

MIT Industrial Liaison Program Faculty Knowledgebase Report

2023 MIT Europe Conference in Vienna

March 29, 2023 - March 30, 2023

Day 1: 29 March, 2023 (all times CET)

29 March, 2023 (all times CET)

Welcome & Opening

Mariana Kühnel
Deputy Secretary General
[Austrian Federal Economic Chamber \(WKO\)](#)

Florian Frauscher
Director General, Economic Affairs, Innovation and International Policy
[Federal Ministry of Labour and Economy](#)

Todd Glickman
Senior Director, [MIT Corporate Relations](#)



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

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

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Randall Wright
Program Director, [MIT Corporate Relations](#)



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Randall S. Wright is a program director with MIT's Industrial Liaison Program. He manages the interface between the managements of companies, headquartered in the United States and Europe, and the senior administration and faculty of MIT.

As a program director for MIT, he convenes teams of researchers and faculty members to provide on-going emerging technology intelligence and strategic advice for the world's leading technology companies. He is a sought after speaker, delivering keynote speeches

2:20 PM

Uncertainties of the Anthropocene – and the Certainty of Societal Transformation

John Fernández

Director, Building Technology and Engineering Systems,

Professor, [MIT Department of Architecture](#)



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Director, Building Technology and Engineering Systems,

Professor

[MIT Department of Architecture](#)

Professor John E. Fernández is a professor in the Department of Architecture at MIT, affiliated with the Department of Urban Studies and Planning, and a practicing architect. Fernández is also Director of the Massachusetts Institute of Technology Environmental Solutions Initiative, enlisting the capacity of the MIT community in the transition to a net zero carbon, biodiverse and equitable future.

Fernández founded and currently directs the MIT Urban Metabolism Group and is a member of the World Economic Forum Global Commission on BiodiverCities by 2030, the Urban Climate Change Research Network, and the Leadership Team of Oceanvisions. He has published on a wide range of subjects, from sustainable cities, urban biodiversity, design, and more, and is the author of two books and numerous articles in scientific and design journals, including *Science*, *the Journal of Industrial Ecology*, *Building and Environment*, *Energy Policy* and others, and author of nine book chapters. He is formerly Chair of Sustainable Urban Systems for the International Society of Industrial Ecology and Director of the MIT Building Technology Program from 2010 to 2015.

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Humanity's past actions and current behaviors have resulted in dramatic damage to people and nature, and pose huge risks for our planet's future. From declining fisheries to acute urban pollution to record-breaking global temperatures, the evidence of human impact on the environment continues to mount. Across the MIT community, scholars and students are working to understand, address, and reverse the negative effects of humanity's footprint on the Earth. Prof. Fernandez is the Director of MIT's Environmental Solutions Initiative, which seeks to accelerate environmental solutions across three vital domains; **Climate Science and Earth Systems**, **Cities and Infrastructure**, and **Sustainable Production and Consumption**.

History has shown that effective solutions to challenging environmental problems nearly always depend on multiple disciplines. To advance a durable, sustainable relationship between humans and the environment, we require contributions not only from science, engineering, and technology but also from the humanities, arts, economics, history, architecture, urban planning, management, policy, and more. MIT's exceptional strength in all of these areas is matched by our proficiency, born of long experience, in bridging them. Prof. Fernandez will highlight the many opportunities that are now arising from the enormous endeavor to secure a sustainable future through societal transformation.

2:50 PM

Bio-Inspired Materials for Human and Environmental Health

Ariel L. Furst

Paul M. Cook Career Development Professor, [MIT Department of Chemical Engineering](#)



Ariel L. Furst

Paul M. Cook Career Development Professor

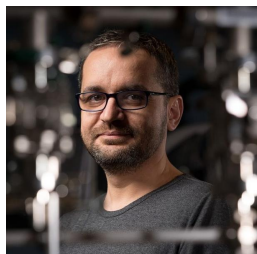
[MIT Department of Chemical Engineering](#)

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.

This talk will discuss novel, equitable technologies for improving human health, remediating environmental contamination, and circularizing the carbon economy. Global inequality is the highest in recent history, and disenfranchised groups are disproportionately burdened by pollution while receiving little benefit from the industrial infrastructure causing it. These inequities are exacerbated by limited access to healthcare resources, contributing to lower life expectancies and preventable deaths. The Furst lab seeks to address these inequalities by developing technologies that tackle the grand challenges of human health, environmental remediation, and sustainability. Specifically, the Furst Lab takes inspiration from Nature. Over four billion years of evolution, natural systems have acquired critical advantages that engineered systems have yet to replicate. By understanding fundamental biological processes, we can improve engineered environments.

Searching for Materials that Collect and Store Energy
Mircea Dinca

W. M. Keck Professor of Energy
MIT Department of Chemistry



Mircea Dinca

W. M. Keck Professor of Energy
MIT Department of Chemistry

Born in Romania in 1980, Mircea Dinca obtained his Bachelor of Arts in Chemistry from Princeton University in 2003. He did his graduate work at UC Berkeley, receiving a Ph.D. in Inorganic Chemistry in 2008. At Berkeley, he worked on the synthesis and characterization of microporous metal-organic frameworks for hydrogen storage and catalysis under the supervision of Prof. Jeffrey R. Long. After a two-year stint as a postdoctoral associate working on heterogeneous electrocatalytic water splitting with Prof. Daniel G. Nocera at MIT, he became an Assistant Professor in the Department of Chemistry at MIT in July 2010. For his group's research on microporous materials with applications in energy storage (e.g., new electrode materials and ion conductors), energy conversion (e.g., electrocatalysis and adsorption heat pumps), and heterogeneous catalysis, Prof. Dinca was awarded the US Department of Energy Young Investigator Award in 2011, the 3M Non-Tenured Faculty Grant in 2013, the Sloan Fellowship and Cottrell Award in 2014, and the NSF CAREER Award, the ACS ExxonMobil Solid State Chemistry Fellowship, and Dream Chemistry Award (Polish Academy of Science) in 2015.

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Mircea Dinca is focused on addressing research challenges related to the storage and consumption of energy and global environmental concerns.

The Dinca lab has spent the last fifteen years focusing on the development of a new class of highly porous materials--metal-organic frameworks (MOFs). Although materials in this class have long been proposed for gas storage and separation, MOFs also have promising applications in the chemical industry and exhibit relatively unexplored electronic properties with applications to the storage and consumption of energy. If one were to unfold the internal surface area of one gram of the material, it would cover an entire football field. MOFs have by far the largest surface area of any material known to humankind. Dinca's work on water sorption in MOFs has led to the isolation of particularly tunable "sponges on steroids" that can produce fresh water by absorbing moisture from air and contribute to new air-conditioning (AC) technology with half the energy consumption of traditional ACs.

The basic science that Dinca pursues lays the groundwork for technological advances that can address some of our society's most challenging problems, and not just in ways that we can predict, such as improving battery technology, reducing the energy footprint of large industrial processes, or extracting atmospheric water, but also in ways that we cannot yet imagine.

Sensing the Physical World in Unprecedented Ways

Fadel Adib

Associate Professor, MIT Media Lab & Electrical Engineering and Computer Science ,
[Electrical Engineering and Computer Science](#)



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[Electrical Engineering and Computer Science](#)

Fadel Adib is an Associate Professor with tenure at MIT and Founder-CEO of Cartesian Systems. At MIT, he holds joint appointments in the MIT Media Lab and the Department of Electrical Engineering and Computer Science. He is also the founding director of the Signal Kinetics group which invents wireless and sensor technologies for networking, health monitoring, robotics, and ocean IoT.

Prof. Adib's research has led to multiple startups. His most recent startup, *Cartesian Systems*, aims to map the physical world at unprecedented scale and precision. Prior to that, his PhD research on wireless sensing led to *Emerald Innovations*, whose devices are used for remote health monitoring of thousands of patients.

Prof. Adib is widely recognized for his research, technological, and commercial impact. He was named by *Technology Review* as one of the world's top 35 innovators under 35 and by *Forbes* as 30 under 30. His research on wireless sensing (*X-Ray Vision*) was recognized as one of the 50 ways MIT has transformed Computer Science, and his work on robotic perception (*Finder of Lost Things*) was named as one of the *103 Ways MIT is Making a Better World*. Prof. Adib's commercialized technologies have been used to monitor thousands of patients with Alzheimer's, Parkinson's, and COVID-19, and he has had the honor to demo his work to President Obama at the White House. His research has also been broadly featured in the public media, including *CNN*, *BBC*, *The Wall Street Journal*, *The Washington Post*, *The Guardian*, and *Der Spiegel*.

Prof. Adib's research has received various academic honors. He was awarded the *CAREER Award* (2019) from the US National Science Foundation, the *Young Investigator Award* (2019) and the *ONR Early Career Grant* (2020) from the Office of Naval Research, the *Google Faculty Research Award* (2017), the *Sloan Research Fellowship* (2021), and the *ACM SIGMOBILE Rockstar Award* (2022). His publications have also received awards for best papers, demos, and highlights at premier academic venues including *SIGCOMM*, *MobiCom*, *CHI*, and *Nature Electronics*.

Adib received his Bachelor's from the American University of Beirut (2011), which named him *Distinguished Young Alumnus* in 2017. He completed his graduate degrees at MIT, where he received awards for Best Master's and Best PhD theses in Computer Science in 2013 and 2016. His PhD thesis was also recognized internationally with the *ACM SIGMOBILE Doctoral Dissertation Award*.

[View full bio](#)

This talk will cover a new generation of technologies that can sense, connect, and perceive the physical world in unprecedented ways. These technologies promise transformative impact on areas spanning climate change monitoring, ocean exploration, healthcare, food security, robotics, and even extraterrestrial exploration.

The talk will cover three core technologies invented by Prof. Adib and his team. The first is an ocean internet-of-things (IoT) that uses battery-free sensors for climate-change monitoring, marine life discovery, and seafood production (aquaculture). The second is a wireless sensing technology that can "see through walls" and monitor people's vital signs (including their breathing and heart rate) without requiring any contact with the human body. The third is a physical intelligence platform that extracts new data from billions of *already-deployed* IoT devices to enable new applications in retail, robotics, and automation.

The talk will touch on the journey of these technologies from their inception at MIT to international collaborations and startups that aim to translate them to real-world impact in areas spanning healthcare, climate change, and supply chain.

4:20 PM Audio-Based Navigation: How the World's First Audio-Spatial Navigation App Guides Visually-Impaired People in their Everyday Lives

Hugo Furtado
Founder & CEO
[Dreamwaves](#)

4:40 PM Networking Break

5:20 PM MIT-Connected Startup Lightning Talks

Arjun Chandar
Founder and CEO
[IndustrialML](#)

Davide Marini
Co-Founder and CEO
[Inkbit](#)

Ali Merchant
Founder and CEO
[iQ3Connect](#)

Kosta Andoni
Robot Controls Lead
[Skylia Technologies](#)

5:50 PM

How to Permanently and Sustainably Solve Homelessness? Use Recycled Consumer Plastics to Locally 3D Print Environmentally Friendly Homes in Distributed Micro-Factories

David Hardt
Professor of Mechanical Engineering; Ralph E. and Eloise F. Cross Professor in Manufacturing
[MIT Department Mechanical Engineering](#)

Alfonso (AJ) Alexander Perez
MIT Morningside Design Fellow
President, [Grow Clean Capital](#)



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AJ (Alfonso A) Perez is an MIT alum and a professional founder. AJ serves as the President of Grow Clean which is an Organic farmland business designed to ensure the supply of healthy Organic food and strong financial returns. AJ also serves as both an ESG and deep tech advisor to family offices and institutional investors. In 2018, AJ co-founded IndustrialML, an MIT enterprise machine learning software spin-out optimizing efficiency of industrial manufacturers and enabling real-time workforce education, where he served on the Board of Directors.

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AJ holds a BS '13 in Mechanical Engineering and Masters of Engineering in Advanced Manufacturing '14 from MIT. His academic interests, lectures, and research include 3D printing, mechanical design, manufacturing processes automation, robotics, medical devices, construction, entrepreneurship, and sustainability. AJ has developed and taught several courses during his career, including the first graduate level 3D printing / additive manufacturing course for the department of Mechanical Engineering at MIT. Most recently, AJ worked with MIT Sloan Sustainability Initiative's Jason Jay to teach an MBA course called 'Innovating for Impact' and run a series of sustainability workshops in collaboration with MIT's Trust Center for Entrepreneurship and Harvard Kennedy School's Social Innovation and Change Initiative.

AJ was the final Lemelson-MIT Inventor Fellow, was selected as one of Boston Globe's 25 under 25, and won the Lemelson-MIT "use it" student prize. AJ is the primary inventor of 30+ inventions in the fields of additive manufacturing, mobile manufacturing, industrial IoT, machine learning, computer vision, medical devices, and construction. AJ seeks leadership and investment opportunities that leverage his MIT engineering background, intellectual property expertise, management experience, international network of trusted investors, and sustainability focused mindset.

Shelter insecurity is a global humanitarian crisis. Conventional construction relies on dirty, CO2-heavy cement and consumes our fresh water. Consumer and industrial plastic pollution is a global environmental crisis. The purpose of this talk is to present a globally scalable, sustainable solution and prototype demonstration to both crises.

6:20 PM

Designing Trustworthy Autonomous Systems

Wilfried Steiner
Director
[TTTech Labs](#)

6:40 PM

Wrap Up
Randall Wright
Program Director, [MIT Corporate Relations](#)



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Randall S. Wright is a program director with MIT's Industrial Liaison Program. He manages the interface between the managements of companies, headquartered in the United States and Europe, and the senior administration and faculty of MIT.

As a program director for MIT, he convenes teams of researchers and faculty members to provide on-going emerging technology intelligence and strategic advice for the world's leading technology companies. He is a sought-after speaker, delivering keynote speeches focused on emerging technology opportunities and challenges, and counter-intuitive insights in executive panels and discussions. Randall draws on extensive experience advising executives on a range of emerging technology areas including digital transformation, big data, robotics, green buildings, water efficiency, energy storage, biofuels, advanced materials, and manufacturing. He provides navigation and recommendations on the emerging technologies and adoption landscapes critical to future business growth, as well as creation, development, and execution of programs of research between industry and MIT.

Randall has been bestowed by Federal President of Austria Dr. Heinz Fischer with the decoration Cross of Honor in Gold for Services to the Republic of Austria for his "outstanding contribution to the development of relations between Austria and MIT".

Prior to MIT, Randall was a marketing manager for Pfizer, Inc., a major U.S. pharmaceuticals company. He was also a strategic planning analyst for Pennzoil Company-- a Fortune 500 oil and natural resources company. Randall is an invited lecturer at Northeastern University's Executive M.B.A. Program where he lectures on innovation and corporate strategy. His column Innovation Counterculture looks at ideas and perspectives on strategy, organization, and thinking to help executives connect to the world of innovation outside their organizations and he is published regularly in Research-Technology Management, the award-winning journal of the Industrial Research Institute.

6:50 PM

MIT Conference Evening Reception

Venue: WKO, Austrian Federal Economic Chamber

7:15 PM - 7:25 PM

Reception Welcome

Mariana Kühnel
Deputy Secretary General
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7:25 PM - 7:45 PM

Keynote: Expedition Mars - Setting Out for a New World

Gernot Grömer
Director
[Austrian Space Forum](#)

10:00 PM

End of MIT Conference Evening Reception

Day 2: 30 March, 2023 (all times CET) | Deep-Dive Workshops

Deep-Dives

Instructional program with hands-on learning activities and specific takeaways with MIT faculty. Limited number of participants.

There are 8 Deep-Dives in 4 different tracks available, four in the morning and four prior to lunch.

- Track A - Management
- Track B - Design & Manufacturing
- Track C - New Technology
- Track D - Climate & Energy

8:45 AM

Registration for Morning Deep-Dives (1-4)

9:00 AM

The MIT Experience

John Fernández

Director, Building Technology and Engineering Systems,

Professor, [MIT Department of Architecture](#)



John Fernández

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Professor

[MIT Department of Architecture](#)

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MIT pioneered the concept of learning by solving real-world problems when it first opened its doors in 1865. the Institute's motto - "Mens et Manus" - literally means "mind and hand" and underscores MIT's philosophy of transforming visionary ideas into concrete and practical realities to benefit humanity. The discoveries of its teachers and students have become part of our everyday lives, the things we now all take for granted. From additive manufacturing to digital technology to RFID to touch screens to mRNA vaccines the list of innovations from MIT's faculty members and students goes on and on.

Professor John Fernandez will give insight into the unique elements that make "The MIT Experience" the foundation of its mission to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century.

9:30 AM

Break

Attendees go to chosen tracks (Morning Deep-Dives 1-4)

Session 1: The World Needs Better Corporate Innovation: How To Do This Internally, and Through Ecosystem Engagement

Phil Budden

Senior Lecturer, Technological Innovation, Entrepreneurship, and Strategic Management,
[MIT Sloan School of Management](#)



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Senior Lecturer, Technological Innovation, Entrepreneurship, and Strategic Management
[MIT Sloan School of Management](#)

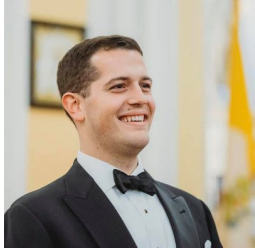
Dr Phil Budden is a Senior Lecturer at MIT's Management School, in Sloan's TIES (Tech Innovation, Entrepreneurship and Strategy) Group, where he focuses on 'corporate innovation' and multi-stakeholder innovation ecosystems, especially how corporates can get value from the latter (including start-up enterprises). He works closely with corporate executives and leaders of other large organisations on such strategies, through MIT Corporate Relations/ILP, the Corporate Innovation Program (<https://corporateinnovation.mit.edu>), Executive Education (<https://executive.mit.edu/ci>) and MIT's global REAP program (<https://reap.mit.edu>), as well as custom and consulting work.

Facing the uncertain world ahead and many emerging technologies, "innovation" will be crucial, but it is hard, especially for Corporates, and yet it is often key to competitive advantage - getting and staying one step ahead!

Dr. Phil Budden offers practical advice on what corporate leaders can do about this, both internally and also how to partner most effectively with external stakeholders such as Universities, Startups, and entrepreneurs. This not only allows Corporates to do well (e.g., financially or competitively), but it also helps them to do good (such as supporting their local innovation ecosystem or addressing global climate challenges).

Session 2: Design for Sustainability

Alfonso (AJ) Alexander Perez
MIT Morningside Design Fellow
President, [Grow Clean Capital](#)



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David E. Hardt
Ralph and Eloise Cross Professor, Mechanical Engineering
Professor, Engineering Systems
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Ralph and Eloise Cross Professor, Mechanical Engineering
Professor, Engineering Systems

Professor Hardt is a graduate of Lafayette College (BSME, 1972) and MIT (SM, PhD, 1978). He has been a member of the Mechanical Engineering faculty at MIT since 1979. His teaching focuses on control, dynamics and manufacturing processes. His disciplinary focus is system dynamics and control, as applied to manufacturing at both the process and system level.

Dr. Hardt has served as Director of the MIT Laboratory for Manufacturing and as Engineering Co-Director for the MIT Leaders for Manufacturing Program. He is currently leader of the Manufacturing Systems and Technology Program, part of distance teaching and research collaboration between MIT and Singapore.

Dr. Hardt also serves as the Graduate Officer for the Department of Mechanical Engineering.

[View full bio](#)

If we want to meaningfully move the needle on pollution, waste, climate, equity, etc., we must challenge ourselves to think and innovate differently than ever before. This talk aims to introduce the audience to the Design for Sustainability toolbox through both a technical discussion and a series of thought-provoking case studies ranging from research in MIT labs to mass production at commercial scale.



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.

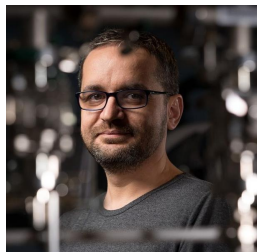
Chemical fertilizers enable sufficient food production to support the global population, but their manufacture is a major source of greenhouse gas emissions, and their use destroys native ecosystems. In Nature, soil microbes fertilize plants, engaging in elemental cycling, waste degradation, and ecosystem protection against stressors such as extreme temperatures and drought. Join MIT Professor Ariel Furst as she discusses how coatings of agricultural microbes to seeds can inexpensively revolutionize agricultural production while protecting the environment.

Microbes are often thought of solely as infection-causing agents, but in fact, these cells support all other life on earth. Microbes are responsible for critical processes, ranging from nutrient cycling in the environment to digestion in our gut. In fact, we have ten times more microbes in and on our bodies than we have human cells. We view microbes as tiny chemical factories that have had four billion years to perfect their target processes. Because of their diverse functions, we view microbes as critical engineering tools to improve human and environmental health. In this workshop, we will brainstorm global grand challenges and discuss the potential of microbial technologies to address these challenges.

9:45 AM - 11:15 AM

Session 4: Distribution Water Harvesting from Air in Water-Stressed and Remote Area
Using Metal-Organic Frameworks
Mircea Dinca

W. M. Keck Professor of Energy
MIT Department of Chemistry



Mircea Dinca

W. M. Keck Professor of Energy
MIT Department of Chemistry

Born in Romania in 1980, Mircea Dinca obtained his Bachelor of Arts in Chemistry from Princeton University in 2003. He did his graduate work at UC Berkeley, receiving a Ph.D. in Inorganic Chemistry in 2008. At Berkeley, he worked on the synthesis and characterization of microporous metal-organic frameworks for hydrogen storage and catalysis under the supervision of Prof. Jeffrey R. Long. After a two-year stint as a postdoctoral associate working on heterogeneous electrocatalytic water splitting with Prof. Daniel G. Nocera at MIT, he became an Assistant Professor in the Department of Chemistry at MIT in July 2010. For his group's research on microporous materials with applications in energy storage (e.g., new electrode materials and ion conductors), energy conversion (e.g., electrocatalysis and adsorption heat pumps), and heterogeneous catalysis, Prof. Dinca was awarded the US Department of Energy Young Investigator Award in 2011, the 3M Non-Tenured Faculty Grant in 2013, the Sloan Fellowship and Cottrell Award in 2014, and the NSF CAREER Award, the ACS ExxonMobil Solid State Chemistry Fellowship, and Dream Chemistry Award (Polish Academy of Science) in 2015.

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Join MIT Professor Mircea Dinca for a conversation about water harvesting from the air and explore the potential and applications for metal-organic frameworks to address issues of water, food, energy storage, and more.

11:15 AM - 11:30 AM

Break / Registration for Lunch Deep-Dives 5-8

Session 5: How to Forge A Clear Path To Industry 4.0

John Carrier

Senior Lecturer, System Dynamics, [MIT Sloan School of Management](#)



John Carrier

Senior Lecturer, System Dynamics

[MIT Sloan School of Management](#)

John Carrier is a senior lecturer in the System Dynamics Group at the MIT Sloan School of Management and Managing Director of 532 Partners. His expertise is in shaping the dynamics of operating environments to improve productivity, quality, safety, and morale simultaneously. He has helped companies save hundreds of millions of dollars by helping them find and eradicate the hidden systems lurking inside every operation. His current focus is to help prepare companies to compete in the new environment of Industry 4.0.

He has educated over five hundred top-level leaders in the MIT Sloan Executive Education program in Oil & Gas, petrochemicals, mining, and healthcare. When not teaching, he spends most of his time in the operating environment, working directly with the front line to deliver measurable results in less than sixty days.

Dr. Carrier holds a B.S. in Chemical Engineering from the University of Michigan, a Ph.D. in Control Systems from MIT, and an MBA from the Harvard Business School.

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Sensor technologies, advanced analytics, artificial intelligence, and machine learning are poised to remake manufacturing. Don't let a legacy mindset derail progress. Carrier, who teaches the MIT executive education course "Implementing Industry 4.0: Leading Change in Manufacturing and Operations," argues that the biggest impediments to Industry 4.0 transformation are operations practices and legacy mindsets that keep employees tethered to familiar work patterns, despite investment in new technologies and business process innovations.

Session 6: Causing A Paradigm-Shift: Machine Learning In Manufacturing and Operations
Duane Boning

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



Duane Boning

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Clarence J. LeBel Professor, [MIT Electrical Engineering and Computer Science \(EECS\)](#)

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

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Finding the shortest path from data to impact - MIT Machine Intelligence for Manufacturing and Operations (MIMO) is a research and educational program created to increase industrial competitiveness by accelerating the deployment and understanding of machine intelligence in manufacturing and operations. Providing the context, Professor Boning identifies that the thrust of Machine Learning is causing a paradigm shift in Manufacturing and Operations driven by IIoT, the availability of massive amounts of structured data, advances in ML methods, and the growth in compute capacity.

11:30 AM - 1:00 PM

Session 7: Building the Next Generation of Electronics - Flexible Electronics

Jeehwan Kim
Associate Professor, MIT Mechanical Engineering
Jeehwan Kim
Associate Professor, MIT Mechanical Engineering

Prof. Jeehwan Kim's group at MIT focuses on innovations in nanotechnology for next generation computing and electronics. Prof. Kim joined MIT in September 2015. Before joining MIT, he was a Research Staff Member at IBM T.J. Watson Research Center in Yorktown Heights, NY since 2008 right after his Ph.D. He worked on next generation CMOS and energy materials/devices at IBM. Prof. Kim is a recipient of 20 IBM high value invention achievement awards. In 2012, he was appointed a "Master Inventor" of IBM in recognition of his active intellectual property generation and commercialization of his research. After joining MIT, he continuously worked nanotechnology for advanced electronics/photonics. As its recognition, he received LAM Research foundation Award, IBM Faculty Award, DARPA Young Faculty Award, and DARPA Director's Fellowship. He is an inventor of > 200 issued/pending US patents and an author of > 50 articles in peer-reviewed journals. He currently serves as Associate Editor of *Science Advances*, AAAS. He received his B.S. from Hongik University, his M.S. from Seoul National University, and his Ph.D. from UCLA, all of them in Materials Science.

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Jeehwan Kim is building a physical neural network and producing cheap semiconductor wafers – technologies that could help bring the artificial intelligence power of supercomputers to handheld devices. A team of researchers led by Professor Kim has designed a "brain-on-a-chip" smaller than a piece of confetti that could advance the development of small portable AI devices and developed a new process that may be the key to manufacturing flexible electronics with multiple functionalities in a cost-effective way.

11:30 AM - 1:00 PM

Session 8: From an MIT Lab to a Startup: Wireless Sensing for Retail, Robotics, and Supply Chain

Fadel Adib

Associate Professor, MIT Media Lab & Electrical Engineering and Computer Science ,
[Electrical Engineering and Computer Science](#)



Fadel Adib

Associate Professor, MIT Media Lab & Electrical Engineering and Computer Science
[Electrical Engineering and Computer Science](#)

Fadel Adib is an Associate Professor with tenure at MIT and Founder-CEO of Cartesian Systems. At MIT, he holds joint appointments in the MIT Media Lab and the Department of Electrical Engineering and Computer Science. He is also the founding director of the Signal Kinetics group which invents wireless and sensor technologies for networking, health monitoring, robotics, and ocean IoT.

Prof. Adib's research has led to multiple startups. His most recent startup, *Cartesian Systems* , aims to map the physical world at unprecedented scale and precision. Prior to that, his PhD research on wireless sensing led to *Emerald Innovations*, whose devices are used for remote health monitoring of thousands of patients.

Prof. Adib is widely recognized for his research, technological, and commercial impact. He was named by *Technology Review* as one of the world's top 35 innovators under 35 and by *Forbes* as 30 under 30. His research on wireless sensing (*X-Ray Vision*) was recognized as one of the 50 ways MIT has transformed Computer Science, and his work on robotic perception (*Finder of Lost Things*) was named as one of the *103 Ways MIT is Making a Better World*. Prof. Adib's commercialized technologies have been used to monitor thousands of patients with Alzheimer's, Parkinson's, and COVID-19, and he has had the honor to demo his work to President Obama at the White House. His research has also been broadly featured in the public media, including *CNN*, *BBC*, *The Wall Street Journal*, *The Washington Post*, *The Guardian*, and *Der Spiegel*.

Prof. Adib's research has received various academic honors. He was awarded the *CAREER Award* (2019) from the US National Science Foundation, the *Young Investigator Award* (2019) and the *ONR Early Career Grant* (2020) from the Office of Naval Research, the *Google Faculty Research Award* (2017), the *Sloan Research Fellowship* (2021), and the *ACM SIGMOBILE Rockstar Award* (2022). His publications have also received awards for best papers, demos, and highlights at premier academic venues including *SIGCOMM*, *MobiCom*, *CHI*, and *Nature Electronics*.

Adib received his Bachelor's from the American University of Beirut (2011), which named him *Distinguished Young Alumnus* in 2017. He completed his graduate degrees at MIT, where he received awards for Best Master's and Best PhD theses in Computer Science in 2013 and 2016. His PhD thesis was also recognized internationally with the *ACM SIGMOBILE Doctoral Dissertation Award*.

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Join Prof. Fadel Adib for a conversation and brainstorming session on the journey of one of his lab's technologies from a moonshot idea in the lab to their most recent startup, Cartesian Systems, that aims to map the physical world at an unprecedented scale. The session will overview the transition from lab to a startup, and brainstorm applications and avenues for collaborations in areas spanning retail, robotics, and supply chain.

1:00 PM - 2:00 PM

Networking Lunch