2021 MIT Research and Development Conference

# November 17, 2021 - November 18, 2021

## Day One: November 17, Wednesday | Plenaries | Grand Ballroom

| | |
|---|---|
| 8:00 AM - 9:00 AM | Registration and Light Breakfast |

9:00 AM - 9:10 AM

Welcome and Introduction: MIT Innovation Ecosystem
Karl Koster
Executive Director, MIT Corporate Relations
Director, Alliance Management
MIT Office of Strategic Alliances & Technology Transfer

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Executive Director, MIT Corporate Relations
Director, Alliance Management
MIT Office of Strategic Alliances & Technology Transfer

Karl Koster is the Executive Director of MIT Corporate Relations. MIT Corporate Relations includes the MIT Industrial Liaison Program and MIT Startup Exchange.

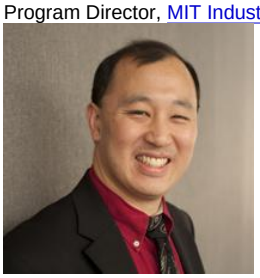
In that capacity, Koster and his staff work with the leadership of MIT and senior corporate executives to design and implement strategies for fostering corporate partnerships with the Institute. Koster and his team have also worked to identify and design a number of major international programs for MIT, which have been characterized by the establishment of strong, programmatic linkages among universities, industry, and governments. Most recently these efforts have been extended to engage the surrounding innovation ecosystem, including its vibrant startup and small company community, into MIT's global corporate and university networks.

Koster is also the Director of Alliance Management in the Office of Strategic Alliances and Technology Transfer (OSATT). OSATT was launched in Fall 2019 as part of a plan to reinvent MIT’s research administration infrastructure. OSATT develops agreements that facilitate MIT projects, programs and consortia with industrial, nonprofit, and international sponsors, partners and collaborators.

He is past chairman of the University-Industry Demonstration Partnership (UIDP), an organization that seeks to enhance the value of collaborative partnerships between universities and corporations.

He graduated from Brown University with a BA in geology and economics, and received an MS from MIT Sloan School of Management. Prior to returning to MIT, Koster worked as a management consultant in Europe, Latin America, and the United States on projects for private and public sector organizations.

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).

9:10 AM - 9:40 AM

Resiliency and Energy at MIT: The MIT Energy Initiative and the Future Energy Systems Center
Robert Armstrong
Chevron Professor of Chemical Engineering
Director, MIT Energy Initiative (MITEI)

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Chevron Professor of Chemical Engineering
Director
MIT Energy Initiative (MITEI)

Professor Robert C. Armstrong directs the MIT Energy Initiative, an Institute-wide effort at MIT linking science, technology, and policy to transform the world's energy systems. A member of the MIT faculty since 1973, Armstrong served as head of the Department of Chemical Engineering from 1996 to 2007. His research interests include polymer fluid mechanics, rheology of complex materials, and energy.

Armstrong has been elected into the American Academy of Arts and Sciences (2020) and the National Academy of Engineering (2008). He received the Founders Award for Outstanding Contributions to the Field of Chemical Engineering (2020), Warren K. Lewis Award (2006), and the Professional Progress Award (1992), all from the American Institute of Chemical Engineers. He also received the 2006 Bingham Medal from the Society of Rheology, which is devoted to the study of the science of deformation and flow of matter,

Armstrong was a member of MIT's *Future of Natural Gas* and *Future of Solar Energy* study groups. He advised the teams that developed MITEI's most recent reports, *The Future of Nuclear Energy in a Carbon-Constrained World* (2018) and *Insights into Future Mobility* (2019), and is co-chairing the new MITEI study, *The Future of Storage*. He co-edited *Game Changers: Energy on the Move* with former U.S. Secretary of State George P. Shultz.

View full bio

9:40 AM - 10:10 AM

Resiliency and Sustainability at MIT: The MIT Climate and Sustainability Consortium
Elsa Olivetti
Associate Dean, MIT School of Engineering; Jerry McAfee Professor in Engineering;
Professor, MIT Department of Materials Science and Engineering

Elsa Olivetti
Associate Dean, MIT School of Engineering; Jerry McAfee Professor in Engineering;
Professor
MIT Department of Materials Science and 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.

10:10 AM - 10:15 AM

MIT Professional Education

Myriam Joseph
Assistant Director, Marketing & Business Development
MIT Professional Education

10:15 AM - 10:20 AM

The MIT International Science & Technology Initiatives (MISTI) Student Internship Program
April Julich Perez

Executive Director
MISTI

April Julich Perez

Executive Director
MISTI

As executive director, April Julich Perez oversees the MISTI country programs, seed funds and partnerships that create opportunities for MIT students and faculty to learn and collaborate abroad.

Julich Perez has worked on the editorial support staff of the International Herald Tribune and the parisavenue.com division of Le Figaro in France, and in Boston as Assistant Cultural Attachée for the French Consulate. Prior to joining MISTI in 2005, she was Program Associate in MIT's Office of the Arts.

While completing a BA in French at the University of Nebraska, Julich Perez earned certificates in European studies and French linguistics from the University of Antwerp, Belgium, and the Center for Applied Linguistics in Besançon, France. She holds an MA in French Cultural Studies from Columbia University.

Julich Perez serves on the policies and procedures group of MIT's International Coordinating Committee. She participated in MIT's Leader to Leader program and is a recipient of the MIT Excellence Award.

A member of NAFSA, the Association of International Educators, Julich Perez authored a case study about MIT's pioneering international education model in the NAFSA publication "Internships, Service Learning & Volunteering Abroad." She has spoken about MISTI at venues such as the American Society for Engineering Education International Forum, the Annual Colloquium on International Engineering Education and the Global Internship Conference.

View full bio

10:20 AM - 10:40 AM

Networking Break

10:40 AM - 11:10 AM

Resiliency and Sustainability at Delta Airlines

Amelia DeLuca
Managing Director of Sustainability
Delta Air Lines

11:10 AM - 11:40 AM

Social and Ethical Responsibilities of Computing (SERC): New Activities at MIT
David Kaiser
Associate Dean, Social and Ethical Responsibilities of Computing, MIT Schwarzman College of Computing

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Associate Dean, Social and Ethical Responsibilities of Computing
MIT Schwarzman College of Computing

David Kaiser is Germeshausen Professor of the History of Science and Professor of Physics at MIT, where he also serves as Associate Dean for Social and Ethical Responsibilities of Computing. He is the author of several award-winning books about modern physics, including *How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival* (2011) and *Quantum Legacies: Dispatches from an Uncertain World* (2020). A Fellow of the American Physical Society, Kaiser has received MIT's highest awards for excellence in teaching. His work has been featured in *Science*, *Nature*, the *New York Times*, and the *New Yorker* magazine. His group's efforts to conduct a "Cosmic Bell" test of quantum entanglement were featured in the documentary film *Einstein's Quantum Riddle*, which premiered in 2019.

View full bio

The interface of artificial intelligence (AI) and machine-learning (ML) techniques with people --- both individuals and groups --- presents special opportunities as well as challenges. The challenges are often described as "algorithmic bias," though there exists a whole range of potential harms and unintended consequences that can arise throughout the entire ML pipeline. Several of these challenges are exacerbated when AI and ML techniques move beyond research settings into real-world applications. The broad aim of new programmatic efforts at MIT on Social and Ethical Responsibilities of Computing (SERC) is to prepare students and facilitate research to address these important challenges.

11:40 AM - 12:00 PM

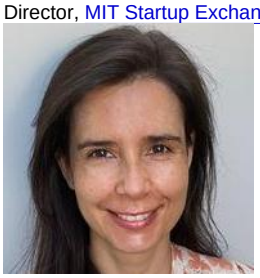
The Resiliency of Innovation and The Future of Kendall Square
Krystyn Van Vliet
Michael (1949) and Sonja Koerner Professor of Materials Science and Engineering
Associate Vice President for Research
Associate Provost

Krystyn Van Vliet
Michael (1949) and Sonja Koerner Professor of Materials Science and Engineering
Associate Vice President for Research
Associate Provost

Prof. Van Vliet earned her Sc.B. in Materials Science & Engineering from Brown University (1998) and her PhD in Materials Science & Engineering from MIT (2002). At MIT, Van Vliet was a National Defense Science & Engineering Graduate Fellow, was President of the Graduate Materials Council, and won the MRS Gold Medal for her thesis research. Her MIT thesis work with Prof. Subra Suresh established the experimental and computational basis for predicting homogeneous nucleation of dislocations (plasticity carrying defects) in crystalline metals. She then conducted postdoctoral research with Dr. Marsha Moses at Boston Children's Hospital, where she developed new experimental approaches to measure the effects of mechanical strain on cells that comprise blood vessels.

12:00 PM - 1:00 PM

MIT Startup Exchange Lightning Talks
Catarina Madeira
Director, MIT Startup Exchange



Catarina Madeira
Director
MIT Startup Exchange

Catarina has been working with the Cambridge/Boston startup ecosystem for over 10 years and joined Corporate Relations with a solid network in the innovation and entrepreneurial community. Prior to MIT, she was part of the team that designed and launched the startup accelerator IUL MIT Portugal, which was later rebranded as Building Global Innovators. She was based in Lisbon and worked in direct relation with the Cambridge team. She held positions including Operations Coordinator, Program Manager, and Business Developer. The accelerator soon achieved steady growth in large part due to the partnerships that Catarina led with regional and global startup ecosystems. After that, she worked at NECEC, leading a program that connects cleantech startups and industry. In this role, she developed and built a pipeline of startups and forged strong relationships with both domestic and European companies. She has also held positions in Portugal and France, including at Saboaria e Perfumaria Confiança and L'Oréal as Technical Director and Pharmacist. Catarina earned her bachelor's in chemistry and pharmaceutical sciences in Portugal. She went on to earn her Master of Engineering for Health and Medicines in France.

MIT Startup Exchange actively promotes collaboration and partnerships between over 1,500 MIT-connected startups and over 230 corporates that are members of MIT's Industrial Liaison Program (ILP). We host a robust schedule of events and facilitate networking and introduction opportunities year round. Qualified startups are those founded and/or led by MIT faculty, staff, or alumni, or are based on MIT-licensed technology. MIT Startup Exchange and ILP are integrated programs of MIT Corporate Relations. STEX25 is a startup accelerator within MIT Startup Exchange, featuring 25 "industry-ready" startups that have proven to be exceptional with early use cases, clients, demos, or partnerships, and are poised for significant growth.

1. **Sublime Systems:** Decarbonizing cement using renewable electricity
2. **Aura Intelligent Systems:** High-resolution perception solution for emerging mobility
3. **LuneWave:** Cutting edge Luneburg antenna and sensor solution for automotive (ADAS/AV), robotics, drones, and wireless/satellite communications
4. **Amogy:** Amogy. Ammonia energy. For a healthy planet.
5. **4M Therapeutics:** Molecules for Memory, Mood, and Mind
6. **Butlr:** Making spaces people-aware
7. **Tellus Technologies**: Materials with Expiration Date
8. **OPT Industries:** Digital manufacturing of materials at scale
9. **Arbor Biotechnologies:** Curative genetic medicines for all patients with genetic disease
10. **Sync Computing:** Breaking the limits of single processors by orchestrating thousands

Leah Ellis
Co-Founder and CEO
Sublime Systems

Jungah Lee
Founder and CEO
Aura Intelligent Systems

John Xin
Co-Founder and CEO
LuneWave

Seonghoon Woo
CEO & Co-Founder
Amogy

Pablo Lapuerta
CEO & Founder
4M Therapeutics

Jillian Qua
Product Manager
Butlr

1:00 PM - 2:00 PM | Lunch with Startup Exhibit

**For Live Streaming Attendees: Join Virtual Exhibit via Zoom**

**Aura Intelligent Systems | LuneWave | Amogy | 4M Therapeutics | Butlr | Tellus Technologies | OPT Industries | Arbor Biotechnologies | Sync Computing**

**Startups at Lunch Exhibit Only**

- **Boston Micro Fabrication – BMF**: Enabling Miniaturization with Micro 3D Printing
- **FGC Plasma Solutions**: Better Combustion for Energy, Aerospace, and National Security
- **SanaHeal**: Stop The Bleed
- **GelSight**: Unleashing the limitless possibilities of tactile sensing
- **Xibus Systems**: bioengineered pathogen detection solutions
- **Skylla Technologies**: Precision Mobility
- **Phuc Labs**: AI-powered particle sorting
- **Einblick**: A radically faster approach to making data-driven decisions

2:00 PM - 5:00 PM | Concurrent Technology Tracks - Day One

5:00 PM - 6:00 PM | Networking Reception

# Day One | Track 1: Sustainability | Concept Room (2nd Floor)

2:00 PM - 2:30 PM | Evolving Organisms to Build New Materials and Devices for Clean Energy, Electronics, the Environment, and Medicine
Angela Belcher
James Mason Crafts Professor of Biological Engineering and Materials Science and Engineering
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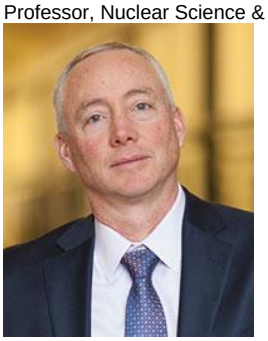
James Mason Crafts Professor of Biological Engineering and Materials Science and Engineering

Angela Belcher is a materials chemist with expertise in biomaterials, biomolecular materials, organic-inorganic interfaces, and solid-state chemistry. Her work focuses on evolving organisms to build new materials and devices for clean energy, electronics, the environment, and medicine. Belcher was awarded the 24th annual MacArthur Foundation Fellowship, the 2004 Four Star General Recognition Award, and was named the 2006 Scientific American's Research Leader of the Year. Her work has been published in many prestigious scientific journals, including Science and Nature, and has been reported in the popular press, including Fortune, Forbes, Discover, The New York Times, and The Wall Street Journal. Belcher holds a BS in creative studies and PhD in inorganic chemistry from the University of California at Santa Barbara.

View full bio

2:30 PM - 3:00 PM

Fusion and IT Environmental Impact
Dennis Whyte
Director, MIT Plasma Science & Fusion Center
Hitachi America Professor of Engineering
Professor, Nuclear Science & Engineering



Dennis Whyte
Director, MIT Plasma Science & Fusion Center
Hitachi America Professor of Engineering
Professor, Nuclear Science & Engineering

Dennis Whyte is a recognized leader in the field of fusion research using the magnetic confinement of plasmas for energy production on a faster, smaller, and more innovative path. Dennis is a Fellow of the American Physical Society, has over 300 publications, and is heavily involved as an educator. He is widely recognized for his themes of innovation and the need for speed and economic viability in fusion. He has served on panels for the National Academies, the U.S. government, and the Royal Society. As director of Plasma Science and Fusion Center (PSFC) he presents the Center's vision to peer institutions and recruits faculty and scientists to the team. The core of the SPARC project was formed over eight years ago during a design course led by Dennis to challenge assumptions in fusion. Many of the ideas underpinning the high-field approach — including the use of HTS for high-field, demountable magnets, liquid blankets, and ARC — have been conceived of or significantly advanced in these courses. Dennis' leadership as director of PSFC has been a key enabler for the SPARC project, providing the stature necessary to bring the institutional and outside support to the project.

View full bio

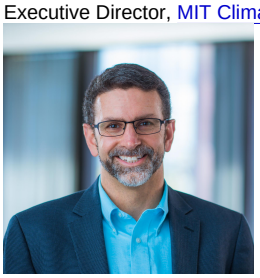
3:00 PM - 3:30 PM

Cleaner and Quieter and New Biofuels: Climate and Air Quality Impacts of Aviation
Steven Barrett
Professor of Aeronautics and Astronautics, MIT Department of Aeronautics and Astronautics

Steven Barrett
Professor of Aeronautics and Astronautics
MIT Department of Aeronautics and Astronautics

Steven Barrett (@StevenRHBarrett) is the H. N. Slater Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology, where he is Associate Department Head of the Aeronautics and Astronautics Department. He is director of the MIT Laboratory for Aviation and the Environment.

MIT Climate and Sustainability Consortium
Jeremy Gregory
Executive Director, MIT Climate & Sustainability Consortium



Jeremy Gregory
Executive Director
MIT Climate & Sustainability Consortium

Dr. Jeremy Gregory is Executive Director of the MIT Climate and Sustainability Consortium (MCSC). He has extensive experience in working with industry partners and diverse stakeholders across MIT. Through his research, Dr. Gregory studies the economic and environmental implications of engineering and system design decisions, particularly in the area of materials production and recovery systems. His research topics include product and firm environmental footprinting, manufacturing and life-cycle cost analysis, and characterization of sustainable material systems. He has applied these methods, often with industry partners, to a range of different products and industries including pavements, buildings, automobiles, electronics, consumer goods, and waste treatment and recovery.

In addition, Dr. Gregory has served as a Faculty Fellow within MIT's Office of Sustainability since 2018. In this role, he has collaborated with administration, faculty, staff, and students across campus to conduct analyses related to strategies for lowering MIT's environmental footprint, with a focus on scope 3 greenhouse gas emissions.

Prior to joining the MCSC, Dr. Gregory served as Executive Director of the MIT Concrete Sustainability Hub, where he worked directly with industry leaders; drew links between academia, industry, and government; helped define strategy; and coordinated research activities with external collaborators.

Previously, Dr. Gregory was the Education Coordinator for the MIT Portugal Program's Engineering Design and Advanced Manufacturing Focus Area, where he built education and research activities between MIT, three Portuguese universities, and numerous Portuguese companies.

He holds a bachelor of science in mechanical engineering from Montana State University-Bozeman, and a master of science and PhD in mechanical engineering from MIT.

View full bio

3:30 PM - 4:00 PM — Networking Break

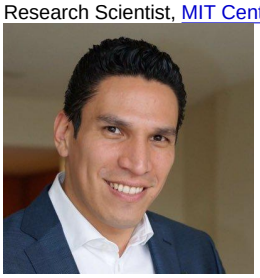
4:00 PM - 4:30 PM — Trans-hemispheric Seeing-Thinking-Doing
Clapperton Chakanetsa Mavhunga
Professor of Science, Technology, and Society (STS)
Clapperton Chakanetsa Mavhunga
Professor of Science, Technology, and Society (STS)

Clapperton Chakanetsa Mavhunga is **Associate Professor of Science, Technology, and Society at MIT**. He is the author of Transient Workspaces: Technologies of Everyday Innovation in Zimbabwe and the editor of What Do Science, Technology, and Innovation Mean from Africa?, both published by the MIT Press.

View full bio

4:30 PM - 5:00 PM

Sustainability in Logistics and Supply Chain for Emerging Markets
Josué C. Velázquez
Director, MIT Sustainable Supply Chains Lab
Research Scientist, MIT Center for Transportation and Logistics



Josué C. Velázquez
Director, MIT Sustainable Supply Chains Lab
Research Scientist
MIT Center for Transportation and Logistics

Josué C. Velázquez Martínez is a Research Scientist, and Lecturer at the MIT Center for Transportation and Logistics specialized in Logistics and Supply Chain Management in transportation, manufacturing, and retail industries, and has more than 10 years of experience in conducting applied research on logistics sustainability and small firms in emerging markets. He serves as the director of the MIT Sustainable Supply Chains Lab, a research group focused on collaborating with organizations to improve their supply chain and logistics operations by considering environmental, social and business goals. Velázquez Martínez is also de director of MIT GeneSys, a research lab aimed at alleviating poverty in Latin America via developing innovative research and technology for micro and small enterprises to foster growth by improving their supply chain management capabilities.

Velázquez Martínez has published a variety of academic and business-oriented articles and book chapters on logistics sustainability and supply chain management, and has been constantly quoted and interviewed by different international media, including HuffPost, CNN, The Washington Post, Bloomberg, NY Times, and ELLE.com. Velázquez Martínez is the lecturer at MIT of the graduate course SCM.290 Sustainable Logistics, has been invited as guest speaker and lecturer in conferences and academic seminars in Europe, Asia, the United States, and Latin America

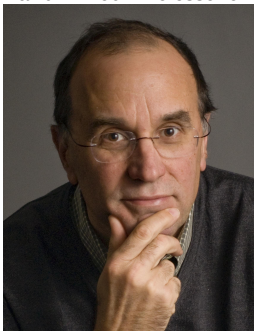
Velázquez Martínez holds a BSc in Industrial Engineering, an MSc in Manufacturing Systems and a PhD in Industrial Engineering with focus on Sustainability in Supply Chains from Monterrey Tech, Mexico.

View full bio

# Day One | Track 2: Corporate Innovation | Grand Ballroom

2:00 PM - 2:45 PM

Innovation in Product Development
Michael Cima
David H. Koch Professor of Engineering, MIT Koch Institute for Integrative Cancer Research



Michael Cima
David H. Koch Professor of Engineering, MIT Koch Institute for Integrative Cancer Research

Dr. Michael J. Cima is the David H. Koch Professor of Engineering, co-director of MIT's Innovation Initiative and Associate Dean of Innovation for the School of Engineering. He also holds the David H. Koch Chair of Engineering at MIT.

Prof. Cima was the recipient of the W. David Kingery Award in 2019, was elected to the National Academy of Inventors in 2016 and the National Academy of Engineering in 2011. He is faculty director of the Lemelson-MIT Program which inspires youth to be inventive and

Michael is author or co-author of over 250 peer-reviewed scientific publications and 80 US patents, and is a recognized expert in materials processing. He is the co-inventor of MIT's three-dimensional printing process.

Prof. Cima has extensive entrepreneurial experience. He co-founded SpringLeaf Therapeutics, a specialty pharmaceutical company, Taris Biomedical, a urology products company acquired by Johnson & Johnson, MicroChips Inc., a developer of microelectronic based drug delivery and diagnostic systems and T2 Biosystems, a medical diagnostics company for which he also serves as director.

View full bio

The word "innovation" is often interpreted by the press as first-in-class products or services. Often overlooked, however, are the innovations required to develop such products. I'll focus on medical products but the extrapolation to other industries will not be difficult. The need for a strategy from the beginning of product development has never been more important. What will proof of concept look like? Are there approvable endpoints? Can the product/service be reimbursed? Will there be barriers to market access?

2:45 PM - 3:30 PM

Advocating for Diversity in Innovation
Ritu Raman
d'Arbeloff Career Development Assistant Professor

Ritu Raman
d'Arbeloff Career Development Assistant Professor

Ritu Raman, PhD is the d'Arbeloff Career Development Assistant Professor of Mechanical Engineering at MIT. Her lab is centered on engineering adaptive living materials for applications in medicine and machines. The Raman Lab's current focus is building neuromuscular actuators to restore mobility and power robots. Prof. Raman has received several recognitions for scientific innovation, including being named a Kavli Fellow by the National Academy of Sciences and being named to the Forbes 30 Under 30 and MIT Technology Review 35 Innovators Under 35 lists. She is the author of the upcoming MIT Press book Biofabrication. She is passionate about increasing diversity in STEM and has championed many initiatives to empower women in science, including being named a AAAS IF/THEN ambassador and founding the Women in Innovation and STEM Database at MIT ( WISDM).

Prof. Raman received her BS from Cornell University and her PhD as an NSF Graduate Research Fellow at the University of Illinois at Urbana-Champaign. She completed her postdoctoral research with Prof. Bob Langer at MIT, funded by a L'Oréal USA For Women in Science Fellowship and a Ford Foundation Fellowship from the National Academies of Sciences, Engineering, and Medicine.

View full bio

As an immigrant with limited socioeconomic capital, a person of color, and a woman in science, my identity lies at the intersection of several groups historically underrepresented in STEM innovation and academia. Education and mentorship is what separated my fate from many of the people I grew up with, who were just as talented and hard-working but never had access to the same opportunities. Even while efforts to recruit women and underrepresented minorities have met with some success at the undergraduate and graduate level, the lack of social support groups and minimal guidance on future career preparation lower their retention in STEM careers. My experiences have helped me form and lead efforts to support the retention and promotion of minority groups in STEM. This talk will highlight a few initiatives designed to empower women in STEM, including the AAAS IF/THEN ambassadors program and the Women in Innovation and STEM Database at MIT ( WISDM), and outline best practices for supporting the next generation of diverse young scientists.

3:30 PM - 4:00 PM

Networking Break

4:00 PM - 4:40 PM

Preparing Technical Leaders to thrive, and drive Corporate Innovation

Reza Rahaman
Bernard M Gordon Industry Co-Director and Senior Lecturer
Gordon-MIT Program in Engineering Leadership

Innovation is inherently a cross-functional team sport and both leadership and followership are critical enablers of the success of technical professionals, yet they are rarely represented in today's engineering curricula. At MIT, among the initiatives designed to meet this need, there are currently four complementary Technical Leadership and Communication (TLC) programs housed together in the School of Engineering – the Undergraduate Practice Opportunities Program (UPOP), the Gordon-MIT Program in Engineering Leadership (GEL), the Graduate Program in Engineering Leadership (GradEL), and the School of Engineering Communication Lab (Comm Lab). These programs allow students to develop the professional skills in Teamwork, Communication and Leadership that enable them to leverage their technical acumen for maximum impact, at every stage of their MIT journey. I will discuss the foundational concepts on which these programs are based (the 'Capabilities of Effective Engineering Leaders'), and the type of experiential learning we use to create the a-ha moments that open students' minds to deeper development. While these efforts will deliver your employees of tomorrow, your employees today can benefit from the same approach, and many companies have found our template useful for assessment and development of their staff. We also offer professional education courses to help on their journey to becoming great leaders and great followers. Over a 30-year career in corporate research and development, I have left a legacy of category-changing innovation and I will be happy to share my experiences and lessons learned in response to your questions and areas of interest.

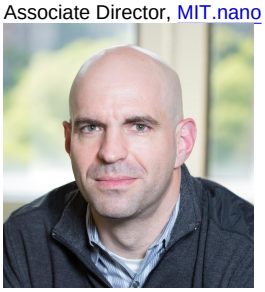
4:40 PM - 5:00 PM

Corporate Innovation Assessment Tools
Irina Franklin
Corporate Innovation Program Director, MIT Innovation Initiative

## Day One | Track 3: Disruptive Technology in Manufacturing | Discovery Room (3rd Floor)

2:00 PM - 2:30 PM

Data Analytics in the Smart and Instrumented Factory - From Twins to Real Time Control
Brian Anthony
Faculty Lead, Industry Immersion Program in Mechanical Engineering
Co-Director, MIT Clinical Research Center
Associate Director, MIT.nano



Brian Anthony
Faculty Lead, Industry Immersion Program in Mechanical Engineering
Co-Director, MIT Clinical Research Center
Associate Director
MIT.nano

Dr. Anthony is Associate Director of MIT.nano, Faculty Lead for the Industry Immersion Program in Mechanical Engineering, and Co-Director of the MIT Clinical Research Center. With over 25 years' experience in product realization—Dr. Anthony won an Emmy (from the Academy of Television Arts and Sciences) in broadcast technical innovation—Dr. Anthony designs instruments and techniques to monitor and control physical systems. His work involves systems analysis and design and calling upon mechanical, electrical, and optical engineering, along with computer science and optimization, to create solutions.

The focus of Dr. Anthony's research is  computational instrumentation—the design of instruments and techniques to measure and control complex physical systems. His research includes the development of instrumentation and measurement solutions for manufacturing systems and medical diagnostics and imaging systems. In addition to his academic work, he has extensive experience in market-driven technology innovation, product realization, and business entrepreneurship and commercialization at the intersection between information technology and advanced manufacturing. His teaching interests include the modelling of large-scale systems in a wide variety of decision-making domains and the development of optimization algorithms and software for analyzing and designing such systems. He has extensive experience in market-driven technology innovation as well as business entrepreneurship.

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View on LinkedIn

The exponential growth of available computation and of available data has enabled amazing growth in the use of Machine Learning in Design and Manufacturing.  In this talk we will highlight recent, deployed to industry practice examples in the use of machine learning for real-time process control, quality control, video-based machine guidance, and in volume/3D measurement systems.

2:30 PM - 3:00 PM

The Trajectory of Metal Additive Manufacturing

John Hart
Director, Center for Additive and Digital Advanced Production Technologies (APT)
Director, Laboratory for Manufacturing and Productivity
Professor of Mechanical Engineering, MIT Department of Mechanical Engineering

John Hart
Director, Center for Additive and Digital Advanced Production Technologies (APT)
Director, Laboratory for Manufacturing and Productivity
Professor of Mechanical Engineering
MIT Department of Mechanical Engineering

John Hart is Professor of Mechanical Engineering, Director of the Center for Additive and Digital Advanced Production Technologies, and Director of the Laboratory for Manufacturing and Productivity, at MIT. John's research group at MIT, the Mechanosynthesis Group, aims to accelerate the science and technology of production via advancements in additive manufacturing, nanostructured materials, and precision machine design. In 2017 and 2018, respectively, he received the MIT Ruth and Joel Spira Award for Distinguished Teaching in Mechanical Engineering and the MIT Keenan Award for Innovation in Undergraduate Education. He is a co-founder of Desktop Metal and VulcanForms, and a Board Member of Carpenter Technology Corporation.

Manufacturing of metal components is essential to every major industry, and involves complex supply chains, consumes significant natural resources, and sometimes still uses ancient techniques. Conversely, additive manufacturing (AM) promises to, ultimately, digitize the formation of objects and redistribute value across the product life cycle. I will highlight recent work from my research group at MIT on this topic including: discrete element simulation of powder spreading coupled with X-ray microscopy for layer quality control; a new concept for drop-on-demand metal printing; physics-based cost and manufacturability modeling for deployment of AM at scale; and high-throughput discovery of new alloys for metal AM.

3:00 PM - 3:30 PM

Human Robot Collaboration and the Future of Team Performance
Julie Shah
Interactive Robotics Group Leader, MIT CSAIL
H.N. Slater Professor, MIT Department of Aeronautics and Astronautics

Julie Shah
Interactive Robotics Group Leader, MIT CSAIL
H.N. Slater Professor
MIT Department of Aeronautics and Astronautics

Julie Shah is the H.N. Slater Professor of Aeronautics and Astronautics at MIT and leads the Interactive Robotics Group of the Computer Science and Artificial Intelligence Laboratory. Shah received her SB (2004) and SM (2006) from the Department of Aeronautics and Astronautics at MIT, and her PhD (2010) in Autonomous Systems from MIT. Before joining the faculty, she worked at Boeing Research and Technology on robotics applications for aerospace manufacturing. She has developed innovative methods for enabling fluid human-robot teamwork in time-critical, safety-critical domains, ranging from manufacturing to surgery to space exploration. Her group draws on expertise in artificial intelligence, human factors, and systems engineering to develop interactive robots that emulate the qualities of effective human team members to improve the efficiency of human-robot teamwork. In 2014, Shah was recognized with an NSF CAREER award for her work on “Human-aware Autonomy for Team-oriented Environments," and by the MIT Technology Review TR35 list as one of the world’s top innovators under the age of 35. Her work on industrial human-robot collaboration was also recognized by the Technology Review as one of the 10 Breakthrough Technologies of 2013, and she has received international recognition in the form of best paper awards and nominations from the International Conference on Automated Planning and Scheduling, the American Institute of Aeronautics and Astronautics, the IEEE/ACM International Conference on Human-Robot Interaction, the International Symposium on Robotics, and the Human Factors and Ergonomics Society.

View full bio

Robotics and related technologies are central to the ongoing digitization and advancement of manufacturing. In recent years, a variety of strategic initiatives around the world including "Industry 4.0", have aimed to improve and connect manufacturing technologies in order to optimize production processes. I present findings from a recent study of the changing technological landscape of robotics and "internet-of-things" (IoT)-based connective technologies over the last 7-10 years in the wake of Industry 4.0. We interviewed key players within the European robotics ecosystem, including robotics manufacturers and integrators, original equipment manufacturers (OEMs), and applied industrial research institutions. I will discuss the challenges faced when integrating these technologies, and will highlight key research directions and recent results from my lab that can enable improved capabilities in the context of manufacturing.

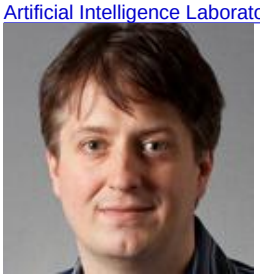
3:30 PM - 4:00 PM

Networking Break

4:00 PM - 4:30 PM

The Age of Intelligent Manufacturing

Wojciech Matusik
Professor, Electrical Engineering and Computer Science , MIT Computer Science and Artificial Intelligence Laboratory



Wojciech Matusik
Professor, Electrical Engineering and Computer Science
MIT Computer Science and Artificial Intelligence Laboratory

Wojciech Matusik is a professor in MIT's Department of Electrical Engineering and Computer Science, and leads the Computational Fabrication Group at the Computer Science and Artificial Intelligence Laboratory. His research interests are in computer graphics, computational design and fabrication, computer vision, robotics and human-computer interaction. Before coming to MIT, he worked at Mitsubishi Electric Research Laboratories, Adobe Systems and Disney Research Zurich. He has received a Ruth and Joel Spira Award for Excellence in Teaching, a DARPA Young Faculty Award and a Sloan Foundation fellowship. He has been named one of the world's top 100 young innovators by MIT Technology Review and received a Significant New Researcher Award from ACM Siggraph. He earned a PhD in computer graphics at MIT.

View full bio

We are entering a phase of intelligent manufacturing with machines and even entire production lines controlled by computational processes. I will describe our efforts to advance this field. I will show manufacturing systems that can automatically optimize process parameters. I will also  show machines that use virtual simulation and real-time sensing to react in real time to the manufacturing errors.

4:30 PM - 5:00 PM

From Bits to Atoms
Neil Gershenfeld
Director, Center for Bits and Atoms

Neil Gershenfeld
Director, Center for Bits and Atoms

Prof. Neil Gershenfeld is the Director of MIT's Center for Bits and Atoms, where his unique laboratory is breaking down boundaries between the digital and physical worlds, from pioneering quantum computing to digital fabrication to the Internet of Things. Technology from his lab has been seen and used in settings including New York's Museum of Modern Art and rural Indian villages, the White House and the World Economic Forum, inner-city community centers and automobile safety systems, Las Vegas shows and Sami herds. He is the author of numerous technical publications, patents, and books including *Designing Reality*, *Fab*, *When Things Start To Think*, *The Nature of Mathematical Modeling*, and *The Physics of Information Technology*, and has been featured in media such as The New York Times, The Economist, NPR, CNN, and PBS. He is a Fellow of the American Association for the Advancement of Science and the American Physical Society, has been named one of Scientific American's 50 leaders in science and technology, as one of 40 Modern-Day Leonardos by the Museum of Science and Industry, one of Popular Mechanic's 25 Makers, has been selected as a CNN/Time/Fortune Principal Voice, and by Prospect/Foreign Policy as one of the top 100 public intellectuals. He's been called the intellectual father of the maker movement, founding a growing global network of over two thousand fab labs in 125 countries that provide widespread access to prototype tools for personal fabrication, directing the Fab Academy for distributed research and education in the principles and practices of digital fabrication, and chairing the Fab Foundation. He is a co-founder of the Interspecies Internet and of the Science and Entertainment Exchange. Dr. Gershenfeld has a BA in Physics with High Honors from Swarthmore College, a Ph.D. in Applied Physics from Cornell University, honorary doctorates from Swarthmore College, Strathclyde University and the University of Antwerp, was a Junior Fellow of the Harvard University Society of Fellows, and a member of the research staff at Bell Labs.

View full bio

After 50 years of exponential scaling in the performance and reach of digital communications and computation, we're now on the cusp of a digital revolution in fabrication that promises to bring the programmability of the digital world into the physical world. I'll describe a research roadmap leading up to Star-Trek style replicators, discuss emerging applications and design implications, and explore the social and economic consequences of anyone being able to make (almost) anything, anywhere.

Slides with videos: http://ng.cba.mit.edu/show/script/21.11.mfgr.html

## Day One | Track 4: Sensors: Design, Application, Analysis | Endeavor Room (3rd Floor)

2:00 PM - 2:30 PM

High-Resolution Touch Sensing
Edward Adelson
John and Dorothy Wilson Professor of Vision Science

Edward Adelson
John and Dorothy Wilson Professor of Vision Science

Edward Adelson is the John and Dorothy Wilson Professor of Vision Science at MIT, in the Department of Brain and Cognitive Sciences, and the Computer Science and Artificial Intelligence Laboratory (CSAIL). He is a member of the National Academy of Sciences, and a Fellow of the American Academy of Arts and Sciences.

Prof. Adelson has published widely in the areas of human vision, computer vision, and computer graphics. His current research focuses on artificial touch sensing for robotics.

Prof. Adelson is well known for contributions to multiscale image representation (such as the Laplacian pyramid) and basic concepts in early vision such as motion energy and steerable filters (honored by the IEEE Computer Society's Helmholtz Prize, 2013). His work on the neural mechanisms of motion perception was honored with the Rank Prize in Optoelectronics (1992). His work on layered representations for motion won the IEEE Computer Society's Longuet-Higgins Award (2005). He introduced the plenoptic function, and built the first plenoptic camera. He has done pioneering work on the problems of material perception in human and machine vision. He has produced some well known illusions such as the Checker-Shadow Illusion. Prof. Adelson has recently developed a novel technology for artificial touch sensing, called GelSight, which converts touch to images, and which enables robots to have tactile sensitivity exceeding that of human skin.

Touch sensing is important for dexterous robotic manipulation while at the same time very challenging to achieve. In this talk, we describe what steps we are taking to address this challenge through a combination of high-resolution tactile sensing and and the use of deep neural network dynamics models.

2:30 PM - 3:00 PM

Electrochemical Sensors to Detect Environmental Contaminants

Ariel L. Furst
Paul M. Cook Career Development Professor, MIT Department of Chemical Engineering

Ariel L. Furst
Paul M. Cook Career Development Professor
MIT Department of Chemical Engineering

Ariel L. Furst is the Paul M. Cook Career Development Assistant Professor of Chemical Engineering at MIT. Her work centers on inventing technologies to improve human and environmental health by making access to resources more equitable. Her lab develops transformative technologies to solve important problems related to healthcare and sustainability by harnessing the inherent capabilities of biological molecules and cells. She is also a co-founder of the regenerative agriculture company, Seia Bio. She completed her Ph.D. at Caltech developing non-invasive diagnostics for colorectal cancer and was then an A. O. Beckman Postdoctoral Fellow at UC Berkeley, where she developed sensors to monitor environmental pollutants. She is a 2023 Marion Milligan Mason Awardee, a CIFAR Azrieli Global Scholar for Bio-Inspired Solar Energy, and an ARO Early Career Grantee. She was recently awarded the MIT UROP Outstanding Faculty Mentor Award for her work with undergraduate researchers. She is passionate about STEM outreach and increasing participation of underrepresented groups in engineering.

Environmental toxins are difficult to detect and remediate. In this talk, we will describe technologies under development in our lab to address both challenges, technologies that use a combination of electrochemistry and bioengineering.

3:00 PM - 3:30 PM

Applications of Single-Photon Detection Sensors
Ramesh Raskar
NEC Career Development Professor
Associate Professor of Media Arts & Sciences
Head, Camera Culture Research Group

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NEC Career Development Professor
Associate Professor of Media Arts & Sciences
Head
Camera Culture Research Group

Ramesh Raskar is an Associate Professor at MIT Media Lab and directs the Camera Culture research group. His focus is on AI and Imaging for health and sustainability. These interfaces span research in physical (e.g., sensors, health-tech), digital (e.g., automating machine learning) and global (e.g., geomaps, autonomous mobility) domains. He received the Lemelson Award (2016), ACM SIGGRAPH Achievement Award (2017), DARPA Young Faculty Award (2009), Alfred P. Sloan Research Fellowship (2009), TR100 Award from MIT Technology Review (2004) and Global Indus Technovator Award (2003). He has worked on special research projects at Google [X] and Facebook and co-founded/advised several companies.

View full bio

The invention of X-ray imaging enabled us to see inside our bodies. The invention of thermal infrared imaging enabled us to depict heat. So, over the last few centuries, the key to making the invisible visible was recording with new slices of the electromagnetic spectrum. The impossible photos of tomorrow, however, won't be recorded; they'll be computed.

Ramesh Raskar's group has pioneered the field of femto-photography, which uses a high-speed camera that enables visualizing the world at nearly a trillion frames per second so that we can create slow-motion movies of light in flight. These techniques enable the seemingly impossible: seeing around corners, seeing through fog as if it were a sunny day, perception in pitch dark and detecting circulating tumor cells with a device resembling a blood-pressure cuff.

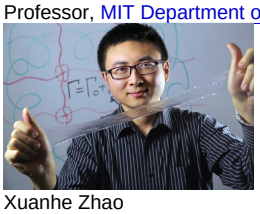
His recent ventures Akasha Imaging and UbiCept AI exploit multiple untapped dimensions of imaging for unconventional computer vision and machine learning. This talk will touch some of the envisioned applications of this technology.

3:30 PM - 4:00 PM

Networking Break

4:00 PM - 4:30 PM

Merging Human-Machine Intelligence with Soft Materials Technology
Xuanhe Zhao
Professor, MIT Department of Mechanical Engineering



Xuanhe Zhao
Professor
MIT Department of Mechanical Engineering

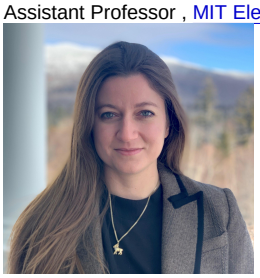
Xuanhe Zhao is a Professor of Mechanical Engineering at MIT. The mission of Zhao Lab is to advance science and technology between humans and machines to address grand societal challenges in health and sustainability. A major current focus is the study and development of soft materials and systems. Dr. Zhao has won early career awards from NSF, ONR, ASME, SES, AVS, Adhesion Society, JAM, EML, and Materials Today. He has been a Clarivate Highly Cited Researcher since 2018. Bioadhesive ultrasound, based on Zhao Lab's work published in Science, was named one of TIME Magazine's Best Inventions of the year in 2022. SanaHeal Inc., based on Zhao Lab's work published in Nature, was awarded the 2023 Nature Spinoff Prize. Over ten patents from Zhao Lab have been licensed by companies and have contributed to FDA-approved and widely-used medical devices.

View full bio

Whereas human tissues and organs are mostly soft, wet and bioactive, machines are commonly hard, dry and biologically inert. Merging humans, machines and their intelligence is of imminent importance in addressing grand societal challenges in health, sustainability, security, education and joy of living. However, interfacing humans and machines is extremely challenging due to their fundamentally contradictory properties. At MIT's Zhao Lab, we exploit *soft materials technology* to form long-term, high-efficacy, multi-modal interfaces and convergence between humans and machines. In particular, hydrogels with similar mechanical and physiological properties as various biological tissues have been explored as an ideal material candidate for such human-machine interfaces and convergence. This talk will focus on *hydrogel devices* to interface with diverse organs of the human body including the skin, the GI tract, and the brain, as well as peripheral nerves, to achieve long-term high-efficacy measurements of various physiological signals from the human body. Applications that will be discussed include a 3D printing method for the fabrication of various hydrogel devices, including wearable, ingestible and implanted devices, as well as in vivo tests on the long-term biocompatibility and efficacy of the hydrogel devices in rat and pig models. The projects are part of a future regarding human-machine convergence enabled by soft materials technology.

4:30 PM - 5:00 PM

Silicon Photonics for LiDAR, Augmented Reality, and Beyond
Jelena Notaros
Assistant Professor , MIT Electrical Engineering and Computer Science



Jelena Notaros
Assistant Professor
MIT Electrical Engineering and Computer Science

Jelena Notaros is the Robert J. Shillman (1974) Career Development Assistant Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, a Principal Investigator in the MIT Research Laboratory of Electronics, and a Core Faculty Member of the MIT Microsystems Technology Laboratories. She received her Ph.D. and M.S. degrees from the Massachusetts Institute of Technology in 2020 and 2017, respectively, and B.S. degree from the University of Colorado Boulder in 2015. Her research interests are in integrated silicon photonics devices, systems, and applications, with an emphasis on augmented-reality displays, LiDAR sensing for autonomous vehicles, free-space optical communications, quantum engineering, and biophotonics.

Jelena's work has been published in Nature, OSA, IEEE, and SPIE journals and conference proceedings. She was one of three Top DARPA Risers, a 2018 DARPA D60 Plenary Speaker, a 2021 Forbes 30 Under 30 Listee, an MIT Herbert E. (1933) and Dorothy J. Grier Presidential Fellow, a National Science Foundation Graduate Research Fellow, a 2018 MIT EECS Rising Star, and an AIM Photonics Academy Supporting Instructor. Jelena was an invited speaker at 2022 OSA OFC, 2020 SPIE Photonics West, 2019 OSA CLEO, 2022 OSA COSI, 2020 OSA FiO, 2019 OSA IPR, 2020 OSA NETWORKS, 2021 OSA AIO, and 2019 IEEE Photonics North. She was the recipient of the MIT Robert J. Shillman (1974) Career Development Chair, 2020 MIT RLE Early Career Development Award, 2019 OSA CLEO Chair's Pick Award, 2014 IEEE Region 5 Student Paper Competition Award, 2019 MIT MARC Best Overall Paper Award and Best Pitch Award, 2018 and 2014 OSA Incubic Milton Chang Student Travel Grant, 2014 Sigma Xi Undergraduate Research Award, 2015 CU Boulder Chancellor's Recognition Award, 2015 CU Boulder College of Engineering Outstanding Graduate for Academic Achievement Award, and 2015 CU Boulder Electrical Engineering Distinguished Senior Award.

View full bio

By enabling the integration of millions of micro-scale optical components on compact millimeter-scale computer chips, silicon photonics is positioned to enable next-generation optical technologies that facilitate revolutionary advances for numerous fields spanning science and engineering. In this talk, I will highlight our work on developing novel silicon-photonics-based platforms, devices, and systems that enable innovative solutions to high-impact problems in areas including augmented-reality displays, LiDAR sensing for autonomous vehicles, free-space optical communications, quantum engineering, and biophotonics.

## Day Two: November 18, Thursday | Plenaries | Grand Ballroom

8:30 AM - 9:00 AM

Registration and Breakfast

9:00 AM

Welcome and 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

9:00 AM - 9:30 AM

An Interdisciplinary Approach to Cancer Research
Matthew Vander Heiden
Director, Koch Institute for Integrative Cancer Research
Lester Wolfe (1919) Professor of Molecular Biology
Professor of Biology

Matthew Vander Heiden
Director, Koch Institute for Integrative Cancer Research
Lester Wolfe (1919) Professor of Molecular Biology
Professor of Biology

Matthew Vander Heiden is Director of the Koch Institute at MIT, the Lester Wolfe (1919) Professor of Molecular Biology, and a member of the Broad Institute. He is a practicing oncologist and instructor in medicine at Dana-Farber Cancer Institute / Harvard Medical School. He earned his doctoral and medical degrees from the University of Chicago, where he worked in the laboratory of Craig Thompson. Vander Heiden then completed a residency in internal medicine at Boston's Brigham & Women's Hospital and a hematology-oncology fellowship at Dana-Farber Cancer Institute / Massachusetts General Hospital. He was a postdoctoral fellow in the laboratory of Lewis Cantley at Harvard Medical School, where he was supported by a Mel Karmazin Fellowship from the Damon Runyon Cancer Research Foundation. In 2010, Vander Heiden joined the MIT faculty. His work has been recognized by many awards including the Burroughs Wellcome Fund Career Award for Medical Sciences, the AACR Gertrude B. Elion Award, the HHMI Faculty Scholar Award, and an NCI Outstanding Investigator Award. Dr. Vander Heiden serves on the scientific advisory board of Yale Cancer Center, Agios Pharmaceuticals, Aeglea Biotherapeutics, iTeos Therapeutics, Evelo Therapeutics, CyteGen, and Auron Therapeutics, of which he is also an academic founder. He is part of the investment advisory board for DROIA Venture Fund.

The Koch Institute for Integrative Cancer Research has a goal to be a leader in interdisciplinary cancer-focused research. We are continually expanding our highly effective relationship network, which involves other academic and clinical oncology centers, industrial partners and cancer-focused individuals and foundations. Firmly rooted in the MIT community, we share its educational mission and are deeply committed to training the next generation of cancer researchers. We bring together a multi-faceted group of biologists and chemists along with biological, chemical, mechanical, and materials science engineers, computer scientists, clinicians and others, to bring fresh and daring perspectives. We create new tools and technologies to better treat, diagnose and prevent the disease. The Koch Institute is a clear example of how collaboration between academia and industry has enabled new discoveries to become emerging technologies at a commercial scale.

| | |
|---|---|
| 9:30 AM - 10:00 AM | U.S. R&D Policy and Competitiveness<br>David Goldston<br>Director, MIT Washington D.C. Office, MIT Washington D.C. Office |

David Goldston
Director, MIT Washington D.C. Office
MIT Washington D.C. Office

David Goldston became Director of the MIT Washington Office in May 2017. The Washington Office is MIT's "embassy," providing policymakers with information and positions from MIT, and keeping the campus abreast of relevant developments in the nation's capital. As director, Goldston helps shape MIT's policy and positions, and its communications regarding federal matters.

Prior to coming to MIT, Goldston was Director of Government Affairs at the Natural Resources Defense Council, a leading environmental group for eight years, where he helped shape NRDC's federal political strategy, policies, and communications. Before his time at the NRDC he spent more than 20 years on Capitol Hill, working primarily on science and environmental policy, including serving as Chief of Staff of the House Committee on Science from 2001 through 2006.

After retiring from government service, Goldston was a visiting lecturer at Princeton University's Woodrow Wilson School of Public and International Affairs, and at Harvard University Center for the Environment. He is currently an adjunct professor at Georgetown University. From 2007 through November 2009, he wrote a monthly column for Nature on science policy titled, "Party of One." Goldston also was the project director for the Bipartisan Policy Center report: "Improving the Use of Science in Regulatory Policy," which was released in August 2009. He authored a chapter in The Science of Science Policy: A Handbook (Stanford University Press, 2011). He is a member of the advisory committee for the National Academies' Climate Communications Initiative, and has served on numerous panels of the Academy and other science policy organizations. He holds a B.A. (1978) from Cornell University and completed the course work for a Ph.D. in American history at the University of Pennsylvania.

U.S. R&D policy is shifting to some extent to focus more on specific desired outcomes, including competitiveness, health and climate solutions. The talk will discuss that shift, its limits, the political and substantive questions it raises, and what it may mean for academic and corporate research.

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| 10:00 AM - 10:30 AM | Networking Break |
| 10:30 AM - 1:00 PM | Concurrent Technology Tracks - Day Two |
| 1:00 PM | Adjournment with Lunch |

## Day Two | Track 5: Health Science Technology: DNA and RNA in Diagnostics & Therapeutics | Concept Room (2nd Floor)

10:30 AM - 11:00 AM

Oligonucleotides: important therapeutic agents

Phillip A. Sharp
Institute Professor and Professor of Biology
Phillip A. Sharp
Institute Professor and Professor of Biology

Phillip A. Sharp is Institute Professor (highest academic rank) at the Massachusetts Institute of Technology, member of the Department of Biology and the Koch Institute for Integrative Cancer Research. He joined the Center for Cancer Research (now the Koch Institute) in 1974 and served as its director for six years, from 1985 to 1991, before taking over as head of the Department of Biology, a position he held for the next eight years. More recently, he was founding director of the McGovern Institute, a position he held from 2000 to 2004. His research interests have centered on the molecular biology of gene expression relevant to cancer and the mechanisms of RNA splicing. His landmark work in 1977 provided the first indications of “discontinuous genes” in mammalian cells. The discovery fundamentally changed scientists' understanding of gene structure and earned Dr. Sharp the 1993 Nobel Prize in Physiology or Medicine. Dr. Sharp has authored over 400 papers. He is an elected member of the National Academy of Sciences, the Institute of Medicine, the American Academy of Arts and Sciences, the American Philosophical Society, and the Royal Society, UK. Among his many awards are the Gairdner Foundation International Award, the Lasker Basic Medical Research Award, and the National Medal of Science. His long list of service includes the presidency of the AAAS (2013) and Chair of the Scientific Advisory Committee, SU2C Project, AACR.

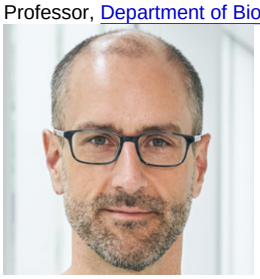
Dr. Sharp is a member of the board of directors of the Whitehead and Broad Institutes, and chairs the advisory boards of the MIT Museum and the Jameel Clinic at MIT. Dr. Sharp is a co-founder of Biogen and Alnylam Pharmaceuticals Inc. He is a member of the advisory board of Polaris Venture Partners; chairman of the scientific advisory board and member of the board of directors, Alnylam Pharmaceuticals; advisor and investor, Longwood and Polaris Venture Funds; member of the boards of directors at Syros Pharmaceuticals and Vir Biotechnology; and member of the scientific advisory board, Dewpoint Therapeutics and Skyhawk Therapeutics. A native of Kentucky, Dr. Sharp earned a BA degree from Union College, Barbourville, KY, and a PhD in chemistry from the University of Illinois, Urbana-Champaign in 1969.

Among biotechnology’s early successes were the introduction of interferons and other proteins as therapeutic agents.  Over the next twenty years, larger macromolecules such as monoclonal antibodies were developed, changing the outcome of many previously untreatable diseases. Oligonucleotides are an emerging class of therapeutic agents with comparable promise for the benefit of patients. The history and future promise of anti-sense oligonucleotides, siRNA and other RNAs will be discussed.

11:00 AM - 11:30 AM

Nucleic Acid-based Virus-like Particles for Vaccine & Gene Therapeutic Applications

Mark Bathe
Director, MIT New Engineering Education Transformation
Member, Harvard Medical School Initiative for RNA Medicine
Associate Member, Broad Institute of MIT and Harvard
Professor, Department of Biological Engineering



Mark Bathe
Director, MIT New Engineering Education Transformation
Member, Harvard Medical School Initiative for RNA Medicine
Associate Member, Broad Institute of MIT and Harvard
Professor
Department of Biological Engineering

Mark Bathe is a Professor in the Department of Biological Engineering at MIT, Director of the MIT New Engineering Education Transformation, Member of the Harvard Medical School Initiative for RNA Medicine, and Associate Member of the Broad Institute of MIT & Harvard. He obtained his Doctoral Degree at MIT working in the Departments of Mechanical, Chemical, and Biological Engineering before moving to the University of Munich as an Alexander von Humboldt Fellow to carry out his postdoctoral research in Biological Physics. He returned to MIT in 2009 to join the faculty in the Department of Biological Engineering, where he runs an interdisciplinary research group focused on engineering nucleic acids for application to vaccines, therapeutics, structural biology, and computing. He is academic co-founder of Cache DNA, Inc. and Kano Therapeutics, Inc., and in his free time he enjoys running, biking, swimming, and skiing amongst other outdoor activities.

View full bio

Synthetic nucleic acids can now be formulated as highly structured virus-like particles (VLPs) on the 10-100nm scale, and manufactured at pre-clinical scales as vaccine or gene therapeutic delivery vectors. These VLPs can be used to display variable copy numbers and types of peptide and protein antigens, as well as sugars and small molecules for programmable immune cell targeting and stimulation. They may be used as traditional vaccine particles to stimulate humoral immunity, or to incorporate gene therapeutic modalities such as siRNAs, ASOs, mRNAs, or CRISPR RNPs. In this talk, I will present our lab's work on the design and fabrication of DNA- and RNA-based VLPs as vaccine and gene therapeutic modalities, and present their application to the design of subunit vaccines for COVID19 and AIDS. I will discuss how these VLPs can be used as adjuvants to stimulate innate immune response, as well as to potentially target therapeutic nucleic acids to specific cell and tissue subtypes.

11:30 AM - 12:00 PM

Nucleic Acid Delivery Systems for RNA Therapy and Genome Editing
Daniel G. Anderson
Professor, Chemical Engineering and Institute for Medical Engineering and Science
Member, Marble Center for Cancer Nanomedicine
Associate Member, Broad Institute
Associate Member, Ragon Institute

Daniel G. Anderson
Professor, Chemical Engineering and Institute for Medical Engineering and Science
Member, Marble Center for Cancer Nanomedicine
Associate Member, Broad Institute
Associate Member, Ragon Institute

Learn more about the work that Professor Anderson's lab is doing to create tiny nanoparticles that can deliver RNA to a cancer cell to stop tumor growth by watching this video: "Inside the Lab: Daniel G. Anderson, Ph.D."

Daniel G. Anderson is a leading researcher in the field of nanotherapeutics and biomaterials. He is appointed in the Department of Chemical Engineering, the Institute for Medical Engineering and Science, the Koch Institute for Integrative Cancer Research, and the Harvard-MIT Division of Health Science and Technology at MIT. The research done in Prof. Anderson's laboratory is focused on developing new materials for medicine. He has pioneered the development of smart biomaterials, and his work has led to advances in a range of areas, including medical devices, cell therapy, drug delivery, gene therapy and material science. Prof. Anderson received a B.A. in mathematics and biology from the University of California at Santa Cruz and a Ph.D. in molecular genetics from the University of California at Davis. His work has resulted in the publication of over 400 papers, patents and patent applications. These advances have led products that have been commercialized or are in clinical development, as well as to the foundation of companies in the pharmaceutical, biotechnology, and consumer products space. Dr. Anderson is a founder of Living Proof, Olivo Labs, Crispr Therapeutics (CRSP), Sigilon Therapeutics, Verseau Therapeutics, VasoRx, and Orna.

View full bio

RNA nano formulations have received much attention for their role in bringing the covid pandemic under control. However, vaccines are only a small part of the broad potential use of RNA in human therapeutics. Here we describe our work developing nanoformulations for RNA therapy and genome editing. Libraries of degradable polymers and lipid-like materials have been synthesized, formulated and screened for their ability to delivery RNA payloads inside of cells. These nanoformulations facilitate in vivo delivery to a range of tissues, and can enable targeted gene suppression with siRNA, gene expression with mRNA, or even permanent genetic editing using the CRISPR/Cas9 system. We will describe the development and use of this technology, and describe their potential as therapies for a range of different diseases.

12:00 PM - 12:30 PM

Exploring Biological Diversity for Technology Development

Soumya Kannan
PhD candidate in Biological Engineering in the lab of Prof. Feng Zhang
Yang-Tan Center for Molecular Therapeutics Graduate Research Fellow
Broad Institute of MIT and Harvard

Programmable genome editing technologies have an unparalleled potential to treat human diseases. However, challenges remain in effectively delivering genome editing reagents to cells *in vivo*, which is required to fully realize this potential. Here, we discuss our efforts to miniaturize genome editing systems through exploration of biological diversity, leading to the discovery of novel reprogrammable systems that are more compatible with current therapeutic delivery technologies.

12:30 PM - 1:00 PM

Harnessing Synthetic Biology for Diagnostics and Therapeutics
James Collins

Termeer Professor, Institute for Medical Engineering & Science (IMES) at MIT
Professor, MIT Department of Biological Engineering
Professor, Wyss Institute at Harvard
Professor, Broad Institute of MIT and Harvard

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James Collins is the Termeer Professor of Medical Engineering & Science and professor of biological engineering at MIT, as well as a Member of the Harvard-MIT Health Sciences & Technology Faculty. He is also a core founding faculty member of the Wyss Institute for Biologically Inspired Engineering at Harvard University, and an institute member of the Broad Institute of MIT and Harvard. Collins is one of the founders of the field of synthetic biology, and his patented technologies have been licensed by over 25 biotech, pharma, and medical devices companies. He has helped to launch a number of companies, including Synlogic (NASDAQ: SYBX), EnBiotix, Sample6 Technologies, and Senti Biosciences, and has received numerous awards and honors, including a Rhodes Scholarship, a MacArthur "Genius" Award, an NIH Director's Pioneer Award, the Sanofi - Institut Pasteur Award, as well as several teaching awards. Collins is an elected member of all three national academies - the National Academy of Sciences, the National Academy of Engineering, and the National Academy of Medicine - as well as the American Academy of Arts & Sciences, the National Academy of Inventors, and the World Academy of Sciences.

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Synthetic biology is bringing together engineers, physicists and biologists to model, design and construct biological circuits out of proteins, genes and other bits of DNA and RNA, and to use these circuits to rewire and reprogram organisms. These re-engineered organisms are going to change our lives in the coming years, leading to cheaper drugs, rapid diagnostic tests, and synthetic probiotics to treat infections and a range of complex diseases. In this talk, we highlight recent efforts to create synthetic gene networks and programmable cells as next-generation diagnostics and therapeutics.

# Day Two | Track 6: Essential Energy Issues for Hitting 1.5°C | Grand Ballroom

10:30 AM - 11:00 AM

Accelerating the Development of Solar PV via High-Throughput Experimentation, Machine Learning, and Computation
Tonio Buonassisi
Professor of Mechanical Engineering

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Tonio Buonassisi is a Professor of Mechanical Engineering at the Massachusetts Institute of Technology (MIT). He is pioneering the application of artificial intelligence to develop new materials for societally beneficial applications. His research in solar photovoltaics and technoeconomic analysis assisted technology developments in dozens of companies, earning him a US Presidential Early Career Award for Scientists and Engineers (PECASE), a National Science Foundation CAREER Award, and a Google Faculty Award. He founded the MIT PVLab and co-founded the Fraunhofer Center for Sustainable Energy Systems in Boston USA. A recipient of the prestigious MIT Everett Moore Baker Memorial Award for Excellence in Undergraduate Teaching, his passion for education is evidenced by the >73k views of his OpenCourseware/YouTube PV lectures series, and a recent YouTube video series focused on the application of AI to materials research, entitled "Accelerated Materials Development for Manufacturing.

View full bio

11:00 AM - 11:30 AM

Accelerating Clean Energy Technologies and Other Climate Solutions Using Data-Informed Models
Jessika Trancik
Professor in the Institute for Data, Systems, and Society

Jessika Trancik
Professor in the Institute for Data, Systems, and Society

Jessika Trancik is a Professor in the Institute for Data, Systems, and Society at the Massachusetts Institute of Technology. Her research examines the dynamic costs, performance, and environmental impacts of energy systems to inform climate policy and accelerate beneficial and equitable technology innovation. Her projects focus on all energy services including electricity, transportation, heating, and industrial processes. This work spans solar energy, wind energy, energy storage, low-carbon fuels, electric vehicles, and nuclear fission among other technologies. Prof. Trancik received her B.S. from Cornell University and her Ph.D. from the University of Oxford as a Rhodes Scholar. She is currently an external professor at the Santa Fe Institute, and was formerly at Columbia University's Earth Institute, and at WSP International/UNOPS (now Interpeace) in Geneva.

View full bio

Renewable energy markets have grown rapidly in recent decades as the costs of these technologies have fallen. What can we learn from these past trends for the development of other clean energy technologies? In the presentation I will describe how we can answer this question by examining the determinants of technological change and quantifying targets for innovation. My research uncovers key drivers of technology improvement, from technology features to company strategies and the formulation of policy. Several powerful lessons emerge that can inform efforts by engineers, private investors, and policy-makers in new areas such as energy storage, hydrogen production, sustainable mobility, and industrial energy services.

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| 11:30 AM - 12:00 PM | Networking Break |
| 12:00 PM - 12:30 PM | Research to De-Risk Nuclear Power Generation; and Why Chernobyl Happened the Way It Did<br>Michael Short<br>Class of ’42 Associate Professor of Nuclear Science and Engineering<br>Associate Director, MIT Plasma Science and Fusion Center |

Michael Short
Class of ’42 Associate Professor of Nuclear Science and Engineering
Associate Director
MIT Plasma Science and Fusion Center

Michael Short joined the faculty in the Department of Nuclear Science and Engineering in July, 2013. He brings 15 years of research experience in the field of nuclear materials, microstructural characterization, and alloy development. His group’s research is a mixture of large-scale experiments, micro/nanoscale characterization, and multiphysics modeling & simulation. The main areas of Short’s research focus on 1) Non-contact, non-destructive measurement of irradiated material properties using transient grating spectroscopy (TGS) more, 2) Preventing the deposition of deleterious phases, such as CRUD in nuclear reactors, as fouling deposits in energy systems more, and 3) Quantification of radiation damage by stored energy fingerprints more. This last project was recently selected for an NSF CAREER award.

## Education

- B.S., Nuclear Science and Engineering, MIT, 2005
- B.S., Materials Science and Engineering, MIT, 2005
- M.S., Materials Science and Engineering, MIT, 2010
- Ph.D., Nuclear Science and Engineering, MIT, 2010

View full bio

Nuclear power is an indispendable part of the zero-carbon energy mix more so every day as we inch towards the 1.5C limitation on average global warming. However, nuclear power comes with three elephants in the room: Accidents, waste, and proliferation. In this seminar we will discuss two of these, with the goal of showing how nuclear's very few accidents and incidents, despite their large scale, have led to better reactor designs and research to make them safer. First, the root causes of the Chernobyl accident will be explained, and how it has led to vast changes in both core design and safety culture. Second, I will present our group's new research on physical enrichment forensics to help verify non-proliferation treaties, to stop the spread of weapons-grade uranium.

12:30 PM - 1:00 PM

Using Behavioral Science to Promote the Adoption of Green Technologies
David Rand
Erwin H. Schell Associate Professor of Management Science, MIT Sloan School of Management

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Erwin H. Schell Associate Professor of Management Science, MIT Sloan School of Management

David Rand is the *Erwin H. Schell Professor* and Professor of Management Science and Brain and Cognitive Sciences at MIT, the director of the Applied Cooperation Team, and an affiliate of the MIT Institute of Data, Systems, and Society, and the Initiative on the Digital Economy. Bridging the fields of cognitive science, behavioral economics, and social psychology, David's research combines behavioral experiments run online and in the field with mathematical and computational models to understand people's attitudes, beliefs, and choices. His work uses a cognitive science perspective grounded in the tension between more intuitive versus deliberative modes of decision-making. He focuses on illuminating why people believe and share misinformation and "fake news," understanding political psychology and polarization, and promoting human cooperation. David received his BA in computational biology from Cornell University in 2004 and his PhD in systems biology from Harvard University in 2009, was a post-doctoral researcher in Harvard University's Department of Psychology from 2009 to 2013, and was an Assistant and then Associate Professor (with tenure) of Psychology, Economics, and Management at Yale University prior to joining the faculty at MIT.

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# Day Two | Track 7: Mobility | Discovery Room (3rd Floor)

10:30 AM - 11:00 AM

Future of Work and Impact of Urban Mobility
Jinhua Zhao
Professor of Cities and Transportation
Founder, MIT Mobility Initiative

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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

Job is an anchor. It secures one's economics, defines one's social identity, and grounds one in the defined time, space and organizational (T, S, O) arrangements. The future of work is shaking this anchor. AI/Robotics, IVT/VR/AR, and Gig/Platform economy are loosening each dimension of such (T, S, O) arrangements. There is a spectrum of 'workplace' from corporate headquarter, satellite office, co-working space to one's home, one's associate's home, and public spaces: cafe, library and community center; and there are different degrees of temporal flexibilities and a variety of employer-employee relationships. Combining the three dimensions yields a rich set of more fluid (T, S, O) arrangements while highlighting three critical dependencies: facility, geographic and associate dependencies. We bring organization behavior and travel behavior together and propose an agenda for both empirical and methodological research. Transportation industry can be more ambitious--mobility service providers, workplace providers and corporations working together to imagine the future of work and mobility.

11:00 AM - 11:30 AM

The Promise and Challenge of Advanced Air Mobility
Hamsa Balakrishnan
William E. Leonhard (1940) Professor

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Hamsa Balakrishnan is the William E. Leonhard (1940) Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology (MIT), where she leads the Dynamics, Infrastructure Networks, and Mobility (DINaMo) Research Group. Her current research interests are in the design, analysis, and implementation of control and optimization algorithms for large-scale cyber-physical infrastructures, with an emphasis on air transportation systems. These include airport congestion control algorithms, air traffic routing and airspace resource allocation methods, machine learning for weather forecasts and flight delay prediction, and methods to mitigate environmental impacts. Her research spans theory and practice, including both algorithm development and real-world field tests.

Hamsa was a recipient of the American Automatic Control Council's Donald P. Eckman Award in 2014, the AIAA Lawrence Sperry Award in 2012, the inaugural CNA Award for Operational Analysis in 2012, the Kevin Corker Award for Best Paper of ATM-2011, and the NSF CAREER Award in 2008. She is an associate fellow of the AIAA.

At MIT, Hamsa is affiliated with the Institute for Data, Systems and Society (IDSS) and the Operations Research Center (ORC).

Hamsa is involved in teaching 16.002: Unified Engineering Signals & Systems, 16.763: Air Transportation Operations Research, and 16.995: Doctoral Research & Communication Seminar. She has also taught 16.72: Air Traffic Control and ESD.55: Management of Infrastructure Systems.

Prior to joining MIT, Hamsa was a Principal Development Engineer at the University Affiliated Research Center (UC Santa Cruz) and the NASA Ames Research Center's Terminal Air Traffic Management Concepts Branch. She received my PhD from Stanford University and her B.Tech. from the Indian Institute of Technology Madras.

11:30 AM - 12:00 PM

Networking Break

12:00 PM - 12:30 PM

Roboat project—a fleet of autonomous boats for Amsterdam
Fabio Duarte
Principal Research Scientist, Senseable City Lab

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Principal Research Scientist, Senseable City Lab

Fábio Duarte is a lecturer in transportation in the Department of Urban Studies and Planning, and Principal Research Scientist at MIT Senseable City Lab, where he leads the Roboat project—a fleet of autonomous boats developed for the city of Amsterdam. Duarte is also a consultant with the World Bank, and his most recent book, “Urban Play: make-believe, technology, and space”, has just been published by MIT Press

Duarte will present Roboat, a project developed in collaboration with the AMS Institute, in Amsterdam, involving faculty, postdocs, engineers, and students from MIT CEE, CSAIL, and SCL. Roboat combines novel perception, navigation, and control systems developed at MIT, with multiple use case—from people transportation to trash collection.

12:30 PM - 1:00 PM

Disruptive Platforms, Disruptive Regulation: A View from the Mobility Space
Jason Jackson
Assistant Professor of Political Economy and Urban Planning, Department of Urban Studies and Planning

Jason Jackson
Assistant Professor of Political Economy and Urban Planning
Department of Urban Studies and Planning

Jason Jackson is Assistant Professor of Political Economy in the Department of Urban Studies and Planning at the Massachusetts Institute of Technology (MIT), where he was a member of the Task Force on Work of the Future.

Jason's research is broadly concerned with the relationship between states and markets. It assesses the implications of political struggles between business, government and societal actors for the structure of market institutions and resulting competitive and distributional outcomes. His work is especially concerned with the role of technology in social transformation. Jason is currently writing in two main areas, the role of anti-colonial economic nationalism in development and the rise of the digital economy.

Jason completed his Ph.D. in Political Economy at MIT. He also holds an AB in Economics from Princeton University, an MSc in Development Economics from the University of London School of Oriental and African Studies (SOAS) and an MPA from the Harvard Kennedy School.

The mobility space has exemplified the effects that platform disruption can have on legacy industries. Much of platforms' success in establishing themselves in new markets has rested on strategies of navigating regulatory environments that were designed for older business models such as the conventional taxi and delivery industries, and so were not well-equipped to address new technology-led firms. More recently, however, there have been regulatory developments that aim to rein in mobility platforms in a number of ways. This talk will highlight recent developments in platform regulation in the areas of labor and antitrust (competition policy) in the US and beyond.

## Day Two | Track 8: New Space: From MIT to Earth Orbit and Beyond | Endeavor Room (3rd Floor)

10:30 AM - 11:00 AM

Designing The Future at The MIT Space Systems Lab
Rebecca Masterson
Co-director, MIT Space Systems Laboratory

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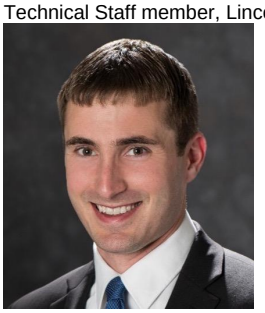
Co-director, MIT Space Systems Laboratory

Rebecca Masterson Rebecca Masterson is the Co-Director of the MIT Space Systems Laboratory and Principal Research Scientist at the Massachusetts Institute of Technology. She has over 20 years of experience in spacecraft design and development including structural design, control structure interactions, system engineering, program management, and integration and test. She was the Instrument Manager for the OSIRIS-REX Student Collaboration Experiment, the REgolith X-ray Imaging Spectrometer (REXIS) and the integration and test lead for TESS (Transiting Exoplanet Survey Satellite). Dr. Masterson's current research interests include model-based systems engineering, engineering management, uncertainty analysis as applied to engineering design, and integrated modeling. She teaches Satellite Engineering and Systems Engineering in the Aeronautics and Astronautics Dep. at MIT and holds B.S., M.S. and Ph.D. degrees in Mechanical Engineering, all from MIT.

11:00 AM - 11:30 AM

Deployable Antennas for Small Satellites
William F. Moulder
Technical Staff member, Lincoln Lab



William F. Moulder
Technical Staff member, Lincoln Lab

Dr. William F. Moulder is a technical staff member in the RF Technology Group at MIT Lincoln Laboratory. His research interests include innovative antennas such as deployable apertures, ultra-wideband antennas and advanced phased arrays. Additionally, he has performed extensive work in microwave imaging, wideband direction finding (DF) systems and full-duplex radio. He holds BS, MS, and PhD degrees in electrical and computer engineering from Ohio State University. He currently serves as the chair of the Boston chapter of the IEEE Antennas and Propagation Society (AP-S).

Micro- and nanosatellites (mass < 100 kg) have drastically reduced cost, risk and development time associated with space access. This has recently enabled many missions and use cases lead by academia and private industry. These platforms have many applications exploiting the radio frequency (RF) spectrum, including scientific data collection, imaging radar, weather sensing, spectral monitoring and communications. While miniaturization of electronics subsystems will continue to enable increased capabilities with small satellites, many RF applications demand highly directive, hence, large antennas. Thus, deployable antennas are critical to such systems, as they enable large antennas to be fielded on small platforms. This presentation will describe several research efforts at MIT Lincoln Laboratory to realize deployable antennas for micro- and nanosatellites. The presented work will include an inflatable reflector antenna, multiple examples of ultra-lightweight phased arrays, and a low-power consumption scanning reflectarray.

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| 11:30 AM - 12:00 PM | Networking Break |
| 12:00 PM - 12:30 PM | Reusable Rockets Enabled by Additive Manufacturing<br>Zachary Cordero<br>Assistant Professor of Aeronautics and Astronautics<br>Zachary Cordero<br>Assistant Professor of Aeronautics and Astronautics<br><br>Zachary Cordero joined the Department of Aeronautics and Astronautics as an assistant professor in July 2020, to pursue research on additive manufacturing of architectured materials for extreme environments, such as those encountered in thermal protection and propulsion systems. He was formerly an assistant professor of Materials Science and NanoEngineering at Rice University where he lead the Additive Lab. He received his B.Sc. in physics and Ph.D. in materials science and engineering from MIT. He then spent one year as a postdoctoral fellow at the Manufacturing Demonstration Facility of Oak Ridge National Laboratory. There, he developed improved process monitoring, quality control, and microstructure design tools for power-bed, metal additive manufacturing technologies. His notable accomplishments as a principal investigator include: developing a hybrid additive manufacturing technique termed PrintCasting for creating architectured composites with precisely controlled thermal and mechanical properties; elucidating the micro-scale deformation mechanisms that control ultrasonic welding and ultrasonic additive manufacturing; and demonstrating a directional solidification technique for growing oligocrystals with tailored 3D grain boundary networks. At MIT, he is using these techniques to tackle key challenges limiting the performance of next-generation aircraft and spacecraft. Professor Cordero's work has been recognized by several awards including Air Force Young Investigator. |
| 12:30 PM - 1:00 PM | MIT Commercial Space Startup Lightning Talks<br><br>**Lunewave**: Developing cutting edge Luneburg antenna and sensor solution for automotive (ADAS/AV), robotics, drones, and wireless/satellite communications. The company offers custom-manufactured Luneburg lens antennas encompassing a wide range of feed, sizes, and operating frequencies to meet today's requirements.<br><br>John Xin<br>Co-Founder and CEO<br>Lunewave |

# Day Two | Post-Conference Campus Tours

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| 1:30 PM - 2:30 PM | MIT campus walking tour (15 people max)<br><br>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.nano (includes the Immersion Lab), 10 people max)<br><br>Set in the heart of campus, MIT.nano is the Institute's new 200,000 sf center for nanoscience and nano 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’s Office of Sustainability and Innovation HQ (15 people max)

MIT’s newest campus building is the Welcome Center, which is home to our Innovation HQ and Office of Sustainability. The mission of MIT’s Office of Sustainability is to integrate sustainability across all levels of our campus, and to ensure that sustainability is a critical part of MIT’s standard operating procedures. The Innovation HQ is MIT’s new hub for innovation and entrepreneurship, and serves as a multi-use space to encourage the cross-pollination of ideas among the MIT community and the broader innovation community around Kendall Square. Finish off this tour at the MIT Press Bookstore next door, where you can see recently published works by MIT authors.

1:30 PM - 2:30 PM

314 Main Street on Kendall Square tour with MIT Investment management Company (15 people max)

MITIMCo supports MIT through returns generated from investing the Institute’s financial resources. These returns not only support a wide array of academic and research activities, but also play a key role in creating and growing MIT’s real estate portfolio in the innovation cluster around Kendall Square.  314 Main Street is an example of how the MIT Cambridge real estate team enhanced the physical environment surrounding campus by providing space, including programmed open space, where academics, leading corporations and the community can come together to drive innovation. This tour will also provide a brief overview of MITIMCO’s role in enhancing the Kendall Square innovation district.

1:30 PM - 2:30 PM

Media Lab (2 tours, 10 people each)

MIT Media Lab creates a convergence of disciplines, housing 22 unusually different research groups, spanning areas as diverse as human-machine interfaces, biologically inspired fabrication, cognitive enhancement, socially engaging robots, emotion AI, bionics, education, sensors, musical devices, and city design. Media Lab innovations include e-ink, the Scratch programming language, operas composed collaboratively by residents of large cities, smart prosthetic limbs, and groundbreaking work about the racial biases encoded in facial recognition technology, among many others.