2024 MIT Research and Development Conference

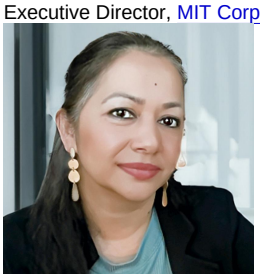
November 19, 2024 - November 20, 2024

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 Corporate Relations

Natalie Kim

Program Director, MIT Corporate Relations

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
Jerome C. Hunsaker Professor of Aeronautics and Astronautics

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Ian A. Waitz is the Jerome C. Hunsaker Professor of Aeronautics and Astronautics and vice president for research at MIT. 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 US 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.

Throughout the Institute's history, industrial leaders have turned to MIT's research enterprise for special expertise. Because excellence, collaboration, and practical impact are in our DNA, here at MIT you can pose the most complex problems and the most urgent challenges, access the most talented workforce, and join in creating the future. Ian Waitz, VP for Research, will share his thoughts on why corporate engagement with academia builds a stronger ecosystem for innovation, what makes MIT the place to be, and how you can make the most of your engagements on campus.

9:35 AM

Innovations at MIT

Anantha P. Chandrakasan

As MIT's inaugural Chief Innovation and Strategy Officer, Dean Anantha Chandrakasan will outline his vision for advancing MIT's innovation ecosystem to address the world's most pressing challenges. Drawing on MIT's strengths in research, interdisciplinary collaboration, and industry partnerships, he will highlight some recent and near-term successes, along with current initiatives that seek to expand the institute's impact. In alignment with President Kornbluth's priorities, Dean Chandrakasan will share how MIT can catalyze breakthroughs in areas like climate, life sciences and healthcare, GenAI, and manufacturing through bold thinking and strategic partnerships. He will also emphasize the critical role industry leaders can play in this process, inviting deeper engagement to co-create solutions that harness talent and research to drive transformative change. Attendees will gain insights into how they can actively collaborate with MIT to shape a better, more innovative future.

9:55 AM

Innovations at Fujitsu

Keith Dear

Building Innovation Bridges – While science, technology, and product development are essential, process and business model innovation are equally critical—and should often take precedence. Keith Dear, Managing Director of Fujitsu's Centre for Cognitive and Advanced Technologies, will present a case study of their partnership with Callen Lenz, focusing on finding new markets, connecting the UK and Japan, and how this is driving science and technology (S&T) and product innovation, specifically in computer vision. Keith will discuss why Japan is a desirable location for building innovation bridges, how Fujitsu UK has been pursuing this goal and the benefits it brings to both countries and their companies.

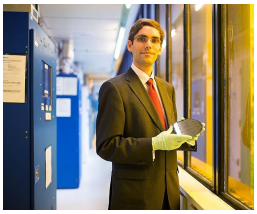
10:15 AM

Networking Break

10:45 AM

MIT Microsystems Technology Laboratories: Overview
Tomás Palacios

Director, MIT Microsystems Technology Laboratories (MTL)
Professor, MIT Department of Electrical Engineering and Computer Science (EECS)



Tomás Palacios

Director, MIT Microsystems Technology 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.

View full bio

11:00 AM

MIT Abdul Latif Jameel Water and Food Systems Lab (J-WAFS): Overview
Renee Robins
Executive Director, Abdul Latif Jameel Water and Food Systems Lab (J-WAFS)

Renee Robins
Executive Director
Abdul Latif Jameel Water and Food Systems Lab (J-WAFS)

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.

11:10 AM

MIT Breakthrough Tech AI: Overview

Chu Huang
Program Director
Breakthrough Tech AI

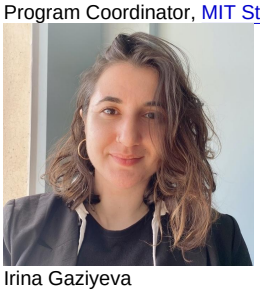
11:20 AM

MIT Senseable City Lab: Overview
Umberto Fugiglando
Research Manager & Partnerships Lead, MIT Senseable City Lab

Umberto Fugiglando
Research Manager & Partnerships Lead
MIT Senseable City Lab

Umberto Fugiglando is a Research Manager at the Senseable City Lab at the Massachusetts Institute of Technology (MIT), a multidisciplinary research group that studies the interface between cities, people, and technologies. He has been leading and managing multi-stakeholder research projects on data science applied to urban technology initiatives, and he is in charge of developing and maintaining partnerships between cities, companies, and foundations that support the group's research agenda. Additionally, Umberto is co-founder of ReFuse, a social enterprise that aims at improving the well-being of communities exposed to waste hazards. Umberto’s background is in Applied Mathematics and Engineering, and he has studied in Italy, Sweden, Canada, and the US.

11:30 AM	MIT Startup Exchange Lightning Talks Irina Gaziyeva Program Coordinator, MIT Startup Exchange



Irina Gaziyeva
Program Coordinator
MIT Startup Exchange

Irina Gaziyeva comes to Corporate Relations from the Mechanical Engineering Department at MIT where she worked 10 years as Administrative Assistant where she has supported four senior faculty members and their research groups (20-25 graduate students). Since 2018, Irina has acted as program coordinator, teaming-up with the program manager and program faculty lead for the MechE Alliance program. She has facilitated 45+ virtual seminars, workshops, and mentoring events in this informal role. Irina has also actively connected members of the MechE community to support student career development, mentorship, and networking opportunities with MIT alumni and industry. Before MIT, Irina held positions as Administrative Assistant and Member Representative at Brookline Dental and Tufts Health plan, respectively. Irina has also been a Community Organizer in Worcester, MA.

Irina earned her B.A., Management (with Innovation & Entrepreneurship track) at Clark University in Worcester, and her M.S., Program and Project Management from Brandeis University in Waltham. She has received many awards at MIT for outstanding service, and she has extensive community volunteer work to her credit.

Cheri Ackerman

Marcie Black

Juejun (JJ) Hu

Peng Yu

Joshua Adler

Kanav Setia

Scott Cohen

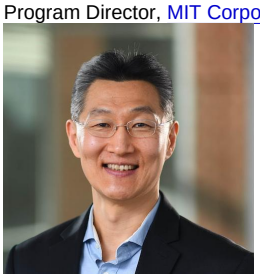
Emily Nieves

Blair DeWitt

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 (Salon 4)

Introduction
Jong Hoon (Jon) Kim
Program Director, MIT Corporate Relations



Jong Hoon (Jon) Kim
Program Director
MIT Corporate Relations

Jon Kim joined Corporate Relations in February 2022 as Program Director.

Jon comes to Corporate Relations with extensive experience in managing business and product development, and partnership with Korean and Asian companies.

Prior to MIT, Jon worked for several technology companies (Entegris, Amazon Alexa, Brooks Automation, Nuance Communications, VoiceSignal Technologies) leading product development and partnership with Korean and Asian companies in semiconductor, AI, voice assistant, mobile, robotics industry.

Before coming to US, Jon was Commercial Specialist at the US Embassy in Seoul (US Department of Commerce, Foreign Commercial Service). There he developed market entry and business strategies for US technology, energy, and automotive companies, and conducted market research and partner alliance programs. Jon also resolved many regulatory issues working with both Korean and US government agencies, for US automotive companies to increase sales in Korea significantly.

Jon earned his B.A. in Public Administration at the Yonsei University in Seoul, and his MBA at the University of Michigan.

2:00 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

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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 (Salon 5-7)

Introduction
David Martin
Program Director, MIT Industrial Liaison Program

David Martin
Program Director
MIT Industrial Liaison Program

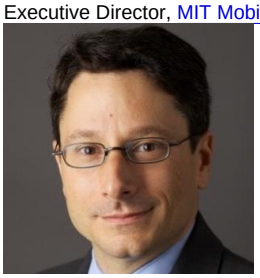
Mr. David Martin joined Corporate Relations on August 15, 2018 as Program Director for the ILP. Martin comes to OCR with deep and broad knowledge and expertise in program management, innovation, commercial and government contracting, and strategic planning. In his most recent position at Altran (Burlington, 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.

2:00 PM

Ten Key Trends in Surface Mobility: 2024

John Moavenzadeh
Executive Director, MIT Mobility Initiative



John Moavenzadeh
Executive Director
MIT Mobility Initiative

John Moavenzadeh is an expert and thought leader on the Future of Mobility. John is the Executive Director of the MIT Mobility Initiative, a platform to advance safe, clean, and inclusive transportation systems through research, education, entrepreneurship, and engagement with businesses, startups, and government. John developed and co-teaches the graduate-level *Mobility Ventures* course at MIT. John is also a Founding Board member of the Mass Mobility Hub, Operator Advisor LP at Assembly Ventures, and a member of the Global Strategic Council of CoMotion. John serves as an independent advisor to several companies that promise to transform transportation.

As Head of Mobility and Member of the Executive Committee of the World Economic Forum for over 15 years in Geneva and New York, John led a team that developed a portfolio of public-private initiatives, including autonomous vehicles and urban mobility, security of the international travel system, drones and the future of the air space, and advancing seamless integrated mobility. John has also served as Executive Director of the MIT International Motor Vehicle Program, an associate with Booz Allen Hamilton's international transportation practice, and started his career as a product design engineer with Ford Motor Company in 1990.

John holds a BS in mechanical engineering from Carnegie Mellon University, an MS in mechanical engineering from the University of Michigan, and an MPP from the Harvard Kennedy School. He has completed executive management programs at China Europe International Business School (CEIBS), INSEAD and the Wharton School.

Each year the MIT Mobility Initiative compiles a list of ten overarching trends and tensions within the surface mobility system. The trends cover an array of geopolitical, consumer-oriented, industrial, entrepreneurial, and financial aspects of the mobility space. The list is based on milestones and key events that have taken place throughout the year and provides context on where we have come from, where we are, and where we are going.

2:40 PM

Is EV Stalling? US vs. China Competition
Jinhua Zhao
Professor of Cities and Transportation
Founder, MIT Mobility Initiative

Jinhua Zhao
Professor of Cities and Transportation
Founder
MIT Mobility Initiative

Jinhua Zhao is the Professor of Cities and Transportation at the Massachusetts Institute of Technology (MIT). Prof. Zhao integrates behavioral and computational thinking to decarbonize the world's mobility system.

Prof. Zhao founded the MIT Mobility Initiative, coalescing the Institute's efforts on transportation research, education, entrepreneurship, and engagement. He hosts the MIT Mobility Forum, highlighting transportation innovation from MIT and across the globe.

Prof. Zhao directs the JTL Urban Mobility Lab and Transit Lab, leading long-term collaborations with transportation authorities and operators worldwide and enabling cross-culture learning between cities in North America, Asia, and Europe.

Prof. Zhao leads the program "Mens, Manus, and Machina (M3S): How AI Impacts the Future of Work and Future of Learning" at the Singapore MIT Alliance for Research and Technology (SMART).

He is the co-founder and chief scientist for TRAM.Global, a mobility decarbonization venture.

Research Interest

He brings behavioral science and transportation technology together to shape travel behavior, design mobility systems, and reform urban policies. He develops computational methods to sense, predict, nudge, and regulate travel behavior and designs multimodal mobility systems that integrate automated and shared mobility with public transport. He sees transportation as a language to describe a person, characterize a city, and understand an institution and establishes the behavioral foundation for transportation systems and policies.

View full bio

Professor Zhao will explore the divergent paths of electric vehicle (EV) adoption in the United States and China, examining the structural, policy, and market forces driving these trends. While the U.S. faces a temporary slowing down in EV growth, China has rapidly advanced, achieving substantial market penetration and exporting vehicles globally. Zhao will analyze the critical factors behind China's EV success, including policy support, extensive investment, infrastructure, industry partnerships, consumer preference and a comprehensive EV ecosystem. Zhao will also discuss the implications of these trends for the global decarbonization and the geopolitical landscape of the automotive sector.

3:20 PM

Networking Break

3:50 PM

Securing Critical Materials for Electric Vehicle Batteries
Elsa Olivetti

Co-Director, MIT Climate and Sustainability Consortium
Jerry McAfee (1940) Professor, Department of Materials Science and Engineering
Associate Dean, MIT School of Engineering

Elsa Olivetti

Co-Director, MIT Climate and Sustainability Consortium
Jerry McAfee (1940) Professor, Department of Materials Science and Engineering
Associate Dean, MIT School of Engineering

Professor Olivetti received a BS in engineering science from the University of Virginia in 2000, and a PhD in materials science and engineering from MIT in 2007. She spent her PhD program studying the electrochemistry of polymer and inorganic materials for electrodes in lithium-ion batteries. In 2014, she joined DMSE as an assistant professor. As an educator, Olivetti overhauled DMSE's undergraduate curriculum and developed new courses, including one for the MIT Climate and Sustainability Consortium Climate Scholars. She's a member of the MIT Climate Nucleus and co-director of the MIT Climate & Sustainability Consortium.

Professor Elsa Olivetti's research focuses on improving the environmental and economic sustainability of materials. Specifically, she develops analytical and computational models to provide early-stage information on the cost and environmental impact of materials. Professor Olivetti and her research-group colleagues work toward improving sustainability through increased use of recycled and renewable materials, recycling-friendly material design, and intelligent waste disposition. The Olivetti Group also focuses on understanding the implications of substitution, dematerialization, and waste mining on materials markets.

Production of lithium-ion batteries that power electric vehicles requires a secure supply of processed materials, such as lithium, nickel, cobalt, copper, and graphite. Where are those materials currently mined and processed, and by which companies? What are the near-term and longer-term factors that could affect the supply of those materials for various EV and EV battery producers around the world? What are the potential technology and policy solutions to secure materials supply?

4:30 PM

Optimization of Electric Vehicle Charging Stations
Alexandre Jacquillat

Maurice F. Strong Career Development Associate Professor
Associate Professor, Operations Research and Statistics, MIT Sloan School of Management

Alexandre Jacquillat

Maurice F. Strong Career Development Associate Professor
Associate Professor, Operations Research and Statistics, MIT Sloan School of Management

Alexandre Jacquillat is the *Maurice F. Strong Career Development Associate Professor* and an Associate Professor of Operations Research and Statistics at the MIT Sloan School of Management.

His research focuses on data-driven decision-making, spanning stochastic optimization, integer optimization, and machine learning. In particular, his research aims to develop scalable algorithms and decision-making tools to support more efficient, equitable, and sustainable operations in transportation and logistics—with a particular interest in air traffic management, on-demand microtransit in urban mobility, and collaborative logistics.

Alexandre is the recipient of several research awards, including the Best Paper Award from the INFORMS Transportation Science and Logistics Society (2017, 2021), the George B. Dantzig Dissertation Award from INFORMS (2015), the Best Dissertation Award from the INFORMS Transportation and Logistics Society (2015), and the L.E. Rivot Medal from the French Academy of Science. He was named in the list of Leading Academic Data Leaders from the Chief Data Officer Magazine in 2021 and 2022.

Prior to joining MIT, Alexandre was an Assistant Professor of Operations Research and Public Policy at Carnegie Mellon University's Heinz College. Alexandre also worked with McKinsey & Co. and Booz Allen Hamilton, advising leading companies and governmental organizations in transportation analytics. He holds a PhD in engineering systems from MIT, a Master of Science in technology and policy from MIT, and a Master of Science in applied mathematics from the École Polytechnique.

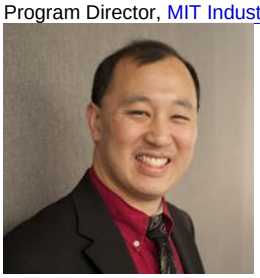
Availability and reliability of public electric vehicle charging infrastructure is an important factor for EV adoption. Professors Alex Jacquillat and Dan Freund provide an overview of their findings from an MIT Mobility Initiative research project that leverages computer vision and optimization to support public EV charging infrastructure within a dense urban context. Where can EV charging stations be feasibly located? Should fewer charging stations be offered each with more charging ports, or should more charging stations be offered each with fewer ports? Where should urban EV chargers be located? What is the ideal charging speed (power level)? This work focuses on the immediate neighborhood of Corktown in Detroit, Michigan, with support from Michigan Central.

5:10 PM

Adjournment with Networking Reception

Day One | Track 3 | Innovations (Salon 1-3)

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.

Disruptive technologies and business processes can be transformative, but they often come from unexpected places – and can have unpredictable effects. While you can't fully plan for what the chaos of innovation will do to your organization, what lessons might you learn in advance in order for innovation to be as constructive as possible? This session focuses on broad areas which might provide lessons in innovation readiness: strategically implementing digital transformation, better understanding your corporate culture, applying tactical entrepreneurship and design thinking often found in startups; considering how future trends in computing could influence your strategic preparation, etc.

2:00 PM

Enabling Innovation In Industry and Academia Through Digital Transformation

Renaud Fournier
Chief Officer for Business and Digital Transformation
MIT Office of the Executive Vice President and Treasurer (EVPT)

The primary goal of the MIT Business and Digital Transformation office is to reduce the administrative burden and thereby free up our community's time so that they can achieve their greatest impact. Innovation is the process of bringing about new ideas, methods, products, services, or solutions that have a significant positive impact and value. Our office, which launched in 2023, supports innovation at all levels at MIT - both in and outside of the research laboratory - and aims to modernize an organically developed 20 to 30-year-old set of enterprise systems, processes, and data.

The MIT community relies on our enterprise systems for a range of activities — everything from hiring and evaluating employees to managing research grants and facilities projects to maintaining student information. Our vision in updating our systems is 1) to create easy-to-use and well-integrated systems, streamlined processes, and comprehensible and accessible data for reporting and analysis; 2) to simplify our business processes to improve efficiency and effectiveness; 3) to modernize our enterprise systems and data architecture to take advantage of more innovative technology and functionality; and 4) to make our data accessible and actionable by implementing more robust data governance through clear ownership and accountability.

This talk shares both our plan and some best practices from recent efforts at transforming a complex collection of digital and non-digital assets into a more cohesive landscape, including a) addressing systems, processes, and data wholistically; b) developing a thoughtful and actionable multi-year roadmap of digital transformation projects; and c) engaging and assisting our entire community every step of the way.

2:40 PM

Leveraging AI to Build a Culture of 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

Dr. Donald Sull is a Professor of the Practice at the MIT Sloan School of Management, where he directs the Measuring Culture and Strategic Agility projects and teaches courses on competitive strategy and strategy execution. Sull was formerly a Professor at Harvard Business School and London Business School and received his bachelor's, master's, and doctorate degrees from Harvard University.

Sull has published six books and over 100 cases and articles, including a dozen best-selling *Harvard Business Review* articles and *MIT Sloan Management Review's* most popular strategy article of all time. The Economist named him “a rising star in a new generation of management gurus” and identified his theory of active inertia as an idea that shaped business management over the past century. Fortune listed him among the ten new management gurus.

He has advised top teams and boards 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) and the Sultan of Oman. Prior to academia, he worked as a strategy consultant with McKinsey & Company and as a management investor with the leveraged buyout firm Clayton, Dubilier & Rice.

Sull is the co-founder and CEO of CultureX, which leverages proprietary AI to measure and improve corporate culture, and an advisor to several start-ups, including Betterworks, Tomorrow.io, and eToro.

View full bio

Corporate culture is one of the most important enablers—or obstacles—to innovation, but culture is notoriously difficult to measure. Recent advances in LLMs enable leaders to mine employee feedback to understand and improve their corporate cultures. This session will discuss how to leverage AI to measure culture and share insights from an ongoing study of innovative culture at companies including NVIDIA, SpaceX, and Novo Nordisk.

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

No model or mathematical formula alone can capture the complexity of our world, with all its emotional, cultural, and human variables that are difficult to define and measure. Therefore, we must design. To cope with complexity, we often oversimplify and seek quick models to make sense of the world and predict outcomes. However, this approach can hinder creative problem-solving and contradict the essence of innovation.

As a method of synthesis, design is a fundamental human ability that relies on intuition, prediction, and facts to envision and create pathways to a better future. Designing generates meaning by inventing new wholes that exceed the sum of their parts through an interactive, collaborative process. By involving stakeholders in the design process to deeply understand their needs and the context of innovation, design uncovers opportunities for problem-solving that conventional analytical methods alone cannot achieve. The design process reveals hidden opportunities within complex situations, enabling a creative way forward. Thus, design is essential in our quest for a more sustainable and equitable future alongside science and technology.

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

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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)

8:15 AM

Registration and Light Breakfast

9:00 AM

Welcome and Introduction
Todd Glickman
Senior Director, MIT Corporate Relations

Todd Glickman
Senior Director
MIT Corporate Relations

Mr. Glickman joined the Industrial Liaison Program in January 2000, serving as the MIT liaison for companies worldwide, and joined the senior management of the office in 2005.

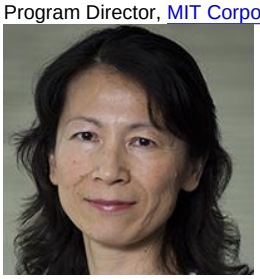
Prior to joining ILP, Todd was Assistant Executive Director of the American Meteorological Society (AMS), the professional society for meteorologists, which is based in Boston. At AMS, Todd's responsibilities included strategic planning for conferences, headquarters' liaison with AMS member boards and committees, support to the AMS Council, and public relations. In addition, Todd was Managing Editor for the AMS Glossary of Meteorology (2nd edition).

From 1979 to 1994, Todd held a variety of positions with WSI Corporation of Billerica, MA, including Manager, New Product Development, Media Marketing Manager, and Manager of the Government Program Office. WSI was a pioneer in the development of real-time weather information, providing value-added information and workstations for clients in media, aviation, industry, academia, and government. Some of Todd's projects included development of the weather data/information infrastructure for The Weather Channel; the introduction of digital satellite and radar imagery for television; planning and implementation of a network of weather briefing systems for the Federal Aviation Administration; and serving as liaison with the National Weather Service and professional organizations. In addition, Todd was instrumental in helping to develop the public-private partnership between the weather information industry and the Federal government.

Concurrently, Todd has a more than 30-year career as a radio meteorologist, and has been heard on dozens of stations nationwide. Today, he can be heard occasionally on all-news WCBS Newsradio-88 in New York City. He has chaired numerous meteorological conferences and symposia, and served on a number of boards and committees for the American Meteorological Society (AMS). He was awarded the AMS Seal of Approval for Radio Weathercasting in 1979, and was elected a Fellow of the AMS in 1997.

Todd's interests include transportation systems of all types, and he is an officer and past-trustee of the Seashore Trolley Museum of Kennebunkport, Maine. At MIT, Todd an officer and trustee of the Technology Broadcasting Corporation, which oversees the campus radio station WMBR-FM. He also volunteers as the academic advisor to a group of MIT freshman.

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.

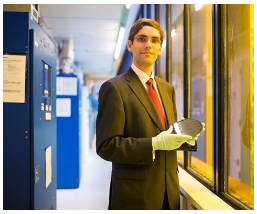
Prior to joining OCR, Hong spent 12 years in the semiconductor industry with executive functions in strategic marketing, business development, corporate strategy, product management, and product marketing at Analog Devices and MediaTek. During those years, Hong played instrumental roles in identifying 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

9:10 AM

Opening Remarks
Tomás Palacios

Director, MIT Microsystems Technology Laboratories (MTL)
Professor, MIT Department of Electrical Engineering and Computer Science (EECS)



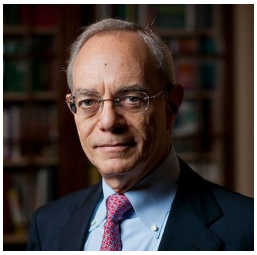
Tomás Palacios

Director, MIT Microsystems Technology 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.

View full bio
L. Rafael Reif

MIT President Emeritus
Ray and Maria Stata Professor, MIT Electrical Engineering and Computer Science (EECS)



L. Rafael Reif

MIT President Emeritus
Ray and Maria Stata Professor, MIT Electrical Engineering and Computer Science (EECS)

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 11million 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

9:30 AM

MTL at 40: Semiconductors, Microsystems and Workforce Development for the Next Technology Revolution
Tomás Palacios

Director, MIT Microsystems Technology Laboratories (MTL)
Professor, MIT Department of Electrical Engineering and Computer Science (EECS)

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10:00 AM

Panel Discussion: The Making of MTL – Community, Impact and Industry Partnership Through Semiconductors and Microsystems

Jesús A. del Alamo

Donner Professor, MIT Department of Electrical Engineering and Computer Science (EECS)

Jesús A. del Alamo

Donner Professor, MIT Department of Electrical Engineering and Computer Science (EECS)

Jesus A. del Alamo is the Donner Professor and Professor of Electrical Engineering at Massachusetts Institute of Technology. He obtained a Telecommunications Engineer degree from the Polytechnic University of Madrid and MS and PhD degrees in Electrical Engineering from Stanford University. From 1985 to 1988 he was with Nippon Telegraph and Telephone LSI Laboratories in Japan and since 1988 he has been with the Department of Electrical Engineering and Computer Science of Massachusetts Institute of Technology. From 2013 until 2019, he served as Director of the Microsystems Technology Laboratories at MIT. His current research interests are focused on nanoelectronics based on compound semiconductors and ultra-wide bandgap semiconductors.

Prof. del Alamo was an NSF Presidential Young Investigator. He is a member of the Royal Spanish Academy of Engineering and Fellow of the Institute of Electrical and Electronics Engineers, the American Physical Society and the Materials Research Society. He is the recipient of the Intel Outstanding Researcher Award in Emerging Research Devices, the Semiconductor Research Corporation Technical Excellence Award, the IEEE Electron Devices Society Education Award, the University Researcher Award by Semiconductor Industry Association and Semiconductor Research Corporation, the IPRM Award and the IEEE Cledo Brunetti Award. He currently serves as Editor-in-Chief of IEEE Electron Device Letters. He is the author of “Integrated Microelectronic Devices: Physics and Modeling” (Pearson 2017, 880 pages), a rigorous and up to date description of transistors and other contemporary microelectronic devices.

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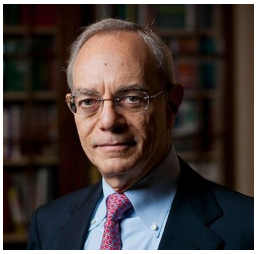
L. Rafael Reif

MIT President Emeritus

Ray and Maria Stata Professor, MIT Electrical Engineering and Computer Science (EECS)



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10:40 AM	Networking Break
11:00 AM	Morning Concurrent Tracks: New Directions for the Future of Microsystems - Track 4: Healthcare - Track 5: Artificial Intelligence - Track 6: Quantum 2.0
12:40 PM	Lunch with MTL Startup Exhibit
	Cynthia Liao
	Bin Lu
	Rob Kimmerling
	Selim Olcum
	Jan Tiepelt
	Andy Wang
	Pablo Acosta
	Kyusang Lee
	Winston Chern
	Andrew Yu
	Marcie Black
	Uroš Kuzmanovi?
	Dane deQuilettes
2:00 PM	The Next Generation of MTL Leaders and Innovators (Part 1)
	Jeehwan Kim
	Suraj Cheema
	Joseph Casamento
	Jelena Notaros
2:45 PM	Networking Break / Startups / Demos
3:15 PM	Panel Discussion: MTL's Impact in the Next 40 Years
	Hae-Seung Lee
	Thomas Lee
	Susan Feindt
	Jennifer Lloyd
	Kenneth O
	Dario Gil

4:15 PM	The Next Generation of MTL Leaders and Innovators (Part 2) Kevin O'Brien Sam Coday Sixian You Deblina Sarkar Jelena Notaros
5:30 PM	MTL 40 Year Anniversary Celebration Reception and Dinner - Invite Only

Day Two | Track 4 | Healthcare (Salon 4)

Introduction
Peter Lohse
Program Director, MIT Corporate Relations

Peter Lohse
Program Director, MIT Corporate Relations

Dr. Peter Lohse joined the Office of Corporate Relations (OCR) in October 2018 as Program Director.

Lohse comes to OCR with deep and broad knowledge and expertise in the pharma, biotech, and other life sciences-driven industries including agro, nutrition, chemical, and consumer products. As a scientist and entrepreneur, he has an extensive background developing business and managing partnerships with large corporations, early-stage companies, academia, and non-profit organizations. Most recently, Lohse was V.P, Operations and Business Development for InnovaTID Pharmaceuticals in Cambridge. Before that, he was a Strategy Consultant for Eutropics Pharmaceuticals, an emerging biotech company in Cambridge.

Prior to this, Dr. Lohse was Director, Scientific Operations & Innovation Program Director for Eli-Lilly's open innovation platform, InnoCentive, Inc. in Waltham. Earlier in his career, he held positions with increasing responsibility at ArQule of Woburn, Phylos in Lexington, and Novartis Pharma in Switzerland.

Lohse earned his M.S., Chemistry & Applied Sciences and his Ph.D., Organic Chemistry at Federal institute of Technology (ETH) in Switzerland. He earned his M.B.A., Strategy, Finance, Marketing as a Sloan Fellow at MIT. He also held the position Research Fellow, Molecular Biology at Harvard Medical School - Massachusetts General Hospital, Boston (with Professor J. Szostak, Nobel Prize 2009), This was a Swiss National Science Foundation Postdoctoral Fellowship -- In vitro selection of functional RNAs.

View full bio

This conference track will spotlight research at the intersection of electrical engineering, computation, and life sciences, demonstrating how interdisciplinary advancements deepen our understanding of human biology and foster the development of technologies that improve human health.

11:00 AM

Waves, Bits, and Molecules Lab at MIT

Ahmad Bahai

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.

11:20 AM

Machine-Learning-Guided Quality Control of CAR-T Therapy Product Using Microfluidic Biophysical Cytometry

Jongyoon Han

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.

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

Bioelectronics for Brain and Body

Polina Anikeeva

Solid-state electronic devices and biological systems exhibit drastically disparate materials properties. While semiconductor devices are often hard, brittle, and bound to flat wafers, biological electronics, such as our nervous system, are soft, mobile, and three-dimensional. Our group bridges this material divide between synthetic and biological electronics by creating multifunctional fibers capable of minimally-invasive interfacing with the organs while integrating advanced sensing and stimulation capabilities. This talk will highlight the development and applications of multifunctional fibers to recording and modulation of neural activity in the brain and in the gastrointestinal tract in behaving subjects. Finally, it will demonstrate how bioelectronic devices can be applied to uncover neural circuits underlying gut-brain communication, paving the way to future gut-centric therapies for neurological and psychiatric disorders.

12:40 PM Lunch / Industry Connections

Day Two | Track 5 | Artificial Intelligence (Salon 1-3)

Introduction
Chuan Tang
Program Director, MIT Corporate Relations Industrial Liaison Program
Chuan Tang
Program Director, MIT Corporate Relations Industrial Liaison Program

Chuan Tang joined the Office of Corporate Relations (OCR) as Senior Industrial Liaison Officer in December 2012.

Dr. Tang comes to OCR with more than 15 years of industry experience with both multi-national corporations and start-ups in North America and China. Most recently, he spent seven years at Motorola Mobility as Senior Principal Engineer where he led broadband product development for cable service providers worldwide. Before that, Tang was Director of Engineering at Rainbow Global Semiconductor Corp in Sharon, MA. Prior to Rainbow, he held positions of increasing responsibility at Applied Micro Circuits Corp (Principal Engineer), ASIC Design Services (Director of Product Development), Agere Systems (Design Center Manager), China, and at Cableshare Interactive Technologies (Senior Design Engineer), Ontario.

Tang received his B.S., Electrical Engineering at Tsinghua University in China, his M.S., Electrical Engineering at Peking University in China, and his Ph.D., Electrical Engineering at the University of Windsor in Canada.

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).

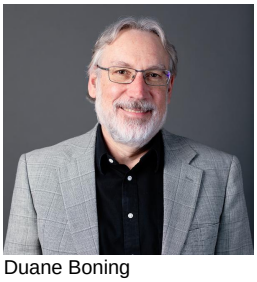
View full bio

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

The Road to Digital Twins in Semiconductor Manufacturing
Duane Boning

MIT Vice Provost for International Activities (VPIA)
Associate Director, Microsystems Technology Laboratories (MTL)
Clarence J. LeBel Professor, MIT Electrical Engineering and Computer Science (EECS)



Duane Boning

MIT Vice Provost for International Activities (VPIA)
Associate Director, Microsystems Technology Laboratories (MTL)
Clarence J. LeBel Professor, MIT Electrical Engineering and Computer Science (EECS)

Duane Boning is Clarence J. LeBel Professor in the Electrical Engineering and Computer Science department at MIT. His research focus is machine learning and statistical methods for modeling and control of variation in manufacturing processes, devices, and circuits, with over 300 journal and conference publications on these topics. He worked at Texas Instruments from 1991 through 1992. He served as Editor in Chief of the IEEE Transactions on Semiconductor Manufacturing from 2001 to 2011, as Associate Department Head of EECS at MIT from 2004 to 2011, and as Associate Chair of the MIT Faculty from 2019 to 2021. He is currently Engineering Faculty Co-Director for the MIT Leaders for Global Operations (LGO) Program, Faculty Co-Director for the Machine Intelligence in Manufacturing and Operations (MIT MIMO) effort, and MIT Vice Provost for International Activities. Prof. Boning is a Fellow of the IEEE for contributions to modeling and control in semiconductor manufacturing.

View full bio

There is great interest in “digital twins” to improve many aspects of semiconductor manufacturing, from increased device yield and performance, reduced consumption of energy and materials, increased flexibility, and to enable rapid uptake and scaling of new material, equipment, and process innovations. The digital twin has both physical and virtual components, with bilateral communication and control; the hope is to enable a wide range of models (of equipment, processes, wafers) at different fidelities (physical to simplified empirical, and machine-learning enabled), to support a wide range of “smart” functionalities. The road to digital twins goes through and builds upon many well-trodden paths. Here, several lines of research at MTL since the late 1980’s are highlighted, beginning with elements of the MIT Computer Aided Fabrication Environment including process flow languages, to DOE/Opt methods for automated surrogate model construction, and run by run control to track and compensate for equipment state and wear in CMP and other unit processes. The development of “statistical metrology” methods encompassed characterization and modeling of semiconductor variation, with layout pattern dependent models to identify “hot spots” in planarization, dishing, and erosion for a given design, as well as to guide dummy fill generation. An evolution from statistical to ML/AI approaches, particularly Bayesian methods, enabled design for manufacturability (DFM) for rapid MOSFET characterization, and then rapid fabrication process tuning, as well as AI-enabled anomaly detection. These and other paths bring us to an exciting next stage of the journey: by harnessing advances in sensing and data collection, AI methods, and computational power not possible at the beginning, the community is poised to create and deploy digital twins for semiconductor manufacturing.

11:40 AM

Networking Break

12:00 PM

Is AI Ready to Transform Chemistry and Materials Science?

Rafael Gomez-Bombarelli

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.

12:20 PM

Efficient Multi-modal LLM on the Edge

Song Han
Associate Professor
MIT Electrical Engineering & Computer Science Department

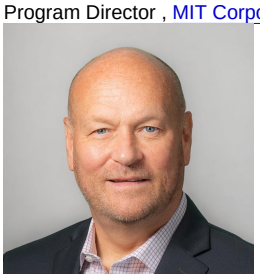
This talk presents efficient multi-modal LLM innovations with algorithm and system co-design. I'll first present VILA, a visual language model deployable on the edge. It is capable of visual in-context learning, multi-image reasoning, video captioning and video QA. Followed by SmoothQuant and AWQ for 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.

12:40 PM

Lunch / Industry Connections

Day Two | Track 6 | Quantum 2.0 (Salon 5-7)

Introduction
Chris Dunphy
Program Director , MIT Corporate Relations



Chris Dunphy
Program Director
MIT Corporate Relations

Chris Dunphy joined Corporate Relations in July 2023 as Program Director. He focuses on ILP members and prospects in Japan, the Middle East, and the government.

Chris has over 20 years of experience in business development, operations, and strategy roles with private and public organizations. Most recently, he established the Director of Business Development position at Boston MedFlight. Prior to joining MedFlight, he worked for the US Department of Commerce and provided consulting services on federal acquisition procedures, defense aerospace and naval research, and foreign military sales.

Prior to this, he spent a decade with Raytheon, holding multiple roles, including Chief of Staff for Business Development and strategy and Business Development Lead for Seapower Undersea Systems. Chris served for 20 years as a United States Naval Aviator in Southeast Asia and on multiple Middle East battle group deployments. Additional tours of duty included advanced pipeline flight instructor, Naval Recruiting District New England, and Aircraft Operations with the Defense Contract Management Agency.

Chris received his B.S. in Economics from the United States Naval Academy, and he earned his M.B.A. at the FW Olin Graduate School of Business at Babson College.

11:00 AM

Quantum Computing

William D. Oliver

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.

11:20 AM

Compiling Machine Intelligence onto (Quantum) Optoelectronic Systems

Dirk Englund

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.

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 Materials for Quantum 2.0

Pablo Jarillo-Herrero
Cecil and Ida Green Professor of Physics
MIT Department of Physics

The XXth century saw a revolution in science and technology, Quantum 1.0, largely triggered by our basic understanding of Quantum Mechanics, the physical theory of nature. Over the coming decades, a much more advanced technological revolution, Quantum 2.0, will make use of much more advanced concepts in quantum mechanics. In order to realize these technologies, new quantum materials are needed. These materials have often defied theoretical understanding, in some cases during decades. The discovery six 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 quantum materials, 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

Lunch / Industry Connections

Day Two | Optional Conference Campus Tours

On day two, after lunch at 12:40 PM, join the ILP for a unique opportunity to explore MIT through five concurrent tours, each providing an in-depth look at the institute's innovation ecosystem. Sign-up boards will be available at the registration desk starting in the morning.

1:15 PM

Attendees to gather at the ILP registration desk for departure from the Marriott

1:30 PM - 2:30 PM

MIT Campus Walking Tour (15 people max)

Take a guided tour of our dynamic campus and experience firsthand how MIT is making a better world. From cutting edge research to innovation, from world-renowned architecture to rich community life, the MIT campus is a treasure to explore. MIT is also the heart of the vibrant innovation district of Kendall Square, the most innovative square mile in the world – come see how academics, entrepreneurs, corporations and non-profits make it all happen.

1:30 PM - 2:30 PM

MIT Center for Quantum Engineering (CQE) (15 people max)

Participants will visit a working quantum computing lab. The Quantum Science and Engineering Consortium (QSEC) within the MIT Center for Quantum Engineering (CQE), is a quantum ecosystem that connects blue-chip corporations, start-ups, venture capital firms, the Engine, and more with MIT researchers.

1:30 PM - 2:30 PM

MIT.nano (15 people max)

Set in the heart of campus, MIT.nano is the Institute's 200,000 sf center for nanoscale science and engineering research. Take a behind the scenes tour of key research spaces, hear about the progress MIT.nano has made since its launch in 2018, and learn how this remarkable building is helping researchers from every corner of MIT explore the dawn of the Nano Age.

1:30 PM - 2:30 PM

MIT Abdul Latif Jameel Water and Food Systems Lab (J-WAFS) Tour (10 people max)

The MIT Abdul Latif Jameel Water and Food Systems Lab (J-WAFS) addresses global challenges in water and food sustainability through innovative research and collaboration. As part of the lab's mission to drive impactful solutions, participants of the J-WAFS tour will have the opportunity to visit Professor Ta?an's and Professor Doyle's labs to explore cutting-edge projects firsthand. Doyle's group will demonstrate their expertise in resin manufacturing alongside a small-scale purification setup for downstream processing. Their project focuses on using hydrogel microparticles for industrial purification of biological molecules including amino acids and biopharmaceuticals, offering a promising sustainable and cost-effective solution. Meanwhile, Ta?an's group will present their groundbreaking project on solid-state scrap processing, which introduces an innovative method with the potential to drastically reduce water consumption in steelmaking—a critical advancement for environmental sustainability.

1:30 PM - 2:30 PM

MIT Museum (15 people max)

Participants will be introduced to provocative exhibitions on CRISPR and AI, the magical kinetic sculptures of Arthur Ganson and Andy Cavatora, and countless unexpected treasures from the museum collection of more than a million artifacts.

Day Two | ILP Complimentary Access to the MIT Senseable Forum on Future Cities: Being Physical

MIT Senseable City Lab's Forum on Future Cities: "Being Physical: How Proximity Fosters a Resilient Society"

Hear from the Senseable City Lab's global research Laboratories—from Amsterdam to Rio to Dubai! This two-day event on November 20 and 21 at MIT consists of panel discussions with renowned experts from various domains exploring the intersection of proximity and the built environment and scientific interactive sessions with our researchers on current research projects, including demos of our sensing and hardware technology.

ILP members can register for free here.

1:00 pm – Registration (MIT Samberg Conference Center)

Introductory Keynote: Sinan Aral

Session 1 | The Power of Proximity
Cities foster a key human attribute: being social. University campuses are simultaneously hotbeds of academic innovation and microcosms of global conflict; next door, entrepreneurs, grassroots groups, and creative thinkers gather to launch small businesses, start-ups, and community initiatives. There is power in proximity: through sharing space and exchanging ideas and sentiments, we can become a collective engine of transformation.

Session 2 | Proximity of Species
Humans interact with other organic life in cities. The coexistence of humans, insects, trees, and microorganisms contributes to urban biodiversity. The balance between human-made and nature can help us to mitigate climate change. Exploring the symbiotic relationships between humans and nonhuman beings promotes healthier, harmonious cities.

Session 3 | Proximity and Mobility
Understanding how populations and individuals move within urban areas helps us address spatial segregation in cities—spatial segregation undermines coexistence. Big data and urban science methods can help us to study the dynamics of neighborhood-level movement, social mixing, community building, and the role of co-location in fostering inclusive and accessible urban environments.

Session 4 | Roundtable on Future Cities
Cities are part of a global network, and solutions to local problems often have global implications. How do we implement local solutions globally, transfer knowledge between cities, and use local challenges as testing grounds for scalable solutions? Innovation across borders can create resilient and sustainable urban environments.

10:00 AM November 21 | Senseable City Lab Demo Day (Senseable City Lab, 77 Massachusetts Ave.)
Visit Senseable to experience and discover our ongoing research projects. Join seminars, lectures, and interactive sessions with our researchers, and demo our sensing and hardware technology.

For more information and the full program, visit the Forum website here.