Office of the Chief Technology Officer of Washington, DC, to advance public discourse on AI policy. The pilot examines the extent to which online deliberation platforms complement or substitute for in-person discussions in facilitating democratic deliberation on public issues.

Gradually opening up to different viewpoints

Hoping to coax MIT students out of like-minded "bubbles" where everyone they know agrees with them, Tsai is encouraged by research showing that in online deliberations, "if you start by presenting participants with viewpoints similar to their own and then slowly expose them to different ones, they are more likely to feel like they were represented and to think of the process as legitimate." Building skills around having difficult conversations, she reflects, like building trust in democracies, is hard. "It takes a lot of work to understand people who are different from ourselves. But when you do succeed, it means that you are able to forge connections and bridge across groups, and that makes your understanding of people richer and more expansive." —Christine Thielman

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MITHIC Powers Interdisciplinary Collaborations for Innovation and Impact

JULIE A. LUCAS, the Institute's vice president for resource development, talks about the new MIT Human Insight Collaborative (MITHIC) and its impact on innovation and cross-disciplinary collaboration at the Institute.

This is an important year for the MIT School of Humanities, Arts, and Social Sciences (SHASS), with the launch of MITHIC. What makes this new initiative special?

It's always exciting to tell MIT supporters and friends something they might not know about the Institute, and many people think of us as primarily a science and engineering school. In fact, MIT has some of the world's leading humanities scholars. MITHIC was launched at the presidential level to elevate human-centered research and teaching and to encourage cross-school collaboration to pursue big ideas and solve difficult challenges. That's a compelling story to tell! For example, on a MITHIC-supported project led by the Center for Sustainability Science and Strategy (see story on page 16), climate scientists, social scientists, and engineering faculty are working together to improve the sustainability infrastructure at MIT.

How can MIT's alumni and friends help MITHIC achieve its goals?

The inaugural MITHIC projects received awards from one of three funds: the SHASS+ Connectivity Fund, which supports projects with interdisciplinary teams representing SHASS, the School of Architecture and Planning, the School of Engineering, the School of Science, and the MIT Stephen A. Schwarzman College of Computing; the Humanities Cultivation Fund, which supports creative work in the arts and humanities; and the SHASS Education Innovation Fund, which supports projects that will help create transformative educational experiences and practices in SHASS for MIT students. Philanthropy will make it possible for these projects to thrive, and gifts of all sizes will help the students and faculty of MIT fulfill our mission of building a better world.

(↗)

LEARN MORE ABOUT THE MIT HUMAN INSIGHT COLLABORATIVE AT
betterworld.mit.edu/mithic

Communities at the Center

City planning student puts AI, digital tech to work for social good

Good design, to Sofia Chiappero, goes beyond aesthetics. "It's about creating a meaningful impact in people's lives," she says.

A Fulbright Fellow from Argentina pursuing a master's degree in city planning in the Department of Urban Studies and Planning (DUSP), Chiappero is a 2024 MIT Morning Academy for Design (MAD) Design Fellow.

She sees digital technology as a means to build community while giving a voice to those on the margins in the developing world. "I'm trying to work for communities that may not have the capacity to build digital tools, and to contribute to their efforts in data activism, economic development, and social and public-space participation," she says.

"A say and a direct voice"

Chiappero was part of an Institute team that launched a social venture called ONE Community, with the aim of providing a digital network for small businesses in an informal settlement called Dharavi, in Mumbai, India, which is facing a redevelopment project that would wipe the settlement from the map. ONE Community devised an app that would enable shop owners and vendors in Dharavi who had relied on person-to-person interaction in the old neighborhood to stay connected with customers and with each other. It was a finalist in the 2024 MIT IDEAS Social Innovation Challenge Virtual Showcase presented by the MIT Solve initiative, and among the 2024 cohort at MITdesignX.

Previously, Chiappero developed a web platform to promote increased citizen participation in decision-making on projects impacting public spaces and infrastructure in Cordoba, Argentina. "This digital tool was designed to give people a say and a direct voice," she says. "It instilled a sense of ownership in the community because people were able to be involved in the feedback and testing process from the very beginning."

In an October 2024 article for the MIT online publication *The Public Interest Technologist*, "Flipping the Script: How AI Can be Used for Social Justice in Latin America," Chiappero notes that many people in Latin American countries participate in "informal economies" that operate outside official regulations and are not captured by traditional data collection systems. Established AI models are trained on data that do not represent the lived experience of these informal economic communities, she writes.

She makes a case for a collaborative research approach in which members of underserved communities "actively participate in gathering data that reflect their realities." AI has "immense potential to drive positive change in cities and communities, if leveraged correctly," she writes.

Inspired by community

Chiappero, who earned a bachelor's in architecture from the National University of Cordoba, is currently a research assistant in the Data + Feminism Lab within DUSP and a fellow of the MIT Priscilla King Gray Public Service Center.

"When I am thinking about what I am going to do next or what I want to do in my society, if I have a voice, I will not take that for granted, and will try to use it for a good cause or a good movement," she says.

Her own cultural background inspires her work. "I was born in a rural town in Argentina called Villa del Rosario and was not surrounded by highly academic people or exposed to academia at all. But I always had my mom, my sisters, and my friends, the most hardworking people I know. I worked hard from a young age to earn scholarships.

"I have in my heart a bunch of hardworking people who are my core foundation. That's what shaped me. Perhaps somebody will read this article and say, 'OK, I'm from Latin America, too. I also can be at MIT. I can contact Sofia.' I want to build that."

She sees MIT as a place of great opportunity. "I feel super inspired by my professors, my mentors, and by every single one of my classmates," Chiappero says. "They're truly amazing, doing work that is impactful and meaningful. I'm very thankful to MIT for all the opportunities I have.

"There are people from all around the world here who are trying their best to create new things for a better world. We are truly valuable. If you walk through the halls at MIT, you will see a vibrant tapestry of colors and cultures. This diversity of voices is what the USA is truly about." —Mark Sullivan

PHOTO: ADELAIDE ZOLLINGER

A Behavioral Economist's Approach to AI

Sendhil Mullainathan wants to harness technology to help solve very human challenges

After graduating from Cornell University, where he studied computer science, economics, and mathematics, Sendhil Mullainathan faced what many would call an enviable decision: he could pursue a PhD in computer science at MIT or study economics at Harvard. While he opted for the latter, Mullainathan ultimately incorporated both disciplines into his work. His career trajectory eventually brought him to MIT, where Mullainathan—a former MacArthur Fellow—holds a dual appointment in electrical engineering and computer science (EECS) and in the economics department in the School of Humanities, Arts, and Social Sciences. Through his EECS appointment, he serves on the faculty of both the MIT Stephen A. Schwarzman College of Computing and the School of Engineering.

Early in his graduate studies, Mullainathan became frustrated by the limitations he recognized in classical economic theory. The people represented in economic models were idealized, making wholly rational decisions based on the information available to them. "But they didn't resemble the people I've encountered," he observes. Much like everyone else, he says, "when I reflected on my own life, I recalled making a lot of mistakes and doing some pretty dumb things."

For this reason, he was attracted to behavioral economics, a field that draws on principles of psychology and economics in an attempt to predict the actions of people in the real world, where emotions compete with reason and our choices are readily swayed by environmental influences.

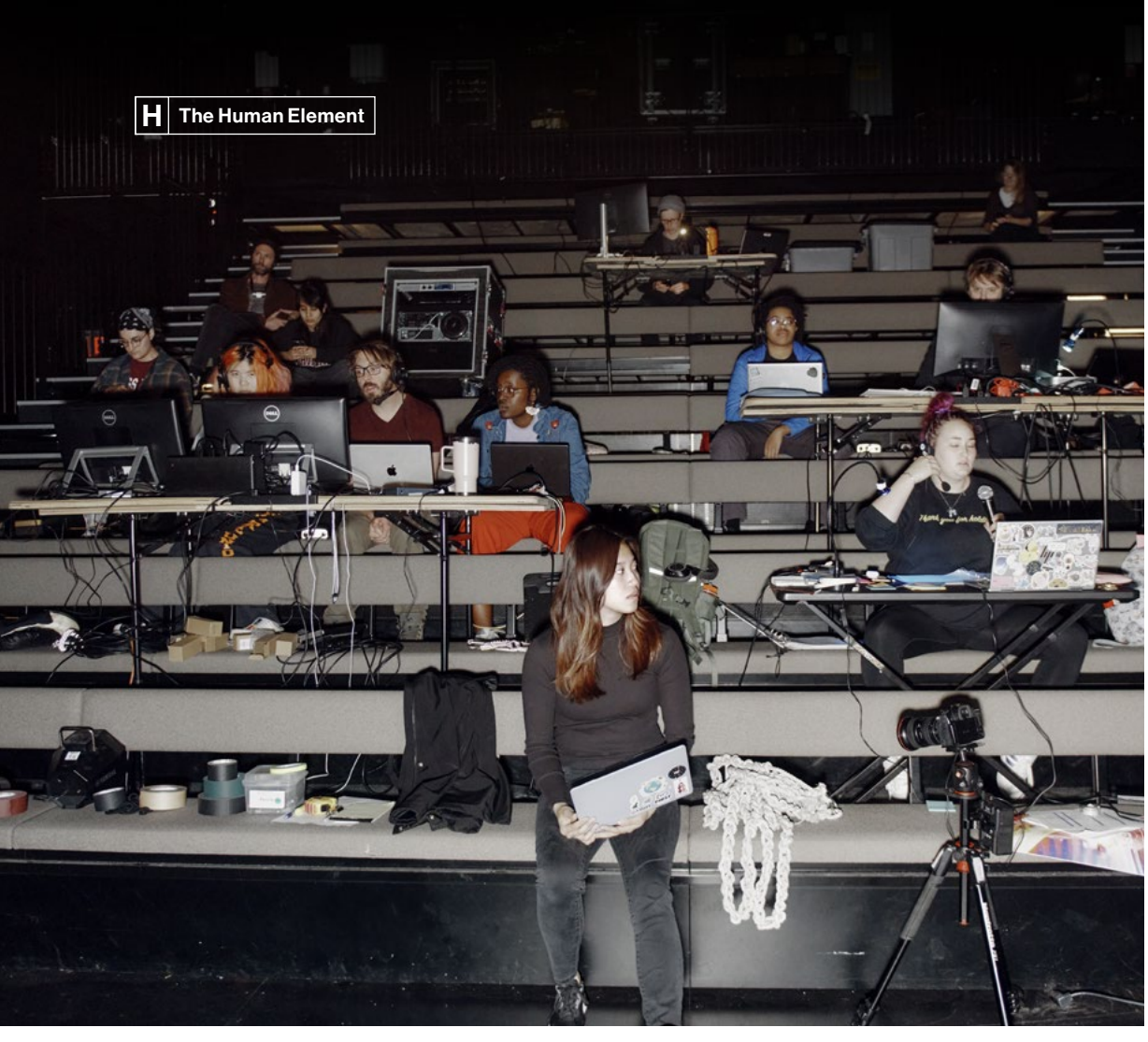
After completing his Harvard PhD in 1998, Mullainathan joined MIT's Department of Economics for the first time. He became interested in development economics after working with future Nobel laureates Esther Duflo PhD '99, the Abdul Latif Jameel Professor of Poverty Alleviation and Development Economics, and Abhijit Banerjee, the Ford Foundation International Professor of Economics, with whom he cofounded the Abdul Latif Jameel Poverty Action Lab (J-PAL). "I grew up in India and thus had a personal connection to the subject of poverty," Mullainathan says. That motivated him to find out "why poor people are poor, and the more I looked into it, the more I recognized that the circumstances of poverty create their own unique psychologies." These can extend far beyond the lack of money, he explains, as poverty casts what he calls a "mental footprint" that can affect practically every facet of life. Lack of sound nutrition and sleep, for instance, can impair one's cognitive abilities, leading to poor decision-making and poor parenting—factors that can make poverty self-perpetuating. Mullainathan presented these ideas in a 2013 book, *Scarcity: Why Having So Little Means So Much* (Times Books), written with psychologist Eldar Shafir.

After appointments at Harvard and the University of Chicago, Mullainathan returned to MIT's faculty last year with a new perspective. Work in behavioral economics, he says, "has helped us understand how the foibles of humanity can create complex situations for people, making it seem like we're all living in a Shakespearean play." Although we've gained insights, he adds, "we haven't been so great on solutions. The interventions we've come up with are often too wooden, unable to match the richness of the dilemmas we face."

Mullainathan now has embarked on what he calls his third phase of work, during which he hopes to develop algorithms that can directly benefit people. The approach he advocates requires a shift in the emphasis of AI. Most of the work done to date involves "automation tasks," he says, "training a computer to do what humans can do—only doing so faster and cheaper." His idea is to flip that strategy on its head. Rather than getting computers to substitute for humans, he wants to enhance human capacity, "to harness AI for tasks that people find hard to do and would love to be able to do better."

Working with assistant professor of economics Ashesh Rambachan (learn more at betterworld.mit.edu/spectrum/rambachan) and several graduate students, Mullainathan is researching personalized algorithms that can help with everyday decisions. "Rich people can afford to have financial advisors [as well as other kinds of advisors], but that's not true for everybody," Mullainathan says. "Once you realize how much of human life revolves around decision-making, this becomes a very natural thing to try to do." –Steve Nadis

ILLUSTRATION: ARIEL DAVIS



Living the Theater Dream

MIT Theater Arts program gives students space to stretch their creativity

Jorge Rubio, lecturer in the MIT Theater Arts Program, had been studying the themes and characters of a play, *La Vida es Sueño (Life Is a Dream)*, for more than a decade before finally deciding the time was right to stage it. In November 2024, the dense classical text—written 400 years ago and often referred to as a Spanish-language *Hamlet*—sprang to modern life in a run of performances in MIT's Theater Arts Building. Rubio was determined to preserve the classic themes that have kept the play well known in the 400 years since its writing.

"That's one of my things—how do we make language fresh? And how do we make these classical texts accessible to all of us?" says Rubio. "So I ran the risk of doing a classical, language-based play. And then on top of that I said, 'OK, we're not only going to do something that has poetry, we're going to do it in two languages.'"

That kind of experimentation is right at home in the MIT Theater Arts program. Some may be surprised to discover that MIT has a flourishing theatrical landscape. But from the academic program to student-run groups, theater production offers undergraduates many opportunities to access their creativity.

The first known theater production at MIT was Eugene O'Neill's *The Hairy Ape* in 1927, according to Jay Scheib, professor and section head for Music & Theater Arts, and the first director of dramatics was appointed in 1934. Academic offerings began in the 1980s, and the Institute officially established a major in Theater Arts in 2015. During the 2023–2024 academic year, more than 1,200 students were involved in theater in some capacity.

"We offer a bachelor of science in theater at MIT, which is a fundamentally deeper dive than the more traditional BA," Scheib says. "But what really separates us from other schools are the many hands-on interactions with new and emerging technologies. Our program is really focused on preparing students to imagine and create in ways that we have not yet discovered, and this ethos of innovation is a very special part of the MIT fabric."

A thriving and evolving scene

Treating theatrical subject matter with the same academic rigor as other subjects gives students a chance to challenge themselves outside their comfort zones.

"There is creative expression [in regular classes], but it's bound by different technicalities and constraints," says Mustafa Al-Obaidi '25, a

MIT students conduct a technical run-through of *La Vida es Sueño (Life Is a Dream)* in preparation for a string of performances in the Theater Arts Building in November 2024.

PHOTOS: TONY LUONG

“Our program is focused on preparing students to imagine and create in ways that we have not yet discovered, and this ethos of innovation is a very special part of the MIT fabric,” says Jay Scheib.

mechanical engineering major and theater minor, and an actor portraying *La Vida es Sueño*’s main antagonist. “The theater scene at MIT is really thriving and evolving, and there is such big room for collaboration.”

Collaboration was key to Rubio’s successful staging of a seventeenth-century Spanish-language play. Speaking in both Spanish and English, the actors imbued their performances with a physicality informed by improvisations they worked on during their class 21T.100 Theater Arts Production, tapping into emotions churned up by aspects of the text and linking them to experiences in their own lives.

Claudia Elena Varela PhD ’22, a member of the Boston-based dance company Danza Orgánica, helped students incorporate these and other movements into the action of the play to guide the audience through the story even if they didn’t always understand the words.

Unusual physicality is a hallmark of MIT Theater Arts productions, along with technical aspects such as video boards and inventive lighting cues. The theater program emphasizes the MIT ethos of risk-taking and experimentation. Many of the faculty and staff have a background in experimental theater, with some coming from New York City’s downtown theater communities.

“People here are working at a really great level and with abandon,” says Rubio. “It’s because of the curiosity that exists in the room, in the students. That is something about the experience here that’s very, very cool.”

The “fire and confidence” to go for it

For Al-Obaidi, being on stage for *La Vida es Sueño* helped him battle back imposter syndrome in the classroom.

“There’s a lot of leaps of faith in theater where it’s like, OK, you rehearse something, you do it, you practice it, you make it better and then just jump on stage in front of an audience and do it, do whatever is going to happen,” he says. “It has given me this space and the sort of fire and confidence to just go for things.”

“The arts play an invaluable role in any landscape but especially in ours. Where we are known at MIT for science and technology, we are also increasingly known as a place where science and technology is meaningfully integrated into the performing arts in unexpected and exciting ways,” says Scheib. “Here we find ourselves regularly engaged in innovative collaborations that lead to fresh ways of reimagining the expressive potential of performance.” —Stephanie M. McPherson SM ’11

Listening to Frontline Workers

MIT Sloan study explores power of employee input to improve workplace conditions

Perhaps no modern workplace has become more essential to the everyday lives of consumers than the fulfillment center, which Erin Kelly, the Sloan Distinguished Professor of Work and Organization Studies at the MIT Sloan School of Management and co-director of the MIT Institute for Work and Employment Research, describes vividly as "warehouses where people pick products and put them in boxes that appear on our doorsteps and make our lives more convenient."

In addition to making modern life run more smoothly, Kelly observes, fulfillment centers offer something else of high value in the American economy: jobs with decent wages that require neither college degrees nor specialized educational credentials. "For noncollege workers," she says, "they're one of the more consistent, regular, and higher-earning options."

Unlike restaurants and retail stores, where employees often struggle to get adequate hours and predictable schedules, fulfillment centers offer full-time hours with benefits and overtime possibilities. "So this sector is very interesting in that it is providing a possibility for non-college workers to have a steady and slightly higher income than they could in the service sector," Kelly points out.

To be sure, this is challenging, tightly monitored, and stressful work. "It's really good work if you can get it," Kelly says, "yet also really tough work. We know that this is a growing sector and our research team wanted to see whether job quality could be improved in a way that would benefit the workforce."

Pride and pressure

Beginning a research partnership with a major corporation (not named to protect confidentiality) in 2019, the team interviewed more than 100 frontline workers and managers in multiple fulfillment center sites.

"We heard about physical exhaustion and feeling that they're under time pressure, but also a sense of pride in the ability to handle the pace needed to meet this goal of getting the products on the trucks every night," Kelly recalls. "Some expressed appreciation of working in a culture where productivity was valued and liked that it was not a place for loafing."

While the employer had concerns about employee turnover, Kelly says, their partnership with MIT Sloan was driven more by a desire "to explore how to respond to the constraints of needing to do next-day delivery and the operational realities of e-commerce, yet look for a way that would be consistent with the company's stated values and supportive of frontline workers."

Post-2020, a new reality

When the pandemic hit in February 2020, Kelly's team paused their research for nearly a year. Once they resumed, consumer demands had skyrocketed and the pressure on fulfillment center workers had intensified. Kelly and the team had previously planned to address scheduling policies, but in light of the broader concerns raised in this pandemic period, "We ended up designing—in dialogue with them—what we called a new health and well-being committee (HaWC) that we tested and evaluated with a field experiment."

The HaWCs are small groups of employees across different departments, including one or two supervisors, that meet regularly and welcome employee concerns, suggestions, and identification of problems. "It's framed as being a chance for people to share what causes them stress

PHOTO: ISTOCK / STOCKROCKET

at work," says Kelly. "Often those end up being operational concerns that also cause frustrations for workers; people would share things like, 'There's no broom in this part of the building, and so I have to take time to go get one, and then I have to work faster for the next portion of my shift.'"

Kelly notes that it is critical for HaWCs to be centered on workers' needs rather than on employer goals. The researchers are also keenly aware of mental health challenges in this population of workers. "Over half of our survey respondents were at moderate or severe psychological distress. Moderate distress is not necessarily clinical depression or another clinical diagnosis, but it is something concerning enough that practitioners would recommend taking some action."

Management response to worker requests raised by the HaWCs, of course, is vital to their mission and legitimacy, and respond they did. "They made a wide variety of changes," says Kelly. There were simple fixes like adding brooms where employees had highlighted a need, but also new ideas like playing music in the workplace and giving everyone input into the playlist. "They set up systems where people could either vote for specific radio stations or contribute top-10 songs that would go on the building's new playlist. That was a smart strategy because it was relatively easy to implement and people would notice it."

More structural changes made because of HaWC feedback related to training, both of new employees and for those asked to cover for absent workers in other departments. In one fulfillment center, says Kelly, the HaWC recognized that new employees were struggling. "They proposed to management that the training period be extended by another couple of weeks and that people be given a department buddy, another coworker to support them." For workers stressed out when they were moved to an unfamiliar department, a group created cheat sheets—visual guides to tasks. "The committee was able to think through, 'What is the problem here and how could we address it?'" Kelly recalls.

Encouraging results

The team was pleased to find that after six months, employees in the buildings with HaWCs were 33% less likely to report moderate or severe psychological distress than employees in the other buildings. "We find short-term benefits for mental health," says Kelly, "but this is still exciting because we see it is feasible to support these workers' well-being by making changes in the workplace." The researchers also found a striking reduction in employee turnover, which was welcome news for the employer, since high turnover results in higher training costs and lower productivity.

"We rolled out the HaWCs in eight buildings, and we had eight buildings that served as our control group and continued on with their usual practices. We have strong experimental evidence that this reduced turnover significantly," Kelly reports. "Employees in the buildings with a HaWC had a 20% lower probability of exit as compared to the previous year's exit rates. What we're seeing is that having a chance to share your concerns and have a voice in this very regimented, technologically monitored setting—that's affecting people."

"The human element here is the signal of being respected, of being heard, of being valued as a member of the organization, beyond whether you complete your specific tasks," says Erin Kelly.

While workers serving on the committees generally valued that experience, the analysis focuses on impact across the fulfillment center, including many workers who were not directly involved in the HaWCs. "There are spillover effects that we think are indicative of people feeling respected. Seeing your peers be actively involved in problem-solving—that signals that the organization appreciates the perspective and wisdom of frontline workers," Kelly says.

Human solutions more powerful than technology

Another aspect of the research was the opportunity to compare the employee-driven HaWCs with a technological approach. The company introduced kiosks in break rooms of many of the same fulfillment centers and invited employees to use them to identify workplace problems. Workers could type their feedback and concerns privately and were assured that responses would be communicated directly to management. But the team found that while the HaWCs, which offered a worker-led, community-building voice channel, significantly reduced turnover, the kiosk had no impact at all.

Kelly's team has presented their findings to the company, and will monitor longer-term results. They are also submitting several academic papers, and Kelly has written a teaching case that she presented to participants in the MIT Sloan Fellows MBA program. Her hope is that the team's findings will lead to improved well-being for workers in this growing industry.

The influence of the HaWCs on employee decisions of whether to stay at or leave their jobs, Kelly says, "was intriguing evidence. The human element here is the signal of being respected, of being heard, of being valued as a member of the organization, beyond whether you complete your specific tasks." —Christine Thielman

A Test Bed for Sustainable Manufacturing

Starting with Turkey—and with support from J-PAL's King Climate Action Initiative—researchers explore strategies to reduce emissions while protecting growth

In the United States and abroad, many companies that struggled to make it through the pandemic still have economic survival rather than sustainability top of mind. But the European Union's Carbon Border Adjustment Mechanism (CBAM), a carbon tariff on products such as steel and cement, will take effect in 2026, holding industry to new standards. In Turkey, government officials are looking to economic development specialists for guidance in their response.

Enter the Abdul Latif Jameel Poverty Action Lab (J-PAL) at MIT and David Atkin, the Barton Weller L. Professor of Economics, working with support from J-PAL's King Climate Action Initiative (K-CAI). K-CAI collaborates with policymakers and researchers to generate evidence and catalyze the scale-up of solutions that reduce carbon emissions and co-pollutants, build vulnerable communities' ability to adapt to climate change, and increase access to affordable energy. Since 2020, K-CAI has powered over 80 research studies and 13 scaling projects in 40 countries. The first complete scale-up supported by K-CAI has reached over 15 million people.

"We came into this because of Turkey's desire to work out how to become more environmentally sustainable, in part because of the perceived future pressures of the CBAM," says Atkin. The government was concerned that carbon-specific taxes would harm the many small- and medium-sized Turkish firms that export products to the European Union, says PhD student Aaron Berman, a member of the research team. They worried that firms "didn't have sufficient capacity both in terms of knowledge and financial capital to be able to adapt to the new tax and lower their carbon emissions. This is a common problem in developing countries."

Turkey was an appealing research site, Berman explains, because government agencies maintain comprehensive industry data "on everything related to firm operations within Turkey, number of employees, volume of sales they're making, and, importantly for our project, what products they make and who they sell to. It's a pretty unique feature of the Turkish setting."

Investing in sustainability

The team provided training on environmental sustainability to industries almost certain to be affected by CBAM. "We've also partnered with commercial banks who get funding from the European Bank for Reconstruction and Development. They provide it to companies at lower than usual rates for environmentally sustainable investments," says Atkin.

Even small businesses that are more focused on profit than on their environmental impact, he observes, are keen to improve efficiency. "The major source of carbon emissions for all of these firms is energy usage, and so if they're able to make things more efficiently, that might be a double win."

The research team is evaluating three types of training in which companies are taught how to directly reduce emissions with the use of mitigation technologies, innovate by manufacturing items that use less energy to produce but sell for higher prices, or increase efficiency by reducing energy usage.

Using a randomized control trial—with firms receiving one of these types of training at random—they hope to understand which of the three strategies is most effective at cutting emissions.

Meeting with employers in Turkey, Berman was struck by the wide range of awareness. "Not only were many of the firm owners unaware of the EU regulations, but very few of them had any direct knowledge of carbon emissions at all. That's additional motivation for us to introduce these trainings and technical solutions."

Potential to backfire

Economic development is a delicate process, Atkin explains. "One thing we're particularly worried about is what people often call carbon leakage: where a firm adopts an environmentally beneficial technology which reduces their emissions, but raises their costs." If that forces the company to raise prices, customers might take their business to competitors with more lax environmental practices.

The reverse scenario is also a danger, he says. "We've had a couple of interventions where when these types of environmental practices are adopted, the firm actually ends up polluting more. Why? Because their output goes up. Although that might be a good thing if they are pulling sales from more polluting firms."

"Something we can scale"

After widespread implementation, Atkin says, "we'll get a sense of how many of these firms have made investments and the impacts on sales and emissions." He hopes their strategies, if successful, can be replicated in other countries.

"Other development banks and organizations are supporting green finance around the world, and these kinds of training programs are somewhat portable. The content is certainly something we can scale."

—Christine Thielman

ILLUSTRATION: ISTOCK / TREETY

The Art of Computer Programming

Nick Montfort SM '98 brings poetry and programming together with artistic results

When people think of computation, they might picture a bank of machines, grinding out calculations related to climate modeling, physics simulations, or financial forecasts. Nick Montfort SM '98 has a different perspective. A professor of digital media at MIT, he views computation as his artistic medium. His métier is "creative computing," and he'd even venture to say that a computer program—or at least *some* computer programs—can be poetic.

For example, his book *The Truelist* (Counterpath Press), which was published in 2017, consists of a 120-page poem generated by a computer, followed by a program Montfort wrote that fits onto a single page. That's the page he's most proud of, because it contains everything needed to create the poem without having to draw upon any outside data sources. By combining different parts of words to form novel compound words, Montfort explains, this poem "invites the reader to imagine moving through a strange landscape that seems to arise from the English language itself."

In the work he carries out in computer-generated poetry, Montfort sees himself as "an explorer of language, computing, and cognition. I do this in a more bottom-up way, and certainly in a less scientific way, than a computational linguist or cognitive scientist might, but I'm nevertheless curious about some of the same things."

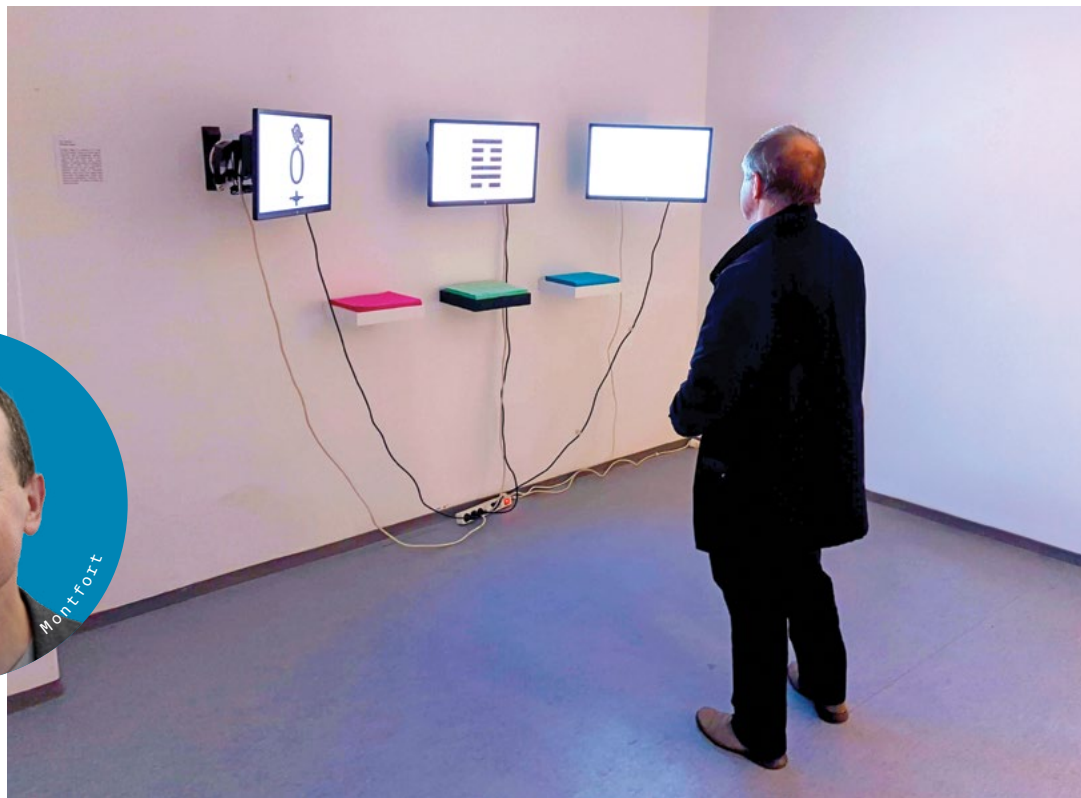
He became interested in digital art at an early age, immersing himself in interactive fiction during middle school. In college, he majored in both computer science and the humanities. He later completed two master's degrees: one in media arts and sciences at MIT, and the other in poetry at Boston University, before going on to earn a PhD in computer science from the University of Pennsylvania. By then he had published two books and knew what he wanted to do: create literary art through computation.

Output, a book Montfort co-edited with Lillian-Yvonne Bertram, was published in November 2024 by the MIT Press. It's a 500-page anthology, containing 200 selections from the field of computer-generated text dating back to the 1950s. For Montfort, one motivation for pursuing this book was to show that the notion of computer-generated text did not start in 2018 with the advent of GPT-1, the first large language model (LLM). "This is not an anti-LLM book," he says, though he's not overly impressed with what he's seen from that realm so far. "LLMs allow a lot of people to be very superficially involved with the computer generation of text and to produce things that are, for the most part, not very good. But that doesn't mean the future is hopeless." He regards his work in creative computing as something very different. Rather than just giving a computer a few prompts from which it autonomously churns out a poem or other literary work, he writes the actual program from which the computer's output is fashioned.

All the Way for the Win (Penteract Press), Montfort's latest book of poetry, was published in January of this year. It's a slim volume, just 48 pages in all, but broad in scope. The book, including its title, consists entirely of three-letter words, explains Montfort. "It begins by narrating the birth of the universe and concludes after describing the eradication of the last human-authored poetic text. While it doesn't deal with everything in between, it's meant to touch on many aspects of human history and experience."

As a professor at MIT, teaching classes, guiding research, and supervising theses, Montfort has one overriding goal, to provide "a space for students to begin or strengthen a practice as a poet and artist." A practice, he adds, "is something one does all the time, as part of life, rather than just when assigned or just when a requirement means that you have to take a particular class." His aims, in other words, are rather ambitious: to instill within his students a different way of looking at the world. That is, he hopes that the lessons he imparts will extend beyond the end of a semester to life beyond graduation.

—Steve Nadis



Nick Montfort's computational language art project, *Process Pages*, was exhibited in Bergen, Norway, in 2022.

PHOTO: COURTESY OF NICK MONTFORT

Srihitha Dasari '26 (center) conducted independent research on cesarean section rates in Telangana, India, through MISTI South Asia.

PHOTO: COURTESY OF SRIHITHA DASARI

MIT Without Borders

Undergraduates gain global experience and new insights through the MIT International Science and Technology Initiatives

A few years ago, Katherine Hobgood '25 never would have dreamed of traveling alone internationally. Now, she's an environmental educator in Guyana with the Peace Corps.

Hobgood's journey of confidence and global experience began with the MIT International Science and Technology Initiatives (MISTI), housed at the Center for International Studies (CIS) within the School of Humanities, Arts, and Social Sciences. For more than four decades, MISTI has been helping students bridge the gap between academic discovery on campus and learning in dozens of countries worldwide.

In summer 2023, Hobgood traveled to Bangalore, India, to study at the National Centre for Biological Sciences. She examined chemical markers in tiger urine samples alongside ecology researchers. Next, she spent her fall semester conducting fieldwork at Green Up Gambia, which addresses climate change mitigation in rural villages. Most recently, she completed an environmental policy internship at Horticulture New Zealand.

Hobgood's father, a development worker conducting US government projects on climate change around the world, inspired her to travel internationally. "One of my dreams was to go to the Peace Corps," she says. "Throughout the interview process, I referred back to my MISTI experiences. A lot of the questions were about cultural adaptation and professionalism in new cultures. MISTI was invaluable."

MISTI also gave her confidence. "In India, on one of my off weekends, I booked my own bus, took a trip to another part of India on my own, and did it safely. This was the first time I'd ever done that. It completely changed everything for me: It made me comfortable with solo traveling and going to places that I don't know all that much about," she says.

Global outlook for global challenges

"MISTI was started around the idea that, in order for engineers to be impactful in the world, they also need to learn from companies around the world," says MISTI faculty director Evan Lieberman, the Total Professor on Contemporary Africa and director of the CIS.

The program launched in 1983 with a focus on Japan, then one of the world's primary innovation hubs. The success of MISTI Japan, under the leadership of Richard Samuels PhD '80, Ford International Professor of Political Science, served as a template for future MISTI opportunities. In 2018, Richard Lester PhD '80, the Japan Steel Industry Professor and MIT's former vice provost for international activities, underscored a commitment to offering international, experiential education to every MIT student who desired it, giving MISTI even more momentum and broader reach.

"MISTI is really trying to help MIT fulfill that mandate," Lieberman says. International study takes on special importance at MIT, he explains, because many students want to wring out every possible moment on campus.

"Most students really want to spend all eight semesters at MIT to get the technical training that they came here for. They don't feel like they can disrupt that. They don't want to leave," Lieberman says.

MISTI makes it possible for students to travel beyond Cambridge without sacrificing the rigor of an MIT education. Now, more than half of undergraduates study internationally through MISTI in more than two dozen countries with a goal of helping to find solutions for some of the world's biggest challenges—MISTI hosts more climate-related internships than any other campus organization. Other popular areas include AI, social impact, and health care.

A fresh outlook, in the lab and beyond

Health care is a focus for neuroscience major Amy Wang '26, who hopes to pursue medicine and potentially obtain a master's degree in public health. As a Spanish minor, she also wants to become fluent to improve her practice. She recently conducted a MISTI summer internship at the Neurobiology Institute at the National Autonomous University of Mexico.

Katherine Hobgood '25 interned at the National Centre for Biological Sciences in Bangalore, India.

PHOTO: COURTESY OF KATHERINE HOBGOOD

"It completely changed everything for me: It made me comfortable with solo traveling and going to places that I don't know all that much about," says Katherine Hobgood '25.

There, she sharpened her language skills. But, just as important, she learned how laboratories function in other countries. While she'd spent plenty of time in US laboratories working with mice, it was eye-opening to explore how other countries conducted research.

"In their labs, they do very detailed habituation processes. You're working with mice for a while before you even start your experiments. You get to hold them, and they crawl around your arms as they get more comfortable with you. It was just a really sweet moment of connection that I hadn't had with animals I worked with before," she recalls.

Igniting lifelong professional passions

MISTI students choose from four tracks: summer internships at companies or laboratories; global teaching labs, in which participants spend January teaching STEM courses to high school and university students; study abroad, a semester-long academic exchange program; and global classrooms, shorter opportunities to work alongside MIT faculty on country-specific projects. For example, Bradley Olsen '03, the Alexander and I. Michael Kasser Professor of chemical engineering, recently took 16 students studying sustainable polymer systems to Brazil to examine the Amazonian bioeconomy alongside Brazilian peers.

These experiences can ignite lifelong professional passions at a crucial developmental stage, Lieberman says. "We see MISTI as an important opportunity for our undergraduates. As a college student, you're wide open to new experiences. Students develop interests that they carry with them for the rest of their lives."

That was the case for premed student Srihitha Dasari '26, who crafted a MISTI independent research program in Telangana, a state in southern India known for high rates of nonmedical cesarean sections. Dasari grew up hearing about India's health care struggles from her aunt, a gynecologist there. Now, she wanted the chance to learn firsthand.

"As someone on a premed track who's particularly interested in the maternal care space, I thought it would be a really interesting public health/medicine intersectionality project," she says.

MISTI faculty encouraged her self-designed plan with funding and logistical support. "I approached the MISTI South Asia office and pitched my research idea, and they were really open to it," she says.

In summer 2024, Dasari conducted qualitative and quantitative analyses to understand C-section rate discrepancies in the private and public health care spaces. She also held more than 40 interviews with stakeholders to understand systemic barriers to safe maternal health care.

"I was able to shadow gynecologists and community health workers and to take tours of different health care facilities, both secondary- and tertiary-level centers, to observe live births, patient consultations, checkups, postpartum care, and maternal health education sessions. I had a front-row seat to the challenges, triumphs, and successes," she says.

The experience reshaped her perspective on medical care and cemented her desire to work in gynecology. "MISTI was a formative experience," she says. "I saw firsthand the different areas of maternal health care through an international lens. It gave me a more well-rounded perspective, as someone interested in the intersection between medicine, public health, and social impact, and opened my eyes to avenues of health care that I really didn't see myself in previously."

Giving students opportunities to explore the unfamiliar is part of what makes MISTI so compelling, says Lieberman. "MIT students understandably always want to be pushed," he says. "They want to be in cutting-edge labs and companies where the best technology is being done. Sometimes, it can be a little too easy to assume that it's only happening in the United States. Getting out of your comfort zone, learning how things work elsewhere, is such an important part of developing marketability for any job or leadership position in the future."

—Kara Baskin

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Students Flock to Revitalized Stratton Student Center

Upgrades to W20 add natural light and welcoming spaces

Nearly 60 years after the Stratton Student Center (W20) first opened in 1968, the building is visited by thousands of MIT community members and guests each day. Much about daily life has changed since then, and the building has gradually evolved to meet the needs of the modern student.

The most recent upgrades, including strategic improvements to the infrastructure and new, welcoming spaces for campus activities, were conceived after gathering significant input from student working groups. Generous donors made the improvements possible. "We are deeply grateful to our alumni and friends who supported the transformational improvements to the Stratton Student Center, which serves as an active hub for campus life and now offers healthy eateries, well-being and dance programming, and a place for all to socialize and study," says Vice Chancellor for Student Life Suzy Nelson.

New form and function on the first and second floors

Nelson's team set out to improve the experience of walking into the student center, viewing it as one of the key entry points to the Institute. The central staircase was reconfigured to create more space that can be used for programming on the ground floor level, and the new design opened up the Stratton Lounge on the second floor, making it brighter and more welcoming.

A key design principle of using natural light to promote well-being was top of mind, and the renovations brought light from outdoors further into the building. Most of all, the team worked with architectural firm Gensler to create spaces where students would want to spend time. "The minute we reopened W20, students were in there just using every square inch and they haven't stopped," says David Randall, dean of student life in the Division of Student Life (DSL).

On the ground floor, there is now banquette seating and more lounge space for students, creating a more welcoming, inviting area than the former storefront. The opening of the new Concord Market, which provides fresh groceries and prepared foods for students, was a recent and much anticipated addition that had been eagerly awaited by the MIT community.

New and improved student spaces

The DSL team is thrilled with the results achieved on the fourth floor, the only part of the Student Center that hadn't changed since the building opened in the sixties. "The fourth floor hadn't been touched,

The central staircase was reconfigured to create more space for student programming.

PHOTO: SARAH BASTILLE PHOTOGRAPHY

Left: More natural light was brought into the building's study and lounge spaces.

PHOTO: SARAH FOOTE

Bottom: Students enjoy gathering in the Wellbeing Lab for special events and everyday activities.

PHOTO: COURTESY OF THE WELLBEING LAB

> "The minute we reopened W20, students were in there just using every square inch and they haven't stopped," says David Randall.

and it's where all of the student organizations' offices are," explains Erin Farrell, senior associate dean of student engagement and campus activities. With enthusiastic support from alumni donors (see story on page 33), she says, "We put in two beautiful new dance spaces with a multipurpose space in between them and a lounge."

"These studios have become a hub of almost daily ballroom classes and countless practice hours for our team," says graduate student Raluca Cobzaru, a member of the MIT Ballroom Dance Team. "Every week you will find couples meticulously practicing their floorcraft on the sprung wood floors. We look forward to many more classes, workshops, and impromptu mid-afternoon practice breaks in our beloved studios."

Another recent improvement to the Student Center is the addition of the Rafael Del Pino (1986) Wellbeing Lab, which opened in fall of 2023 on the third floor. The sun-filled space offers quiet study nooks, group and individual activities, fitness classes, and community workshops, as well as meeting space for counseling and other supportive meetings.

Looking to the future

Farrell and her team are always thinking about the best use of space for students, brainstorming as they try to anticipate campus needs for the next 20 years of student life. The Student Center is by no means finished, but an ever-evolving project; for example, Lobdell Dining Hall and La Sala De Puerto Rico multipurpose room on the second floor have yet to be renovated. "We're looking to bring them up to date so that the whole floor makes sense," she says. "The technology piece is important, too, making sure that meeting and event spaces are plug-and-play tech ready."

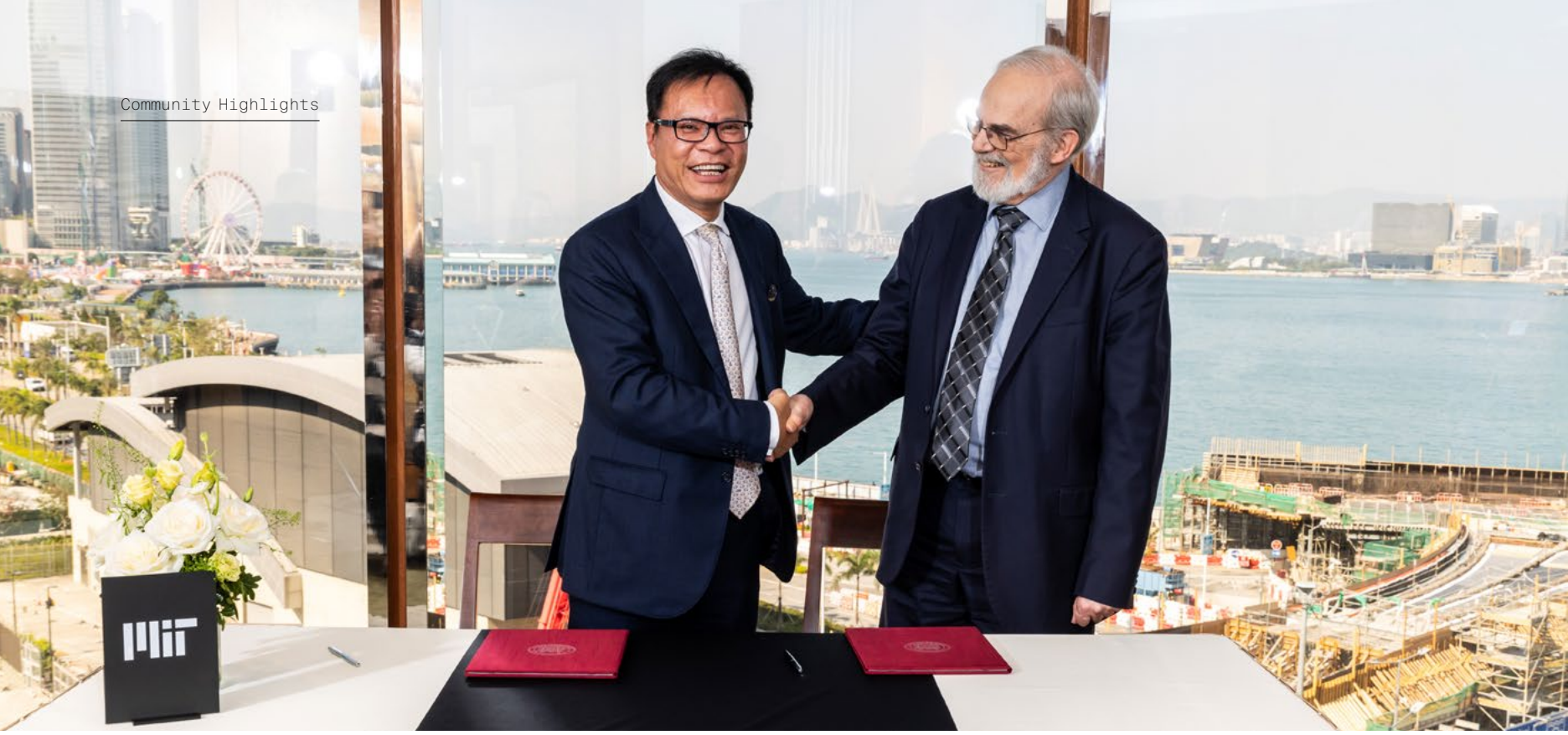
"From a programmatic perspective, we're really just getting started," she continues. "We have a number of different spaces under our purview, but we have 500 student organizations and 40 spaces." It's a constant puzzle to assign events to locations on any college campus, since space is always a precious resource.

Well-being is the common theme

Every upgrade and improvement to W20 has been done with the student experience in mind. "We know that student involvement contributes to a sense of connection and community, that sense of purpose in life," says Randall. New elements like the Wellbeing Lab are part of Chancellor Melissa Nobles's Whole Student Initiative, which stresses four well-being pillars for students to prioritize: mind, body, relationships, and purpose.

"The Student Center renovations have made it the hub of student activity," says Janine Medrano '26. "I have undoubtedly spent more time there after renovations than before, both using common spaces to work and taking advantage of the Wellbeing Lab as a place to de-stress by participating in and hosting events."

Adds Farrell, "I've noticed in the evening, after students finish their classes, the Student Center is a very popular place to be. It's really fun to see!" —Christine Thielman



SEBASTIAN MAN ’79, SM ’80

Supporting MIT’s Future in Computing and AI

Sebastian Man speaks fondly of his years as an MIT undergraduate. “The place really opened my eyes,” he recalls, “and sharpened my intellect. It offered me a whole brave new world. Everything was interesting, and everything was exciting.”

Coming from a high school on the West Coast of the United States, Man vividly recalls his first interaction with other MIT students at the International Student Orientation. “Everyone there wanted to be a nuclear physicist,” he chuckles, remarking that one of the friends he met that day finished a bachelor’s degree in nuclear physics in two and a half years. “I asked myself, ‘What am I doing here with these people?’” Initially intimidated by his peers, Man went on to earn his bachelor’s in three years and his master’s in the year after that, 1980.

In the decades since, Man has been an involved and supportive Institute alumnus, serving on the MIT Corporation Development Committee and the Mechanical Engineering Visiting Committee, among others, even as he conducted a successful and demanding career. Man is the chairman and CEO of Chung Mei International Holdings Limited, a manufacturer of domestic kitchen electrics and air treatment products for major international brands.

Particularly supportive of education, Man is a council member of the Hong Kong University of Science and Technology, serves on the Board of the Morningside College of the Chinese University of Hong Kong, and was a member of the court of the University of Hong Kong and the chair of the Harvard Business School Association of Hong Kong. His community activities include serving as a council member of The Better Hong Kong Foundation and executive committee member of the International Chamber of Commerce Hong Kong China Business Council, as well as of many other civic and business organizations. Man is also part of the MIT parent community, as his son, Brandon Man SM ’25, is a graduate student in the Department of Mechanical Engineering.

Recently, he made a major gift to the MIT Stephen A. Schwarzman College of Computing, naming a key space in the college’s new headquarters on Vassar Street. The college was established in 2018 to build on MIT’s rich history of groundbreaking research and innovation in computing and AI, with a goal of strengthening the computing fields and more effectively connecting computing to every discipline at the Institute. Man’s is the most significant gift to support the building since Stephen A. Schwarzman’s foundational gift established the college.

“This new building is a home for the MIT community and a home for the people who are helping shape the future of computing and AI,” said MIT Schwarzman College of Computing Dean Daniel Huttenlocher SM ’84, PhD ’88, thanking Man and his family at a ceremony last winter. He credited Man’s transformative gift with better positioning the college to achieve its mission of creating a positive impact on society. Man recently accepted an invitation to join the Schwarzman College of Computing Dean’s Advisory Council.

The state-of-the-art college headquarters was designed to support the mission of meeting rapidly changing needs in computing through new approaches to research, education, and real-world engagement. The space provides MIT’s campus with a home base for computing research groups, new classrooms, and convening and event spaces.

“I come from a family where my father taught us that one should always be grateful to those people and places that have helped you to become who you are today,” Man reflects. “The only reason he had the opportunity of receiving education was through scholarships he earned throughout his life. He had a tremendous sense of gratitude to all those institutions that shaped him positively. MIT instilled in me unending intellectual curiosity and the love for the unknown, and I am honored and privileged to be associated with the MIT Schwarzman College of Computing.” —Christine Thielman

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DOUG ’72, SM ’74, ME ’75 AND SARA BAILEY | CHI-MAN LO ’74 AND ESTHER KONG LO

For the Love of Ballroom—and MIT

Doug Bailey ’72, SM ’74, ME ’75, president and CEO of American Bailey Corporation, discovered ballroom dancing well past his graduation from MIT. Yet today, his commitment to both ballroom and the Institute are closely intertwined. In 2023, Doug and his wife, Sara, made a lead contribution to the renovation of the Stratton Student Center (W20), including two new dance studios on the fourth floor. These spaces now serve as a home to the MIT Ballroom Dance Team, as well as numerous other MIT dance clubs and troupes, showcasing diverse styles from hip-hop and folk dancing to Asian and Latin traditions.

For Doug, who studied mechanical engineering at MIT, ballroom dancing represents “a balance of artistry with the mathematics and physics of movement.” His journey into ballroom began in 2004, when he surprised Sara by signing them up for lessons at a dance studio in their hometown of Westport, Connecticut. “Pretty quickly, we were hooked and, within one year, I began competing around the country with my professional partner” he says. Ballroom has become a shared passion for the Baileys, and a meaningful link to their MIT community. They are especially proud that his Class of 1972 contributed to the fourth-floor renovations as part of their 50th Reunion Class Gift.

Although MIT has had a ballroom dance team for decades and hosts the MIT Open, a major collegiate competition, the team lacked a permanent home. “They practiced wherever they could, including the lobby of Building 13,” Doug explains. “But a dance team without a proper floor is like a hockey team without an ice rink.” The Stratton Center’s two light-filled dance studios feature sprung floors, which provide flexing and cushioning. Best of all, the central location of these dance spaces near 77 Massachusetts Avenue, Kresge Lawn, Rockwell Cage, and the MIT Chapel—where Doug and Sara were married in 1974—places them “right at the heart of student life.”

Chi-Man Lo ’74 and his wife, Esther, are also long-time supporters of MIT’s ballroom dance community and made a generous gift to the W20 renovation. Chi-Man, an anesthesiologist, and Esther, a sculptor and art director, first took up ballroom dancing 15 years ago after receiving lessons as a gift from their children. Esther says that dancing has been a source of joy and new challenge, as well as a form of artistic expression. Chi-Man adds that it is also rigorous exercise “that can help ward off aging.”

Chi-Man studied computer science and biology at MIT and remembers his undergraduate years with great fondness. “MIT gave me a deep knowledge base, analytic ability, research opportunities, and generous financial aid for which I’m deeply grateful.” He sees a natural connection between the structure and discipline of ballroom and the sensibilities of MIT students. Ballroom also offers useful lessons in confidence, poise, and partnership. “Dance partners do not simply lead or follow,” he says. “It’s a conversation.” Esther found that dance both enhanced her physical strength and enriched her work as a sculptor. “My deeper understanding of body mechanics has inspired me to create pieces with more dynamic movement.”

For Doug, Chi-Man, and many others, dance and the arts are central to MIT’s vibrant student life. Doug is grateful for the chance to expand these activities in partnership with other alumni and friends, and visionary leaders like Suzy Nelson, vice chancellor for student life, and Gustavo Burkett, former senior associate dean for student life. Chi-Man shares this sentiment, finding great satisfaction in supporting the Student Center’s transformation and the many forms of dance—including ballroom—that enrich the MIT experience. “We hope this will be a lifelong gift for students, as it has been for us.” —Kris Willcox

“Dance partners do not simply lead or follow. It’s a conversation,” says Chi-Man Lo.

PHOTO: TONY LUONG

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THESE CHIPS ARE FAB

During the 2025 Independent Activities Period (IAP), students learned their way around a cleanroom at MIT.nano, the Institute's open-access, state-of-the-art research facility for nanoscale science and engineering. IAP is a four-week period in January when MIT community members are freed from the rigors of regular academics to enjoy specially designed classes, projects, or activities, with more than 600 choices offered each year. This IAP course was conducted at MIT.nano's fabrication facility, which provides advanced cleanroom toolsets and capabilities ranging from lithography, etching, and deposition to diffusion, wet processing, and packaging for use by any qualified researcher at MIT, as well as external users from industry, academia, and government. Over multiple sessions, a total of 306 students learned to properly gown up to work in a cleanroom and used fabrication tools to etch the image of their choice in a layer of aluminum just 50 nanometers thick. Participants wrapped up the session by moving their 1×1 inch chip to a small frame or carrier to take home.

PHOTO: SARAH BASTILLE PHOTOGRAPHY

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