

MIT Industrial Liaison Program Faculty Knowledgebase Report

Future of Manufacturing @MIT

March 2, 2021 10:00 am - 12:35 pm

10:00am

Welcome and Introduction
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.

10:05am

MIT's ecosystem develops the future tools and approach for our future manufacturing needs

Brian Anthony

Associate Director, MIT.nano

Faculty Lead, Industry Immersion Program in Mechanical Engineering



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Associate Director, MIT.nano

Faculty Lead, Industry Immersion Program in Mechanical Engineering

Dr. Anthony has over 25 years of commercial, research, and teaching experience in product realization and information enabled manufacturing. 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 research and product development interests cross the boundaries of manufacturing and design, medical imaging, computer vision, acoustic and ultrasonic imaging, large-scale computation and simulation, optimization, metrology, autonomous systems, and robotics. His teaching interests include the modeling 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 teaches on-line and on-campus professional programs in Smart Manufacturing and sensory systems Beyond IoT.

Dr. Anthony spent the first part of his career as an entrepreneur. He developed and directed the development of products and solutions for the industrial and scientific video markets. His products fueled corporate growth from startup to dominant market leader. He has been awarded 20 patents, published over 100 peer reviewed articles, and won an Emmy from the Academy of Television Arts and Sciences for innovations in sports broadcast technical innovation.

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10:20am

AI and Manufacturing
Duane S. Boning
Professor, Electrical Engineering and Computer Science
Engineering Faculty Co-Director, Leaders for Global Operations (LGO) Program
MTL Associate Director, Computation and CAD



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Dr. Duane S. Boning is the Clarence J. LeBel Professor in Electrical Engineering, and Professor of Electrical Engineering and Computer Science in the [EECS Department](#) at MIT. He is affiliated with the MIT [Microsystems Technology Laboratories](#), and serves as MTL Associate Director for Computation and CAD. He is also the Engineering Faculty Co-Director of the [MIT Leaders for Global Operations \(LGO\)](#) program, serving in that role since September 2016. From 2004 to 2011, he served as Associate Head of the EECS Department at MIT. From 2011 through 2013 he was the Director/Faculty Lead of the [MIT Skoltech Initiative](#), and from 2011 through July 2018, he was the faculty Director of the [MIT/Masdar Institute Cooperative Program](#).

Dr. Boning received his S.B. degrees in electrical engineering and in computer science in 1984, and his S.M. and Ph.D. degrees in electrical engineering in 1986 and 1991, respectively, all from the Massachusetts Institute of Technology. He was an NSF Fellow from 1984 to 1989, and an Intel Graduate Fellow in 1990. From 1991 to 1993 he was a Member Technical Staff at the Texas Instruments Semiconductor Process and Design Center in Dallas, Texas, where he worked on semiconductor process representation, process/device simulation tool integration, and statistical modeling and optimization.

Dr. Boning is a Fellow of the IEEE, and has served as Editor in Chief for the IEEE Transactions on Semiconductor Manufacturing, and as chairman of the CFI/Technology CAD Framework Semiconductor Process Representation Working Group. He is a member of the IEEE, Electrochemical Society, Eta Kappa Nu, Tau Beta Pi, Materials Research Society, Sigma Xi, and the Association of Computing Machinery.

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10:35am

MIT Startup Exchange Lightning Talks

[Meter](#): Next-generation volumetric imaging for manufacturing inspection

Eduardo Torrealba
Co-Founder and CEO
[Meter](#)

10:40am

Advanced processes applied to industrial needs

Katrin Ellen Daehn
Postdoctoral Associate, Department of Materials Science and Engineering

10:55am

Future skills for the manufactures and industries of tomorrow
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.

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11:10am

MIT Startup Exchange Lightning Talks

[Eureka Robotics](#): Enabling High Accuracy – High Agility automation

Cuong Pham
Co-Founder
[Eureka Robotics](#)

11:15am

Processes and Artificial Intelligence in Design
Wojciech Matusik
Professor, Electrical Engineering and Computer Science



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Professor, Electrical Engineering and Computer Science

Wojciech Matusik is a Professor of [Electrical Engineering and Computer Science](#) at the [Computer Science and Artificial Intelligence Laboratory](#) at MIT, where he leads the [Computational Fabrication Group](#) and is a member of the [Computer Graphics Group](#). Before coming to MIT, he worked at Mitsubishi Electric Research Laboratories, Adobe Systems, and Disney Research Zurich. He studied computer graphics at MIT and received his PhD in 2003. He also received a BS in EECS from the University of California at Berkeley in 1997 and MS in EECS from MIT in 2001. His research interests are in computer graphics, computational design and fabrication, computer vision, robotics, and hci. In 2004, he was named one of the world's top 100 young innovators by MIT's Technology Review Magazine. In 2009, he received the Significant New Researcher Award from ACM Siggraph. In 2012, Matusik received the DARPA Young Faculty Award and he was named a Sloan Research Fellow. In 2014, he received Ruth and Joel Spira Award for Excellence in Teaching.

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11:30am

Workforce of the Future
Elisabeth B. Reynolds
Executive Director, Work of the Future Project
Lecturer, Urban Studies and Planning
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Elisabeth B. Reynolds works on issues related to systems of innovation, regional economic development and industrial competitiveness. She has focused in particular on the theory and practice of cluster development and regional innovation systems and advises several organizations in this area. Her current research focuses on the pathways that U.S. entrepreneurial firms take in scaling production-related technologies, as well as advanced manufacturing, including the globalization of the biomanufacturing industry. She is a member of the Massachusetts Advanced Manufacturing Collaborative Executive Committee.

Before coming to MIT for her Ph.D., Reynolds was the Director of the City Advisory Practice at the Initiative for a Competitive Inner City (ICIC), a non-profit founded by Professor Michael Porter focused on job and business growth in urban areas.

Reynolds has an A.B. from Harvard in Government and was the Fiske Scholar at Trinity College, Cambridge. She holds a MSc. from the University of Montreal in Economics and a Ph.D. from MIT in Urban and Regional Studies.

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11:45am

MIT Startup Exchange Lightning Talks

Realtime Robotics: Autonomous Motion Planning and Spatial Perception for Industrial Automation

Tom Munger
Director of Sales
[Realtime Robotics](#)

11:50am

Using AI and Machine learning in product and process design
Richard Braatz
Gilliland Professor, Chemical Engineering
Faculty Research Officer
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Faculty Research Officer

Richard D. Braatz joined the MIT Chemical Engineering Department as the Edwin R. Gilliland Professor. Before coming to MIT, Braatz was the Millennium Chair and Professor of Chemical and Biomolecular Engineering at the University of Illinois at Urbana-Champaign. He has been recognized internationally as a leader in process systems and control engineering. Professor Braatz brings to MIT a unique blend of fundamental controls theory, multiscale modeling, and challenging applications.

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12:05pm

Project Manus: MIT's campus makerspaces and student maker communities
Martin Culpepper
Professor, Mechanical Engineering



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Professor, Mechanical Engineering

Marty Culpepper, a Professor of Mechanical Engineering, is MIT's first Maker Czar. He leads MIT's effort to upgrade legacy spaces/equipment, introduce new technologies, create new campus makerspaces, foster maker communities, and collaborate with peer universities, alumni, government, and industry. Professor Culpepper is the recipient of an NSF Presidential Early Career Award, two R&D 100 awards, a TR100 award, and a Joel and Ruth Spira Teaching Award. His areas of expertise are in Precision Engineering, Manufacturing, and Thermo/Fluid system design.

He is a self-described gear head who loves working on his Ducati and Mustang, but not as much as riding/driving them. He loves building things at MIT and at home in his own shop. His favorite maker tools are mills and waterjets, though he's become fond of glass blowing.

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12:15pm

MIT Startup Exchange Lightning Talks

[Akasha Imaging](#): "See it, Build it!" Perception Solutions for Manufacturing

Kartik Venkataraman
CEO
[Akasha Imaging](#)

12:20pm

Teaching Predictive Multiscale Materials Design
Markus Buehler
McAfee Professor, Civil and Environmental Engineering



Markus Buehler
McAfee Professor, Civil and Environmental Engineering

Markus J. Buehler is the McAfee Professor of Engineering at MIT and leads MIT's Laboratory for Atomistic and Molecular Mechanics. His primary research interests focus on the structure and mechanical properties of biological and bio-inspired materials, to characterize, model and create materials with architectural features from the nano- to the macro-scale. Much of his research deals with protein materials – the basic constituent of all life – rendering complex materials such as cells, blood vessels, but also spider silk and viruses. Using an array of theoretical, computational and experimental methods, his work seeks to understand the means by which nature creates materials, with applications in bio-inspired engineering. His most recent book, Biomateriomics, presents a new design paradigm for the analysis of biomaterials using a categorization approach that translates insights from disparate fields.

Buehler is the recipient of many awards including the Harold E. Edgerton Faculty Achievement Award, the Alfred Noble Prize, the Feynman Prize in Nanotechnology, the Leonardo da Vinci Award, and the Thomas J.R. Hughes Young Investigator Award. He is a recipient of the National Science Foundation CAREER award, the United States Air Force Young Investigator Award, the Navy Young Investigator Award, and the Defense Advanced Research Projects Agency (DARPA) Young Faculty Award, as well as the Presidential Early Career Award for Scientists and Engineers (PECASE). In 2018, Buehler was selected as a Highly Cited Researcher by Clarivate Analytics. In 2019, he received the Materials Horizons Outstanding Paper Prize, and his work was recognized as a highly cited author by the Royal Society of Chemistry. A frequent collaborator with artists, he is a member of the MIT Center for Art, Science and Technology (CAST) Executive Committee.

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12:30pm

MIT Professional Education
Myriam Joseph

Manager, Business Development and Marketing
MIT Professional Education

12:35pm

Closing Remarks