

MIT Industrial Liaison Program Faculty Knowledgebase Report

2024 MIT Research and Development Conference

November 19, 2024 - November 20,
2024

Day One | Plenary (Salon 1-3)



8:00 AM

Registration and Light Breakfast

9:00 AM

Welcome and Introduction
Gayathri Srinivasan
Executive Director, [MIT Corporate Relations](#)

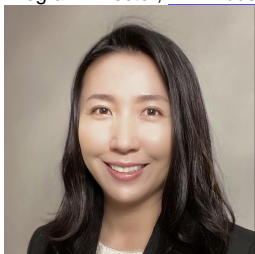


Gayathri Srinivasan
Executive Director
[MIT Corporate Relations](#)

Dr. Srinivasan is a distinguished scientist who received her PhD in Microbiology from The Ohio State University in 2004, where she contributed to the discovery of the 22nd amino acid, Pyrrolysine (2002). She first came to MIT as an NIH Postdoctoral Fellow in Prof. Tom Rajbhandary's lab, where her research focused on understanding protein synthesis mechanisms in Archaea.

Dr. Srinivasan subsequently moved into the business development and technology licensing space, serving in MIT's Technology Licensing Office, where she helped commercialize technologies in medical devices and alternative energies. She then moved to UMass Medical School's Office of Technology Management in 2009 and to Emory University in Atlanta in 2014 as the Director of Public and Private Partnerships for the Woodruff Health Sciences Center. In 2019, Dr. Srinivasan joined Emory's Office of Corporate Relations as Executive Director, and in 2021, she led the Office of Corporate and Foundation Relations.

Natalie Kim
Program Director, [MIT Industrial Liaison Program](#)



Natalie Kim
Program Director
[MIT Industrial Liaison Program](#)

Dr. Najung "Natalie" Kim is a Program Director at the MIT Industrial Liaison Program. She brings to the Office of Corporate Relations (OCR) expertise in strategic collaboration in life sciences and biotech industries, including cell and gene therapy and AI/ML analytics. Kim comes to OCR from Adjuvant Partners where she has been serving as Senior Consultant, Strategic Partnering, working to connect industry, startups, and academic leaders in the cell and gene therapy sector. Before Adjuvant, Natalie worked at Ajinomoto, where she was Manager of the Research & Innovation Center, facilitating collaborations on preclinical and clinical development of biologics, diagnostics, and cell therapy ancillary products in Asia, Europe, and North America. Prior to Ajinomoto, Kim was a business development manager at Medipost, where she led strategic partnerships in mesenchymal stem cell therapeutics in orthopedic and neurodegenerative applications. Kim also went through her postdoctoral training at the Wake Forest Institute for Regenerative Medicine as a Department of Defense Research Fellow working on translational gene therapy in tissue engineering programs.

Kim earned her B.S. Bioscience and Food Engineering at Handong Global University, her M.S. Medicine at Seoul National University in South Korea, and her Ph.D. Biomedical Engineering at the University of Iowa.

9:15 AM

MIT-Industry Research Collaboration
Ian A. Waitz

MIT Vice President for Research, [MIT Office of the President](#)
Jerome C Hunsaker Professor of [Aeronautics and Astronautics](#)
Margaret MacVicar Faculty Fellow



Ian A. Waitz

MIT Vice President for Research, [MIT Office of the President](#)
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Ian A. Waitz is the vice president for research at MIT and the Jerome C. Hunsaker Professor of Aeronautics and Astronautics. Vice President Waitz is the Institute's senior research officer and has overall responsibility for research administration and policy at the Institute. He sets MIT's strategic research direction, fosters an outstanding research environment for faculty, students, and staff, and enables major multidisciplinary research initiatives. The Vice President for Research is responsible for research integrity and compliance and plays a central role in the Institute's research relationships with the federal government, industry, and other sponsors. Vice President Waitz oversees MIT Lincoln Laboratory and more than a dozen interdisciplinary research laboratories and centers.

Waitz has been on the faculty at MIT since 1991. He has served as head of the Department of Aeronautics and Astronautics, as dean of the School of Engineering, and most recently, from 2017 to 2024, as MIT's vice chancellor for undergraduate and graduate education. While leading the Office of the Vice Chancellor, Waitz re-envisioned the first-year undergraduate academic experience, expanded undergraduate advising and financial aid, and increased support and professional development opportunities for graduate students. He also led MIT's response to graduate student unionization. As dean of the School of Engineering from 2011 to 2017, Waitz enhanced the school's ability to attract and support exceptional students and faculty, launched the MIT-wide Institute for Data, Systems, and Society and the Institute for Medical Engineering and Science, fostered innovation and entrepreneurship among students and faculty, and advanced programs for residential and online learning.

Waitz's early research led to advances in gas turbine engines, fluid mechanics, combustion, and acoustics. However, his most significant contributions have related to the modeling and evaluation of climate, air quality, and noise impacts of aviation, along with the assessment of technological, operational, and policy options for mitigating these impacts. These efforts have led to more rigorous evaluations of environmental policy and technology. His current research aims to reduce the climate impacts of aviation.

Waitz received his BS in 1986 from the Pennsylvania State University, his MS in 1988 from the George Washington University, and his PhD in 1991 from the California Institute of Technology. He has engaged widely with U.S. and international government and industry throughout his career. He is a member of the National Academy of Engineering, a fellow of the American Institute of Aeronautics and Astronautics, and has been recognized by multiple awards for teaching and research, including MIT's MacVicar Fellowship.

9:30 AM

Innovations at MIT
Anantha P. Chandrakasan

9:45 AM

Innovations in Industry

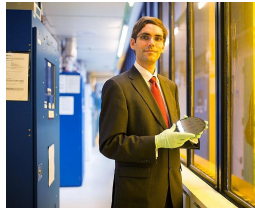
10:15 AM

Networking Break

10:45 AM

MIT Microsystems Technology Laboratories Overview
Tomás Palacios

Director, [Microsystems Technologies Laboratories \(MTL\)](#)
Professor, [MIT Department of Electrical Engineering and Computer Science \(EECS\)](#)



Tomás Palacios

Director, [Microsystems Technologies Laboratories \(MTL\)](#)
Professor, [MIT Department of Electrical Engineering and Computer Science \(EECS\)](#)

Tomás Palacios is the Director of Microsystems Technology Laboratories ([MTL](#)) and is a Professor in the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. He received his Ph.D. from the University of California - Santa Barbara in 2006 and his undergraduate degree in Telecommunication Engineering from the Universidad Politécnica de Madrid (Spain). Being a fellow of IEEE his current research focuses on demonstrating new electronic devices and applications for novel semiconductor materials such as graphene and gallium nitride. Tomás is passionate about making an impact on modern society in Energy, Engineering, Nanoscale, Physics, Semiconductors, Nanotechnology, and Climate Change. His work has been recognized with multiple awards, including the Presidential Early Career Award for Scientists and Engineers, the 2012 and 2019 IEEE George Smith Awards, and the NSF, ONR, and DARPA Young Faculty Awards, among many others. Prof. Palacios is the founder and director of the MIT MTL Center for Graphene Devices and 2D Systems, as well as the Chief Advisor and co-founder of Finwave Semiconductor, Inc. From 2023, Tomas serves as Associate Director of the SUPeRior Energy-efficient Materials and Devices (SUPREME) center, one of the seven 2023 JUMP 2.0 programs sponsored by [Semiconductor Research Corporation](#).

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11:00 AM

MIT Abdul Latif Jameel Water & Food Systems Lab: Overview
Renee Robins
Executive Director, [Abdul Jameel Water and Food Systems Lab](#)



Renee Robins
Executive Director
[Abdul Jameel Water and Food Systems Lab](#)

Renee J. Robins is the Executive Director of the Abdul Latif Jameel Water and Food Systems Lab at MIT. Renee works closely with faculty director John Lienhard to develop and manage the lab's activities, priorities, and strategy, including new funding opportunities and international collaborations.

Since 1998, Renee has worked on the conception, launch, and development of a number of large interdisciplinary, international, and partnership-based research and education collaborations at MIT and elsewhere. MIT programs she has worked on since she joined the staff in 1998 include the Cambridge MIT Institute (Associate Director for Graduate Programs), the MIT Portugal Program (Director for Program Integration), the Mexico City Program (Program Coordinator), and the Program on Emerging Technologies (Program Manager). From 2000-2011, she also served as Director of Special Projects for the Technology and Policy Program, where she was responsible for the development of a number of academic initiatives and major events. Before joining J-WAFS as executive director, she managed a \$15M research program at the Harvard Graduate School of Education as it scaled from implementation in one public school district to 59 schools in seven districts across North Carolina.

Outside of MIT, Renee's experience includes serving on the Board of Trustees for the International Honors Program (IHP) – a comparative multi-site study abroad program – and independent consulting work for the International Atomic Energy Agency in Vienna and program design and strategy consulting for Université Mohammed VI Polytechnique (UM6P), a new university in Morocco. For IHP, she conceived, initiated, and developed the "Cities in the 21st Century" program, which began in 1998 and is one of IHP's most popular offerings with over 1000 alumni. She is herself an alumna of IHP, having studied comparative culture and anthropology in seven countries around the world, and also studied at the Sorbonne in Paris.

Renee's holds two undergraduate degrees from MIT (biology and humanities/anthropology), and a masters degree in public policy from Carnegie Mellon University.

11:15 AM

MIT Breakthrough Tech AI
Chu Huang
Program Director
[Breakthrough Tech AI](#)

11:30 AM

MIT Startup Exchange Lightning Talks

12:30 PM

Lunch with Startup Exhibit

2:00 PM

Concurrent Tracks
- **Track 1: Space**
- **Track 2: Mobility**
- **Track 3: Innovations**

5:10 PM

Adjournment with Networking Reception

Day One | Track 1: Space

2:00 PM

Introduction
Ryo N. Ishibashi
Program Director, [MIT Corporate Relations](#)



Ryo N. Ishibashi
Program Director
[MIT Corporate Relations](#)

Ryo N. Ishibashi has nearly two decades of leadership experience in startups and multinationals, spanning multiple sectors such as automotive, software, and robotics. His most recent assignment was in Japan, leading a team of engineers to develop and deploy warehouse automation solutions that leverage artificial intelligence and machine learning.

In addition to Japan, he's also worked in Singapore -- and speaks English and Japanese fluently.

Ishibashi has a Master's degree from Columbia University and a Bachelor's degree from the University of Michigan.

Outside of work, he enjoys studying economics, finance, management, philosophy, and history -- while spending time with his two dogs.

2:05 PM

Whither the Space Enterprise - A View from the Lens of Technology and Policy

Daniel E. Hastings

The space enterprise is changing dramatically. Entrepreneurial space has increased dramatically, as has international space activity. The talk will review the critical space policy issues based on a recent class in this area. Next, it will outline the issues in space technology and architecture from the perspective of the AIAA and then turn to what research work in space is going on in the MIT AeroAstro Department. The talk will finish with some of the demographic challenges for the space enterprise.

2:40 PM

Earth-to-Orbit: An Update on the Global Launch Industry

Olivier de Weck

Reaching Earth's orbit is an extremely energetic event. To remain in orbit requires a velocity of about 8 km/s, which corresponds to a specific energy of 30 MJ per kilogram. Since 1957 humans have been able to launch themselves as well as artificial satellites into orbit at increasing frequencies. This talk will give an update on the current state of launch vehicle technologies and this important and enabling part of the space sector. In 2023, for example, there were 222 launch attempts worldwide, of which 95% were successful. Assuming a CAGR of 12%, we predict that by 2027, there will be daily launches to space from somewhere on Earth's surface. This talk will summarize some of the physics, technologies, and economics of the launch vehicle industry.

3:20 PM

Networking Break

3:50 PM

Space Security Issues in Space, Traffic Management and Space Sustainability
Richard Linares

Rockwell International Career Development Professor
Associate Professor of Aeronautics and Astronautics, [MIT AeroAstro](#)



Richard Linares

Rockwell International Career Development Professor
Associate Professor of Aeronautics and Astronautics, [MIT AeroAstro](#)

Richard Linares joined the Department of Aeronautics and Astronautics as an assistant professor last July. Before joining MIT, he was an assistant professor at the University of Minnesota's aerospace engineering and mechanics department. Linares received his BS, MS, and PhD degrees in aerospace engineering from the State University of New York at Buffalo. He was a Director's Postdoctoral Fellow at Los Alamos National Laboratory and also held a postdoc appointment at the United States Naval Observatory. His research areas are astrodynamics, estimation and controls, satellite guidance and navigation, space situational awareness, and space-traffic management.

[View full bio](#)

MIT ARCLab focuses on space traffic management, space situational awareness, and space sustainability. This talk will analyze space security issues related to space management and orbital debris. It will also cover topics in space awareness, including behavior estimation, behavior characterization, and learning. Furthermore, the talk will discuss the Department of the Air Force's AI Accelerator, which has a focused project dedicated to space awareness and the development of AI techniques to address space security issues.

4:30 PM

Automating the Identification of Chemical Mixture Components with Machine Learning

Brett McGuire
Class of 1943 Career Development Assistant Professor
[MIT Department of Chemistry](#)

Identifying the precise chemical makeup of complex mixtures is of interest in fields ranging from atmospheric chemistry to pharmaceutical development and quality control to my own field of astrochemistry. A variety of analytical tools such as spectroscopy, mass spectrometry, nuclear magnetic resonance, and chromatography provide chemical "fingerprinting," which can, in theory, be used to identify these chemical components, but the sheer density of spectral features of different molecules that are often present in such readings can make unambiguous assignment to individual species challenging. Yet, the components are commonly chemically related due to the shared chemical evolution of the mixture. Therefore, along with investigating the analytical signals, analysis of the structural and chemical relevance of a molecule is an important consideration when determining which species are present in a given mixture. My group works primarily in applications of rotational spectroscopy, and thus, in this talk, I will present a method that combines machine-learning molecular embedding models with a graph-based ranking system to determine the likelihood of a molecule being present in a pure rotational spectrum based on the other known species, chemical priors, and spectroscopic information. I'll present details on the process as well as demonstrate its utility on both laboratory mixtures and astrochemical observations from space. Our work demonstrates that the chemical inventory can be identified with extremely high accuracy in a much more efficient manner than manual analysis.

5:10 PM

Adjournment with Networking Reception

Day One | Track 2: Mobility

2:00 PM

Introduction
David Martin
Program Director, [MIT Industrial Liaison Program](#)



David Martin
Program Director
[MIT Industrial Liaison Program](#)

Mr. David Martin joined Corporate Relations on August 15, 2018 as Program Director for the ILP. Martin comes to OCR with deep and broad knowledge and expertise in program management, innovation, commercial and government contracting, and strategic planning. In his most recent position at Altran (Burlington, MA) as the VP Programs, Dave had many major accomplishments including leading an innovation team to develop new technology in the beverage-filling industry, and managing client-facing relations supporting sales and execution of projects. Before that, he was at Windmill International as VP, Product Development, R&D. There he spearheaded the move into new markets for an innovative satellite communications product including through the SBIR program where he secured funding and sponsorship. Martin also leveraged other government programs collaborating with the DoD and congressional contacts. He began his career in the US Air Force as an Active Duty Captain and served for 10 years as an Acquisition Manager, Scientist, Test Director, and finally as Executive Officer in the Executive Office for Command, Control and Communications Systems in the Pentagon. Martin also served in the US Air Force Reserves before joining Windmill.

Mr. Martin earned his B.S., Physics from MIT, and his M.S., Systems Management from the University of Denver. He also earned a Certificate in Information Systems at the University of Denver.

2:05 PM

Mobility Speaker 1

2:40 PM

Mobility Speaker 2

3:20 PM

Networking Break

3:50 PM

Mobility Speaker 3

4:30 PM

Mobility Speaker 4

5:10 PM

Adjournment with Networking Reception

Day One | Track 3: Innovations

2:00 PM

Introduction: Setting the Stage for Innovation
Corey Cheng
Program Director, [MIT Industrial Liaison Program](#)



Corey Cheng
Program Director
[MIT Industrial Liaison Program](#)

Dr. Corey Cheng joined the Office of Corporate Relations (OCR) as an Senior Industrial Liaison Officer in December 2011. He has broad interests in science and technology, and uses his technical research experience to better serve ILP members in Asia and the United States.

Cheng spent six years in industrial research at Dolby Laboratories, San Francisco, where he contributed to sound compression (Dolby Digital, AAC, MP3), wireless networking, fingerprinting, and spatial/"3-D audio" technologies. Later, he was Associate Professor and Director of the undergraduate and graduate programs in music engineering technology at the University of Miami, Florida, where he also held a dual appointment in Electrical and Computer Engineering. Cheng holds various U.S. and international patents, has published technical papers, and has presented at various conferences. His technical work includes collaborations and consulting work with the U.S. Naval Submarine Medical Research Laboratory, Fujitsu-Ten USA, Starkey Laboratories, America Online, and the Chicago Board of Trade (CBOT). Cheng was an IEEE Distinguished Lecturer for the Circuits and Systems Society from 2009-2010, and was a Westinghouse (Intel) Science Talent Search national finalist many years ago.

Cheng holds degrees in Electrical Engineering (Ph.D., M.S.E. University of Michigan), Electro-Acoustic Music (M.A. Dartmouth College), and physics (B.A. Harvard University).

Personally, Dr. Cheng is an American Born Chinese (ABC), serves as his family's genealogist, and traces his roots back to Toi San, Guang Dong Province and Xing Hua, Jiang Su Province, China. He also has a background in music, and his electro-acoustic compositions have been presented at various U.S. and international venues.

2:05 PM

Enabling Innovation In Industry and Academia Through Digital Transformation

Renaud Fornier
Chief Officer for Business and Digital Transformation
[MIT Office of the Executive Vice President and Treasurer \(EVPT\)](#)

2:40 PM

Measuring Corporate Culture for Innovation
Donald Sull

Professor, Technological Innovation, Entrepreneurship, and Management, [MIT Sloan School of Management](#)



Donald Sull

Professor, Technological Innovation, Entrepreneurship, and Management, [MIT Sloan School of Management](#)

[Donald Sull](#) is a Professor of the Practice at the MIT Sloan School of Management, where he directs the [Strategic Agility Project](#) and the [Culture 500](#), a data-based view of company culture for some of the largest and most powerful organizations in the world. Don has worked at McKinsey & Company, and as a management-investor with the leveraged buyout firm Clayton, Dubilier & Rice. Sull is the cofounder of [CultureX](#), which leverages proprietary AI to measure and improve corporate culture. He is the chairman of [FilmFish](#) and an advisor to several startups including [Betterworks](#), [Tomorrow.io](#), and [eToro](#). He has advised top teams of more than fifty Fortune Global 500 companies, as well as non-business organizations ranging from the Bill and Melinda Gates Foundation to the Naval Criminal Investigative Service (NCIS). Sull was formerly a Professor at Harvard Business School and London Business School, and earned his Bachelor's, Master's, and Doctorate at Harvard University.

[View full bio](#)

3:20 PM

Networking Break

3:50 PM

Designing the X: The Transformational Powers of Design
Svafa Grönfeldt

Professor, [MIT Morningside Academy for Design](#)
Founding Member and Faculty Director, MIT [DesignX](#) Innovation Accelerator



Svafa Grönfeldt

Professor, [MIT Morningside Academy for Design](#)
Founding Member and Faculty Director, MIT [DesignX](#) Innovation Accelerator

Svafa Grönfeldt is a Professor of Practice at the Massachusetts Institute of Technology. She is a founding member and faculty Director of MIT DesignX, a program dedicated to design innovation and entrepreneurship. Dr. Grönfeldt is the co-founder of The MET Fund, a Cambridge-based seed investment fund. She is a member of the Board of Directors of three publicly listed companies on NASDAQ OMX and the Amsterdam Stock Exchange. As a member of a team of entrepreneurs that created and scaled two global life science companies, her professional career has been focused on organizational design for high-growth companies. As a venture designer, she works in parallel in industry and academia with teams of people from around the world to build companies, brands, experiences, academic programs, processes, and organizational structures designed to improve business results and workplace well-being. Applying the lens of design with a concern for human needs to solve complex problems has been a focal point of her work. Dr. Grönfeldt holds a Ph.D. from the London School of Economics

4:30 PM

Sourcing Innovation: Applications to AI
Neil Thompson

Director, [MIT FutureTech Research Project](#) at [MIT's Computer Science and Artificial Intelligence Lab \(CSAIL\)](#)
Principal Investigator, [MIT Initiative on the Digital Economy](#)



Neil Thompson

Director, [MIT FutureTech Research Project](#) at [MIT's Computer Science and Artificial Intelligence Lab \(CSAIL\)](#)
Principal Investigator, [MIT Initiative on the Digital Economy](#)

Neil Thompson is the Director of the FutureTech research project at MIT's Computer Science and Artificial Intelligence Lab and a Principal Investigator at MIT's Initiative on the Digital Economy.

Previously, he was an Assistant Professor of Innovation and Strategy at the MIT Sloan School of Management, where he co-directed the Experimental Innovation Lab (X-Lab), and a Visiting Professor at the Laboratory for Innovation Science at Harvard. He has advised businesses and government on the future of Moore's Law, has been on National Academies panels on transformational technologies and scientific reliability, and is part of the Council on Competitiveness' National Commission on Innovation & Competitiveness Frontiers.

He has a PhD in Business and Public Policy from Berkeley, where he also did Masters degrees in Computer Science and Statistics. He also has a masters in Economics from the London School of Economics, and undergraduate degrees in Physics and International Development. Prior to academia, He worked at organizations such as Lawrence Livermore National Laboratory, Bain and Company, the United Nations, the World Bank, and the Canadian Parliament.

Firms always face a choice for where to source their innovation: do they hire internal researchers? Work with startups or external companies? There are many options. In this talk, I will present results from research on how firms are sourcing digital innovations, and then I will speak specifically about AI and how to view it in this framework.

5:10 PM

Adjournment with Networking Reception

Day Two | Plenary (Salon 1-3)

9:00 AM

Welcome and Introduction

Hong Fan

Program Director, [MIT Corporate Relations](#)



Hong Fan

Program Director

[MIT Corporate Relations](#)

Hong Fan is a Program Director at the Office of Corporate Relations at MIT. She joined OCR in August 2016, brought with her 20+ years of international work experience across semiconductor, consumer electronics, telecom, and higher education.

Prior to joining OCR, Hong spent 12 years in the semiconductor industry with executive functions in strategic marketing, business development, corporate strategy, product management, and product marketing at Analog Devices and MediaTek. During those years, Hong played instrumental roles in identifying emerging business opportunities related to wireless communication networks, smartphones, wearable devices, Internet of Things (IoT), and medical devices and applications. She led cross-functional teams in defining and driving product and market strategy for businesses with annual revenue ranging from \$30 million to \$100 million.

Prior to joining the semiconductor industry, Hong spent 6 years in the telecommunications and electronics industry, leading engineering teams at companies such as Lucent Technologies and Watkins-Johnson Company for the development of digital signal processing, wireless communications, and micro-controller software.

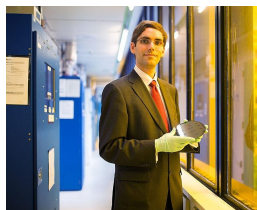
Before coming to US, Hong was a strategic research staff at the President Office of Shanghai Jiao Tong University, one of the oldest universities in China. She was the first woman to hold this highly selective position.

Hong has a B.S in Electronic Engineering from Shanghai Jiao Tong University, an M.S. in Electrical Engineering from University of Maryland at College Park, and an MBA from Sloan School of Management at MIT. She received numerous academic honors and awards including the McKinsey & Co. Scholarship, the NSF Graduate Research Fellowship, and the Shanghai Outstanding College Graduate Award.

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Opening Remarks
Tomás Palacios

Director, [Microsystems Technologies Laboratories \(MTL\)](#)
Professor, [MIT Department of Electrical Engineering and Computer Science \(EECS\)](#)



Tomás Palacios

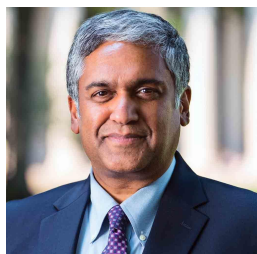
Director, [Microsystems Technologies Laboratories \(MTL\)](#)
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Tomás Palacios is the Director of Microsystems Technology Laboratories ([MTL](#)) and is a Professor in the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. He received his Ph.D. from the University of California - Santa Barbara in 2006 and his undergraduate degree in Telecommunication Engineering from the Universidad Politécnica de Madrid (Spain). Being a fellow of IEEE his current research focuses on demonstrating new electronic devices and applications for novel semiconductor materials such as graphene and gallium nitride. Tomás is passionate about making an impact on modern society in Energy, Engineering, Nanoscale, Physics, Semiconductors, Nanotechnology, and Climate Change. His work has been recognized with multiple awards, including the Presidential Early Career Award for Scientists and Engineers, the 2012 and 2019 IEEE George Smith Awards, and the NSF, ONR, and DARPA Young Faculty Awards, among many others. Prof. Palacios is the founder and director of the MIT MTL Center for Graphene Devices and 2D Systems, as well as the Chief Advisor and co-founder of Finwave Semiconductor, Inc. From 2023, Tomas serves as Associate Director of the SUPeRior Energy-efficient Materials and Devices (SUPREME) center, one of the seven 2023 JUMP 2.0 programs sponsored by [Semiconductor Research Corporation](#).

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Anantha P. Chandrakasan

Dean of MIT's [School of Engineering](#),
MIT's Chief Innovation and Strategy Officer
Vannevar Bush Professor, [MIT Electrical Engineering and Computer Science](#)



Anantha P. Chandrakasan

Dean of MIT's [School of Engineering](#),
MIT's Chief Innovation and Strategy Officer
Vannevar Bush Professor, [MIT Electrical Engineering and Computer Science](#)

Anantha P. Chandrakasan is dean of MIT's [School of Engineering](#), MIT's Chief Innovation and Strategy Officer, and the Vannevar Bush Professor of Electrical Engineering and Computer Science. He serves as chair of the [MIT Climate and Sustainability Consortium](#) and the [MIT AI Hardware Program](#), and co-chair of the [MIT-IBM Watson AI Lab](#), the [MIT-Takeda Program](#), and the [MIT and Accenture Convergence Initiative for Industry and Technology](#).

He earned his bachelor's (1989), master's (1990), and doctoral (1994) degrees in electrical engineering and computer sciences from the University of California, Berkeley. He joined the MIT faculty in 1994 and was the director of the [MIT Microsystems Technology Laboratories](#) from 2006 to 2011. From July 2011 through June 2017, he served as head of the [Department of Electrical Engineering and Computer Science](#) (EECS), a position that concluded with his appointment as dean in July 2017.

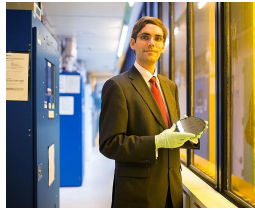
As dean of engineering since 2017, Chandrakasan has implemented various interdisciplinary programs, creating new models for how academia and industry can work together to accelerate the pace of research. This has resulted in the launch of initiatives including the [MIT Climate and Sustainability Consortium](#), the [MIT-IBM Watson AI Lab](#), the [MIT-Takeda Program](#), the [MIT and Accenture Convergence Initiative](#), the [MIT Mobility Initiative](#), the [MIT Quest for Intelligence](#), the [MIT AI Hardware Program](#), the [MIT-Northpond Program](#), the [MIT Faculty Founder Initiative](#), and the [MIT-Novo Nordisk Artificial Intelligence Postdoctoral Fellows Program](#).

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9:30 AM

Keynote: MIT Microsystems Technology Laboratories (MTL) at 40 Years
Tomás Palacios

Director, [Microsystems Technologies Laboratories \(MTL\)](#)
Professor, [MIT Department of Electrical Engineering and Computer Science \(EECS\)](#)



Tomás Palacios

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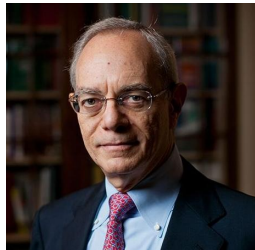
10:00 AM

Panel Discussion: The Making of MTL - A Unique Partnership Between Academia and Industry

L. Rafael Reif

MIT President Emeritus

Ray and Maria Stata Professor of Electrical Engineering and Computer Science



L. Rafael Reif

MIT President Emeritus

Ray and Maria Stata Professor of Electrical Engineering and Computer Science

Rafael Reif served as the 17th President of the Massachusetts Institute of Technology (MIT) between July 2012 and January 2023, where he led MIT's pioneering efforts to help shape the future of higher education. A champion for both fundamental science and MIT's signature style of interdisciplinary, problem-centered research, he is also pursuing an aggressive agenda to encourage innovation and entrepreneurship.

In education, his central focus has been the development of the Institute's latest experiments in online learning, MITx and edX, which he spearheaded in his previous role as MIT provost. As of March 2017, the open online learning platform edX had engaged more than 11 million unique learners. The final report of his Institute-wide Task Force on the Future of MIT Education spurred rapid adoption of blended learning models in MIT classrooms and the October 2015 announcement of a MicroMaster's credential from MITx, the Institute's portfolio of massive open online courses.

In keeping with MIT's mission to "bring knowledge to bear on the world's great challenges," in May 2014, Dr. Reif launched the MIT Environmental Solutions Initiative, and in October 2015, Dr. Reif and his leadership team issued MIT's Plan for Action on Climate Change, centered on research, education, campus sustainability and a strategy of industry engagement.

To enhance MIT's innovation ecosystem and equip the next generation of innovators to drive their ideas to impact, in October 2016 Dr. Reif launched The Engine, an accelerator specially geared to help "tough tech" ventures deliver innovations that address humanity's great challenges. Additional steps include the October 2013 launch of the MIT Innovation Initiative, the creation of the MIT Hong Kong Innovation Node, a new Minor in Entrepreneurship and Innovation and the MIT Sandbox Innovation Fund Program.

To accelerate research and innovation at the nanoscale, MIT is also constructing MIT.nano, a major new facility at the heart of campus set to open in 2018. And because MIT's entrepreneurial ecosystem extends well beyond the campus, Dr. Reif is leading an ambitious, decade-long redevelopment initiative in Kendall Square.

On May 6, 2016, Dr. Reif announced the \$5 billion "MIT Campaign for a Better World." A member of the MIT faculty since 1980, Dr. Reif has served as director of MIT's Microsystems Technology Laboratories, as associate department head for Electrical Engineering, as head of the Department of Electrical Engineering and Computer Science (EECS), and as provost.

An elected member of the National Academy of Engineering and the American Academy of Arts and Sciences, Dr. Reif is the inventor or co-inventor on 13 patents, has edited or co-edited five books and has supervised 38 doctoral theses. He received the degree of Ingeniero Eléctrico from Universidad de Carabobo, Valencia, Venezuela, and his doctorate in electrical engineering from Stanford University.

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Ray Stata

Vladimir Bulovic

Director, [MIT.nano](#)

Fariborz Maseeh (1990) Professor of Emerging Technology, [MIT Electrical Engineering and Computer Science \(EECS\)](#)



10:40 AM	Networking Break
10:40 AM	Concurrent Tracks <ul style="list-style-type: none"> - Track 4: Healthcare - Track 5: Artificial Intelligence - Track 6: Quantum 2.0
12:40 PM	Lunch and MTL Exhibit
2:00 PM	Panel Discussion: Workforce Development in Microsystems and Nanoelectronics
3:00 PM	Networking Break
3:30 PM	The Next Generation of MTL Leaders and Innovators
6:00 PM	MTL 40 Year Anniversary Celebration Reception and Dinner

Day Two | Track 4: Healthcare

11:00 AM	<p>Ahmad Bahai</p> <p>Recent innovations in semiconductor technology and biochemistry have brought about opportunities for realizing the long sought-after dream of personalized care. Periodic clinical-quality readings of biomarkers and vital signs provide the data needed to build a digital twin of one's biological profile based on an AI-generated model. The digital twin will be a powerful tool for prevention, diagnosis, prognosis as well as therapeutic plans. The "Waves, Bits, and Molecules" lab at MIT envisions transformational improvements in healthcare and life quality through innovations in advanced technologies at the intersection of semiconductor technology, biochemistry, and machine learning. In this talk, we review innovative semiconductor technologies such as electrochemical, Ultrasonic, photoacoustic, RF, and magnetic sensors and nanoactuators, which can transform the future of personalized diagnostics and treatments.</p>
11:20 AM	<p>Machine-Learning-Guided Quality Control of CAR-T Therapy Product Using Microfluidic Biophysical Cytometry</p> <p>Jongyoon Han</p> <p>Chimeric Antigen Receptor (CAR) T cell therapy has revolutionized cancer care, yet its manufacturing remains challenging due to variability in quality and efficacy. In this talk we introduce a novel microfluidic, label-free cellular biophysical profiling assay that rapidly assesses the functional phenotypes of CAR T cells. Our assay leverages biophysical features such as cell size and deformability to directly correlate with critical functional attributes, including the CD4:CD8 ratio, effector and central memory subtypes, and killing potency. Validated through extensive longitudinal studies across multiple CAR T batches from different donors and culture platforms, this method requires fewer than 10,000 cells and completes profiling within 10 minutes. The assay provides an efficient means to predict CAR T cell quality at critical manufacturing stages, thereby potentially reducing batch failure rates and enhancing therapeutic consistency.</p>
11:40 AM	Networking Break

12:00 PM

Neural Computation Underlying Behavior

Mark Harnett

The thousands of inputs a single neuronal cell receives can interact in complex ways that depend on their spatial arrangement and on the biophysical properties of their respective dendrites. For example, operations such as coincidence detection, pattern recognition, input comparison, and simple logical functions can be carried out locally within and across individual branches of a dendritic tree. In this talk, we will present the hypothesis that the brain leverages these fundamental integrative operations within dendrites to increase the processing power and efficiency of neural computation. We will focus on sensory processing and spatial navigation, with the goal of understanding the mechanistic basis of these brain functions.

12:20 PM

Illuminating Diseases by Imaging Intrinsic Contrast

Sixian You

Many diseases manifest with subtle metabolic and structural changes before becoming visually apparent on traditional biopsies. Label-free nonlinear microscopy offers the potential for non-invasive, metabolic, in vivo imaging but faces limitations in contrast generation and clinical adaptability. In this talk, I will present optical and computational methods overcoming these challenges. By controlling nonlinear effects in multimode fibers, flexible, efficient, and deep excitation of metabolic and structural contrast can be achieved without the aid of stains, enabling perturbation-free exploration of living systems. These capabilities further motivate the development of AI algorithms that boost photon efficiency and 3D imaging resolution, allowing us to illuminate diseases in unprecedented detail. The integrated approach promises to bridge the gap between theoretical potential and practical utility in clinical and biological settings.

12:40 PM

Lunch & MTL Exhibit

Day Two | Track 5: Artificial Intelligence

11:00 AM

Analog Brain-Inspired Computing
Bilge Yildiz

Breene M. Kerr (1951) Professor, Professor of [Materials Science and Engineering](#)
Professor of [Nuclear Science and Engineering](#)



Bilge Yildiz

Breene M. Kerr (1951) Professor, Professor of [Materials Science and Engineering](#)
Professor of [Nuclear Science and Engineering](#)

Bilge Yildiz is the Breene M. Kerr (1951) Professor in the Nuclear Science and Engineering and the Materials Science and Engineering Departments at Massachusetts Institute of Technology (MIT), where she leads the Laboratory for Electrochemical Interfaces. Yildiz's research focuses on laying the scientific groundwork to enable next generation electrochemical devices for energy conversion and information processing. The scientific insights derived from her research guide the design of novel materials and interfaces for efficient and durable solid oxide fuel cells, electrolytic water splitting, brain-inspired computing, and solid state batteries. Yildiz laboratory has made significant contributions in advancing the molecular-level understanding of ion diffusion, oxygen reduction, water splitting and charge transfer mechanisms in mixed ionic-electronic conducting oxides. Yildiz's research has uncovered the effects of surface chemistry, elastic strain, dislocations, and strong electric fields on the reactivity, efficiency, and degradation in these applications. Her approach combines computational and experimental analyses at the atomic and electronic level, using in situ scanning tunneling and X-ray spectroscopy together with first-principles calculations and novel atomistic simulations. Yildiz's teaching and research efforts have been recognized by the Argonne Pace Setter (2006), ANS Outstanding Teaching (2008), NSF CAREER (2011), IU-MRS Somiya (2012), the ECS Charles Tobias Young Investigator (2012), the ACeRS Ross Coffin Purdy (2018) and the LG Chem Global Innovation Contest (2020) awards. She is a Fellow of the American Physical Society (2021), the Royal Society of Chemistry (2022), and the Electrochemical Society (2023) and an elected member of the Austrian Academy of Science (2023).

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Physical neural networks made of analog resistive switching processors are promising platforms for analog computing and for emulating biological synapses. State-of-the-art resistive switches rely on either conductive filament formation or phase change. These processes suffer from poor reproducibility or high energy consumption, respectively. Our work, on one hand, focuses on understanding and controlling the variability of the conductive filament formation in insulating oxide materials. On the other hand, we are innovating alternative synapse designs that rely on a deterministic charge-controlled mechanism, modulated electrochemically in a solid state, and that consists of shuffling the smallest cation, the proton. As typical throughout our research, here, too, we combine experimental synthesis, fabrication, and characterization with first principles-based computational modeling to gain a deep understanding and control of these promising devices.

11:20 AM

Modeling and Design of Efficient and Flexible Hardware Accelerators for Deep Learning

Joel Emer
Professor of the Practice
[MIT Electrical Engineering & Computer Science Department \(EECS\)](#)

11:40 AM

Networking Break

12:00 PM	<p>Is AI Ready to Transform Chemistry and Materials Science?</p> <p>Rafael Gomez-Bombarelli</p> <p>AI's influence is undeniable in the digital realm, affecting consumers' lives and corporate operations. Transferring these advancements to sectors producing physical goods, such as drug discovery and biotech, commodity chemicals, materials for energy and sustainability, and manufacturing, presents a thrilling prospect and a translational challenge. This talk will explore the present use cases and the potential of applying generative AI within the chemistry and materials domain. Unlike a large part of the tech sector, these industries are capital-intensive and cautious, meaning that AI must bridge an "execution gap" between the digital and physical realms for value generation. We will outline strategies to overcome current technical and cultural hurdles.</p>
12:20 PM	<p>Efficient Multi-modal LLM on the Edge</p> <p>Song Han Associate Professor MIT Electrical Engineering & Computer Science Department</p> <p>This talk presents efficient multi-modal LLM innovations with algorithm and system co-design. I'll first present VILA, a visual language model deployable on the edge. It is capable of visual in-context learning, multi-image reasoning, video captioning and video QA. Followed by SmoothQuant and AWQ for LLM quantization, which enables VILA deployable on edge devices, bringing new capabilities for mobile vision applications. Second, I'll present StreamingLLM, a KV cache optimization technique for long conversation and QUEST, leveraging sparsity for KV cache compression.</p>
12:40 PM	Lunch & MTL Exhibit

Day Two | Track 6: Quantum 2.0

11:00 AM	<p>Quantum Computing</p> <p>William D. Oliver</p> <p>Quantum computers are fundamentally different than conventional computers. They promise to address certain problems that are practically prohibitive and even impossible to solve using today's supercomputers. The challenge is building one that is large enough to be useful. In this talk, we will provide an overview of contemporary quantum computing at an intuitive level, including the technology, the promise, the hype, and the challenges ahead associated with realizing useful quantum computers at scale.</p>
11:20 AM	<p>Compiling Machine Intelligence onto (Quantum) Optoelectronic Systems</p> <p>Dirk Englund</p> <p>The world of quantum mechanics holds enormous potential to address unsolved problems in communications, computation, precision measurements, and machine learning/AI. Dr. Englund's QP-Group at MIT pursues experimental and theoretical research towards machine learning hardware and critical quantum technologies (computing, networking, sensing) by precision control of photons and atomic systems, combining techniques from atomic physics, optoelectronics, and modern semiconductor devices. In this talk, Dr. Englund will share some of the latest research conducted by his group at MIT and their potential applications.</p>
11:40 AM	Networking Break

12:00 PM

Engineering at the Limits of the Nanoscale

Farnaz Niroui
Associate Professor
[MIT Electrical Engineering & Computer Science Department](#)

Engineering matter, with near-atomic control, is core to designing the emergent properties that help drive today's technology frontiers in computing, sensing and information processing. However, realizing such precision engineering is challenged by the conventional fabrication strategies lacking the desired resolution and compatibility for the integration of unconventional nanomaterials and device designs. We address these limits by developing new engineering frameworks enabling down to atomic-scale control of materials and their heterogeneous integration into functional structures with designer properties for next-generation electronics, optoelectronics, and photonic quantum technologies, which will be discussed in this talk.

12:20 PM

Quantum Matter

Pablo Jarillo-Herrero
Cecil and Ida Green Professor of Physics
[MIT Department of Physics](#)

The understanding of strongly interacting quantum matter has challenged physicists for decades. The discovery four years ago of correlated phases and superconductivity in magic angle twisted bilayer graphene has led to the emergence of a new materials platform to investigate strongly interacting physics, namely moiré quantum matter. These systems exhibit a plethora of quantum phases, such as correlated insulators, superconductivity, magnetism, ferroelectricity, and more. In this talk, Jarillo-Herrero will review some of the recent advances in the field, focusing on the newest generation of moiré quantum systems, where correlated physics, superconductivity, and other fascinating phases can be studied with unprecedented tunability. He will conclude with an outlook of some exciting directions in this emerging field.

12:40 PM

Adjournment with Bagged Lunch