











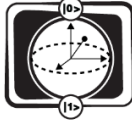


MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

The Beaver Works Summer Institute offers its students a unique opportunity to learn about emerging technologies from leading academic and industry researchers, engineers, and entrepreneurs. This year’s seminar series features a diverse set of 17 topics including breakthroughs in health monitoring and cutting-edge developments in advanced robotics and artificial intelligence, to approaches for developing a cleaner and more resilient power grid. Students will have the opportunity to engage directly in conversations with these leaders about how we can better learn and innovate in science, technology, and engineering.

<p>Raytheon Intelligence & Space Project</p>  <p>Autonomous RACECAR Grand Prix</p>	<p>BAE Systems Project</p>  <p>Autonomous Air Vehicle Racing</p>	 <p>Autonomous Cognitive Assistant</p>	<p>Amazon Project</p>  <p>Remote Sensing</p>	<p>Sierra Nevada Corp. Project</p>  <p>Build a CubeSat</p>
 <p>UAS-SAR</p>	 <p>Serious Game Design and Development with AI</p>	<p>MITRE Project</p>  <p>Embedded Security and Hardware Hacking</p>	 <p>Data Science for Health & Medicine</p>	
 <p>Assistive Technology</p>	 <p>Cyber Security</p>	<p>ONR Autonomous Maritime Engineering Project</p>  <p>Autonomous Underwater Vehicle Challenge</p>	<p>MITRE Project</p>  <p>Quantum Software</p>	



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MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

12:30pm EDT, Webinar

- July 6 (Tue): Dr. Marija Ilic, MIT Laboratory for Information & Decision Systems and MIT Lincoln Laboratory
Can we have plug-and-play autonomous electricity service? Bringing Data to Make Electric Energy Services Clean and Resilient
- July 7 (Wed): Don Kieffer, MIT Sloan School of Management
Dynamic Work Design: Principles, Structures, Methods
- July 8 (Thu): Cheryl Paradis, BAE Systems
Lessons from an Introverted Innovator
- July 9 (Fri): Dr. Yael Kalai, Microsoft Research New England
The Magic of Cryptography
- July 12 (Mon): Prof. Asegun Henry, MIT Mechanical Engineering
Rethinking Problems in Thermal Science and Engineering - From Atoms to Applications
- July 13 (Tue): Chris Peterson, MIT Admissions Office
How to apply to MIT (and other colleges) as a Maker
- July 14 (Wed): Brad Tousley, Raytheon Intelligence & Space, and Dr. Timothy Chung, DARPA
Emerging and Disruptive Technologies of Today
- July 15 (Thu): Prof. Dina Katabi, MIT Computer Science and Artificial Intelligence Laboratory
From Wearables to Invisibles: Monitoring Sleep, Motion and Vital Signs with Radio Signals
- July 19 (Mon): Prof. Sangbae Kim, MIT Mechanical Engineering
Robots with Physical Intelligence
- July 20 (Tue): Dr. Eli Niewood, MITRE
System Analysis of an Engineer's Career (8 Things I Wish I had Known Before I Started My Career)
- July 21 (Wed): Prof. Fikile Brushett, MIT Chemical Engineering
Building an Electrochemical Future: Innovators Needed!
- July 22 (Thu): Dr. Eric Evans, Director, MIT Lincoln Laboratory
MIT Lincoln Laboratory Overview
- July 23 (Fri): Louie Lopez, Director of STEM in OUSD/R&E
DoDSTEM Program Overview
- July 26 (Mon): Malik and Miles George, MIT
TTikToking about Science: The Importance of STEM Communication and Diversity

- July 27 (Tue): Vilas Dhar, President, Patrick J. McGovern Foundation
From Video Games to Artificial Intelligence: Using Tech for Good
- July 28 (Wed): Dr. Alyssa Bennett, Naval Surface Warfare Center - Carderock
The Importance of a Holistic Approach
- July 29 (Thu): Regina Apodaca, MIT Media Lab, Space Enabled
Learning How to Fly in Mars and Space

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Can we have plug-and-play autonomous electricity service? Bringing Data to Make Electric Energy Services Clean and Resilient

Dr. Marija Ilić

12:30pm EDT, July 6, 2021
Webinar

Electric power grids are one of the largest physical man-made network systems; they serve electricity to areas as large as the entire Eastern US, Western US, and Texas. However, much is changing and large far-away power plants are being replaced by smaller clean wind and solar distributed energy resources (DERs); electricity users can have IoT embedded in their appliances, including electric vehicles, to help adjust their consumption when needed. The power network was not designed to deliver power from these new locations, nor to serve customers with such intermittent power sources; because of this, it must be helped with lots of ‘smarts’ embedded in small resources, users and the local grids to jointly keep the lights on without damaging environment. Starting from Physics 101, and a little background on energy/power, one can model, control and simulate the transforming power networks and their smarts. At the end it all becomes possible and quite simple, transparent and easy to understand. We use our MIT scalable electric power system simulator (SAPSS) to demonstrate how self-adaptation can ensure use of clean power and enable gradual loss of service, instead of sudden blackouts during extreme events.



Marija Ilić, is a Professor Emerita at Carnegie Mellon University (CMU). She currently holds two positions at the Massachusetts Institute of Technology (MIT): Senior Staff in the Energy Systems Group 47 at the MIT Lincoln Laboratory, and Senior Research Scientist at the MIT Laboratory for Information and Decision Systems (LIDS). She is an IEEE Life Fellow and an elected member of the US National Academy of Engineering, and the Academia Europaea. She was the first recipient of the NSF Presidential Young Investigator Award for Power Systems

in the US. She has co-authored several books on the subject of large-scale electric power systems, and has co-organized an annual multidisciplinary Electricity Industry conference series at Carnegie Mellon (<http://www.ece.cmu.edu/~electricconf>) with participants from academia,

government, and industry. She was the founder and co-director of the Electric Energy Systems Group (EESG) at Carnegie Mellon University (<http://www.eesg.ece.cmu.edu>). Currently she is building EESG@MIT, in the same spirit as EESG@CMU.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Dynamic Work Design: Principles, Structures, Methods

Don Kieffer

12:30pm EDT, July 7, 2021

Webinar

People usually think of Work Design as the organizational chart or a process map. But these organizational structures do a poor job of informing people how to interact once the work begins and problems appear.

Dynamic Work Design provides a framework for human interaction when work is moving through the organization that yields both faster and better results, particularly in intellectual/creative work.

<https://www.youtube.com/watch?v=uANbmvmwhG8&index=2&list=PLKaF-rnKfpxOIJ2UIRq8PosoNwOksO8P9>



Don Kieffer is a career operations executive and an expert in improvement and transformation. He has collaborated with MIT social scientist and associate dean of MIT Sloan School of Management, Nelson Repenning since 1996. Their focus for the past 15 years on improving strategy, innovation, administrative and technical work has resulted in the creation of Dynamic Work Design, a method of transforming office work quickly without reorganizations, new software or major change

initiatives. His consulting and teaching spans 5 continents.

Don is Founder of ShiftGear Work Design, LLC (<http://shiftgear.work/>).

In 2008, Kieffer was appointed Senior Lecturer at MIT's Sloan School of Management where he teaches in the Executive MBA program, custom executive education programs as well as courses offered publically.

<https://executive.mit.edu/openenrollment/program/implementingimprovement-strategies#.WOU1D6KpZAZ>

Contact information: don@shiftgear.work, DonKieffer@mit.edu

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Lessons from an Introverted Innovator

Cheryl Paradis

10am EDT, July 8, 2021

Webinar

Hear from Cheryl Paradis, vice president & general manager of BAE Systems' FAST Labs, as she shares lessons from her near 30-year career in the defense and aerospace industry. Cheryl, a self-proclaimed introvert, will share everything from how to choose when you're at a 'crossroads', to how to build your own 'personal board of directors'. She'll then share her perspectives on some of the hardest technology challenges being tackled in FAST Labs, from autonomy to quantum to artificial intelligence.



Cheryl Paradis is vice president and general manager of FAST Labs, where she heads the research and development of advanced technologies that underpin BAE Systems' products and services. FAST Labs develops next-generation differentiating capabilities for the warfighter and BAE Systems, executing research in advanced electronics, autonomy, artificial intelligence, cyber, electronic warfare, and sensors & processing.

With 29 years in the defense and aerospace industry, Cheryl has held numerous technical and leadership roles at BAE Systems, beginning as a design engineer in 1992. Cheryl has developed a variety of novel solutions as an aerospace engineer, working across a breadth of airborne platforms executing Electronic Warfare and multi-intelligence missions. Prior to assuming the position of FAST Labs' VP/GM, she most recently served as director of the Optical EW Systems (OEWS) product line for the Survivability, Targeting, & Sensing Solutions business area. Prior to that, she served as the Deputy General Manager for FAST Labs.

Cheryl earned a Bachelor of Science in Aerospace Engineering from Embry-Riddle Aeronautical University and a Masters of Business Administration from Rivier University.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

The Magic of Cryptography

Dr. Yael Tauman Kalai

12:30pm EDT, July 9, 2021
Webinar

In this talk I will demonstrate some of the magical aspects of cryptography, including how one can convert any proof into one that reveals no information, beyond the fact that the statement is true!



Yael Tauman Kalai received her BA (1997) from the Hebrew University in Jerusalem, MA (2001) under the supervision of Adi Shamir at the Weizmann Institute, and PhD (2006) under the supervision of Shafi Goldwasser at MIT. After postdoctoral positions at Microsoft Research and the Weizmann Institute, she is now a Researcher at Microsoft Research New England. Her honors include an outstanding master's thesis prize, and a Sprows award (co-winner) for best PhD thesis at MIT. Her research focuses on cryptography.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Rethinking Problems in Thermal Science and Engineering - From Atoms to Applications

Prof. Asegun Henry

12noon EDT, July 12, 2021

Webinar

Thermal energy transport, conversion and storage are central to many of the industries, technologies and devices we use every day, from our cell phones and laptops to our refrigerators and automobiles. However, there are still a number of thermal phenomena for which the underlying science is not well understood and on the engineering side, there are regimes of operation/performance that are theoretically possible, but inaccessible from a practical perspective. This talk will review how the Atomistic Simulation & Energy (ASE) research group at MIT has managed to realize important advancements on some of these problems, by rethinking problems from the beginning and challenging established paradigms.

More specifically, this talk will highlight recent progress towards enabling heat transfer at extreme temperatures by using liquid metal as a heat transfer fluid in all graphite/ceramic infrastructures. Most notably, the ASE group has demonstrated the highest temperature pump on record (1400°C), which has opened up a new regime of operation that was previously inaccessible. This technological breakthrough has led to the conception of new energy systems, such as thermal energy grid storage (i.e., aka “*Sun in a Box*”) and a new CO₂ free approach to hydrogen production based on methane pyrolysis. Both of these new technologies are currently under development in the ASE group and this talk will review progress to date. In addition, this talk will also cover what are believed to be the *Top 5 Most Impactful Problems in Thermal Science and Engineering for Decarbonization*. Here the goal is to inspire the next generation to begin working on these critical technological problems, because if solved, each will have a significant impact on mitigating climate change.



Dr. Asegun Henry is a Robert Noyce Career Development professor in the Department of Mechanical Engineering at MIT. Prior to joining MIT in 2018, he was an Assistant Professor in Mechanical Engineering at Georgia Tech for six years (2012-2018). Prior to starting as a professor, he worked as a fellow in the U.S. Department of Energy, in the Advanced Research Projects Agency – Energy (ARPA-E). He also worked as a postdoc at Northwestern and Oak Ridge National Labs, and completed his Masters and Ph.D. from MIT, and bachelors from Florida A & M University. Professor

Henry has made significant advances and contributions to several fields within energy and heat transfer, namely: solar fuels and thermochemistry, phonon transport in disordered materials, phonon transport at interfaces, and he has developed the highest temperature pump on record, which used an all ceramic mechanical pump to pump liquid metal above 1400°C. This technological breakthrough, which is now in the Guinness Book of World Records, has opened the door for new high temperature energy systems concepts, such as methane cracking for CO₂ free hydrogen production and a new grid level energy storage approach affectionately known as “*Sun in a Box*”, that is cheaper than pumped hydro.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

How to apply to MIT (and other colleges) as a Maker

Chris Peterson

12:30pm EDT, July 13, 2020

Webinar

There is a renewed interest in 'maker' education in the United States. In this talk Chris Peterson will share insights from the admissions process, both here at MIT and for other universities generally. He will discuss both specific aspects of the MIT educational experience that make it 'maker'-friendly, and how to talk about your technically creative projects in the MIT application and in applications for other selective universities.



Chris Peterson SM '13 is Senior Assistant Director for Talented Outreach at MIT Admissions, where he oversees the recruitment and evaluation of makers, entrepreneurs, and academic superstars. He serves on the National Working Group for the MakerEd Open Portfolio Project and manages the Engineering Advisory Board that assesses supplemental Maker Portfolios in the MIT admissions process. He teaches and researches on the cultural aspects of technical systems in the Comparative Media

Studies program, where he did his graduate work, and blogs frequently at mitadmissions.org.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Emerging and Disruptive Technologies of Today

12noon EDT, July 14, 2021

Webinar



Bradford Tousley is acting vice president of Advanced Concepts & Technology for Raytheon Intelligence & Space, a business of Raytheon Technologies. His presentation will highlight some of the emerging and disruptive solutions his innovative technology incubator team is creating and delivering to customers.

Before joining the company, he spent more than 35 years in leadership positions within government agencies, the private sector and the United States military. Among other roles, Tousley previously served as the Defense Advanced Research Projects Agency (DARPA) director for the Tactical Technology Office, the pivotal DARPA platforms and systems office covering space, air, maritime/undersea and ground warfighting domains.

He holds a master's and Ph.D. in electrical engineering from the University of Rochester and a bachelor's in nuclear engineering from the United States Military Academy at West Point.

Raytheon Intelligence & Space specializes in developing advanced sensors, training, and cyber and software solutions — delivering the disruptive technologies its customers need to succeed in any domain, against any challenge.



Dr. Timothy Chung joined the Defense Advanced Research Projects Agency's (DARPA) Tactical Technology Office as a program manager in February 2016.

His presentation will focus on advancing innovations for robotics teams in complex environments.

His interests include autonomous/unmanned air vehicles, collaborative autonomy for unmanned swarm system capabilities, distributed perception, distributed decision-making, and counter unmanned system technologies.

Prior to joining DARPA, Dr. Chung served as an Assistant Professor at the Naval Postgraduate School and Director of the Advanced Robotic Systems Engineering Laboratory.

His academic interests included modeling, analysis, and systems engineering of operational settings involving unmanned systems, combining collaborative autonomy development efforts with an extensive live-fly field experimentation program for swarm and counter-swarm unmanned system tactics and associated technologies. Dr. Chung also served as Deputy Director of the Secretary of the Navy initiative for the Consortium for Robotics and Unmanned Systems Education and Research.

Dr. Chung holds a Bachelor of Science in Mechanical and Aerospace Engineering from Cornell University. He also earned Master of Science and Doctor of Philosophy degrees in Mechanical Engineering from the California Institute of Technology.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

From Wearables to Invisibles: Monitoring Sleep, Motion and Vital Signs with Radio Signals

Prof. Dina Katabi

12:30pm EDT, July 15, 2021
Webinar

In this talk, I will present sensing technologies that track people's gait and movements based purely on the radio signals that bounce off their bodies. They can further monitor a person's breathing, heartbeats, and sleep quality remotely, without requiring any physical contact with the human body. They operate by transmitting a low-power wireless signal and analyzing its reflections using machine learning models. We show results from using these sensors for remote health monitoring of patients with Parkinson's, Alzheimer's, and COVID-19. We envision that such technologies can enable truly smart homes that learn people's habits and passively monitor their vital signs to allow for early detection of health problems and improve overall health and well-being.



Dina Katabi is the Andrew & Erna Viterbi Professor of Electrical Engineering and Computer Science at MIT, the director of the MIT Center for Wireless Networks and Mobile Computing, and co-founder of Emerald Innovations, Inc. Professor Katabi is a MacArthur Fellow and a Member of the National Academy of Engineering. She received her PhD and MS degrees from MIT in 2003 and 1999, and her Bachelor of Science from Damascus University in 1995. Her research interests span digital health, wireless and mobile systems, and applied machine learning. She develops new

technologies, algorithms, and systems that provide non-invasive health monitoring, enable smart homes, improve WiFi and cellular performance, and deliver new applications that are not feasible given today's technologies. She has received multiple prestigious awards including the ACM Prize in Computing, the ACM Grace Murray Hopper Award, two SIGCOMM Test of Time Awards, a Sloan Fellowship, the IEEE William R. Bennett prize, and multiple best paper awards.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Robots with Physical Intelligence

Prof. Sangbae Kim

12:30pm EDT, July 19, 2021

Webinar

While industrial robots are effective in repetitive, precise kinematic tasks in factories, the design and control of these robots are not suited for physically interactive performance that humans do easily. These tasks require ‘physical intelligence’ through complex dynamic interactions with environments whereas conventional robots are designed primarily for position control. In order to develop a robot with ‘physical intelligence’, we first need a new type of machines that allow dynamic interactions. This talk will discuss how the new design paradigm allows dynamic interactive tasks. As an embodiment of such a robot design paradigm, the latest version of the MIT Cheetah robots and force-feedback teleoperation arms will be presented. These robots are equipped with proprioceptive actuators, a new design paradigm for dynamic robots. This new class of actuators will play a crucial role in developing ‘physical intelligence’ and future robot applications such as elderly care, home service, delivery, and services in environments unfavorable for humans.





Sangbae Kim is the director of the Biomimetic Robotics Laboratory and a professor of Mechanical Engineering at MIT. His research focuses on bio-inspired robot design achieved by extracting principles from animals. Kim's achievements include creating the world's first directional adhesive inspired by gecko lizards and a climbing robot named Stickybot that utilizes the directional adhesive to climb smooth surfaces. TIME Magazine named Stickybot one of the best inventions of 2006. One of Kim's recent achievements is the development of the MIT Cheetah, a robot capable of stable running outdoors up to 13 mph and autonomous jumping over obstacles at the efficiency of animals. Kim is a recipient of

best paper awards from the ICRA (2007), King-Sun Fu Memorial TRO (2008) and IEEE/ASME TMECH (2016). Additionally, he received a DARPA YFA (2013), an NSF CAREER award (2014), and a Ruth and Joel Spira Award for Distinguished Teaching (2015).

<http://meche.mit.edu/people/faculty/SANGBAE@MIT.EDU>

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

System Analysis of an Engineer's Career *(8 Things I Wish I Had Known Before I Started My Career)*

Dr. Eliahu (Eli) H. Niewood

12:30pm EDT, July 20, 2021

Webinar

Eli Niewood started his career nearly 30 years ago learning how to do and apply systems analysis to hard problems for the USAF. Now he leads the MITRE Corporation's work for the Intelligence Community and for its cross-cutting national security priorities like nuclear command, control, and communications. Eli will apply his systems analysis skills to his own career to draw lessons for you as you decide what careers you would like to take on and how you might navigate those. Those lessons may or may not be useful to you, but hopefully they will at least be interesting. In the process, you may also learn a little bit about system analysis, working on national security problems as an engineer, and the MITRE Corporation.



Eliahu (Eli) H. Niewood is vice president, intelligence programs and cross-cutting capabilities at MITRE. In this role, Niewood leads coordination and collaboration across MITRE's intelligence and national security portfolios to shape major cross-functional and joint multi-agency initiatives that address significant national security challenges. He leads MITRE in applying systems engineering, technology expertise, and innovation to help the intelligence and federal law enforcement

communities improve mission effectiveness, integrate across agencies, and drive greater operating efficiency.

His focus also includes building collaboration between MITRE's intelligence, national security, and public sector portfolios, particularly where whole-of-government solutions are required.

Niewood has directed MITRE's work in developing a new generation of command and control technology for the Department of Defense (DoD). He also led MITRE's efforts in helping the national security community use emerging technologies, such as artificial intelligence, to solve critical mission problems. He joined MITRE in 2017, bringing rich experience in systems analysis and tactical system technologies.

Previously, Niewood was a technical adviser to the director of the U.S. Air Force Rapid Capabilities Office. He also served as head of the Engineering Division at the MIT Lincoln Laboratory, where he oversaw mechanical, aerospace, and control systems engineers building space payloads and aircraft sensor systems.

From 2011-2014, Niewood served as chair of the Air Force Scientific Advisory Board, a Federal Advisory Committee of 50 national experts in science and technology fields. He previously served as a member of the Defense Science Board Task Force on unexploded ordnance. Niewood holds bachelor's, master's, and doctoral degrees in aeronautics and astronautics from MIT and a certificate in Leadership for the 21st Century from Harvard's Kennedy School of Government.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Building an Electrochemical Future: Innovators Needed!

Prof. Fikile Brushett

12:30pm EDT, July 21, 2021

Webinar

Energy is essential to modern society and the abundance, availability, and affordability of liquid fossil fuels has been a key driver of the past century's progress. However, with continued growth in energy demand worldwide, there is an increasingly urgent need to decouple carbon emissions from economic activity without stifling development. Electrochemical processes are poised to play a pivotal role in the evolving global power system as the efficient interconversion of electrical and chemical energy can enable the deployment of sustainable technologies that support the decarbonization of the electric grid, power the automotive fleet, and offer new opportunities in chemical manufacturing. Meeting these emerging needs will require transformational advances in technology as the stringent performance, cost, and scale requirements cannot be met by many of today's systems. In this talk, I will describe an emerging opportunities and challenges in science and engineering of electrochemical systems with a particular emphasis on sustainable electrification. Ultimately, I hope to inspire renewed interest in this critical area.



Fikile Brushett is an Associate Professor of Chemical Engineering at the Massachusetts Institute of Technology (MIT) where he holds the Cecil and Ida Green Career Development Chair. He received his B.S.E. in Chemical & Biomolecular Engineering from the University of Pennsylvania in 2006 and his PhD in Chemical Engineering from the University of Illinois at Urbana-Champaign in 2010. From 2010-2012, he was a Director's Postdoctoral Fellow in the Electrochemical Energy Storage group at Argonne National Laboratory. In 2013, he started his own laboratory at MIT where his research group seeks to develop transformative

electrochemical technologies that enable a sustainable energy economy. Prof. Brushett is especially fascinated by the fundamental processes that define the performance, cost, and lifetime of present day and future electrochemical systems.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

MIT Lincoln Laboratory Overview

Dr. Eric D. Evans

12:30 p.m. EDT, July 22, 2021

Webinar

Lincoln Laboratory is a multidisciplinary federally funded research and development center that develops advanced technologies for national security applications. Lincoln Laboratory investigates and prototypes systems to solve difficult problems for the Department of Defense. The laboratory also conducts R&D for other government agencies, such as NASA and the Federal Aviation Administration.



Eric D. Evans is the Director of Lincoln Laboratory. He is responsible for the Laboratory's strategic direction and overall technical and administrative operations. Dr. Evans was appointed as Chair of the Defense Science Board in 2020, is a Fellow of the IEEE and the AIAA, and was elected to the National Academy of Engineering. He holds BS, MS, and PhD degrees in electrical engineering from The Ohio State University.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

DoDSTEM Program Overview

Louie Lopez

12:30pm EDT, July 23, 2021

Webinar



Mr. Louie Lopez is the Director of the Science, Technology, Engineering and Mathematics (STEM) in the Office of the Undersecretary of Defense in Research and Engineering's (OUSD/R&E), Defense Laboratories and Personnel. Mr. Lopez is responsible for the management and execution of the Department of Defense (DoD) K through Graduate STEM efforts under the National Defense Education Program (NDEP). His responsibilities include the Science Mathematics and Research Transformation (SMART) scholarship, Military Child Pilot Program, Manufacturing Engineering Education Program, and STEM education and outreach initiatives under the Defense STEM Education Consortium (DSEC) cooperative

agreement award in collaboration with partners from academia, industry, and other community organizations with a shared mission in STEM. He is also responsible for policy and coordination of STEM efforts across the DoD components to ensure alignment with DoD and Federal STEM Strategic plans.

Prior to April 2019, Mr. Lopez served as the chief of STEM Education and Outreach for the U.S. Army Combat Capabilities Development Command (CCDC), overseeing STEM efforts across the enterprise, leveraging eight major Army laboratory and engineering centers and its approximately 11,000 scientists and engineers, to engage and support command-wide STEM initiatives. His responsibilities included the technical and fiscal oversight of the Army Educational Outreach Program (AEOP) cooperative agreement award on behalf of the Army science and technology community and the Office of the Deputy Assistant Secretary of the Army for Research and Technology (DASA R&T). Mr. Lopez also managed the Army, Navy, and Air Force Junior Science & Humanities Symposium high school research competition on behalf of AEOP. In 2017, Mr. Lopez served as the Acting Chief of Human Capital and talent

management for CCDC. In 2017-2018, Mr. Lopez also served as the COR on the U.S. Army Manufacturing Technology (ManTech) program support contract at CCDC.

Prior to serving in the federal government in 2011, Mr. Lopez worked as Director of pre-collegiate STEM programs in the Lyles College of Engineering at California State University, Fresno from 2006-2011, and previously served as Associate Director for University of California's Mathematics, Engineering, Science Achievement (MESA) Program at California State University, Fullerton from 1998 to 2005. From 1999-2003, Mr. Lopez taught computer science courses at California State University, Fullerton. Mr. Lopez proudly served in the United States Marine Corps.

Mr. Lopez successfully completed the OPM sponsored Aberdeen Proving Ground Senior Leadership Course as part of COHORT 8 in 2016-2017. He earned his Bachelor's degree in Mathematics from the University of California, San Diego, and Master's Degree in Educational Technology from National University in San Diego, California.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

TTikToking about Science: The Importance of STEM Communication and Diversity

Malik and Miles George

12:30pm EDT, July 26, 2021

Webinar

In addition to research, a crucial part of science is being able to explain it to others. Science communication is pivotal in spreading knowledge to the world, whether it's to other researchers, curious adults, or even children. In this talk, we will discuss how we expose new audiences to STEM and teach concepts to a wide-range of audiences in fun and engaging ways. We will also talk about our experiences as college undergraduates being able to both study and communicate science. Finally, we will talk about our experiences with diversity in STEM, why it's important, and how we can increase it within the field.



Malik and Miles George are currently undergraduate students at the Massachusetts Institute of Technology studying Biological Engineering and minoring in African and African Diaspora Studies. They come from an African American family and went to public school in Woodbridge, New Jersey. At MIT, they are a part of multiple diverse groups on campus such as Nu Delta Fraternity, The Standard, and Laureates and Leaders. They also work with MIT Admissions as Admissions Ambassadors to increase the amount of underrepresented students that apply to and attend MIT. On campus and virtually, they have worked in several biological engineering labs,

including the Weiss Lab and the Boyden Lab. Recently, they have started social media accounts on Tiktok, Instagram, Twitter, and Discord promoting STEM and higher education in fun and relatable ways.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

From Video Games to Artificial Intelligence: Using Tech for Good

Vilas Dhar

12:30pm EDT, July 27, 2021

Webinar

As a technologist, lawyer and human rights advocate, Vilas is dedicated to advancing innovative approaches to creating positive social impact. Today's lecture will highlight the power that each of us hold to apply technology to solve problems in our own communities, as well as some exciting applications globally underway. Instead of focusing on products coming from big tech companies, today we'll discuss efforts to build the same technological capacity and expertise within our communities, as well as career pathways to impact.

Our conversation will cover some of the most exciting work in technology, now happening outside of the private tech sector - including powerful examples of vulnerable communities authoring their technological future for greater resilience, equity and justice. Each of us has the opportunity to stand with communities to catalyze tech solutions that amplify the best of our shared humanity. For example:

- The Atlantic's Covid Tracking Project is a volunteer organization launched from The Atlantic magazine and dedicated to collecting and publishing the data required to understand the COVID-19 outbreak in the United States.
- The Marshall Project's objective, fact-based reporting about whether reducing the populations of prisons and jails during the pandemic can be the beginning of the end of mass incarceration in the United States.
- The International Wakashan AI Consortium is developing automatic speech recognition AI for Wakashan languages, empowering these indigenous communities to revitalize the modern use of their endangered language family. They've deployed AI to understand and revive their native and now extinct languages.
- Conservation International is using artificial intelligence to build Wildlife Insights, an AI tool for identifying and monitoring wildlife from images taken on cameras hidden natural habitats. Using these images and AI, Conservation International can estimate populations and understand areas where endangered species live, to better protect them in real time.

- Child's Play is dedicated to improving the lives of children in hospitals around the world by adapting video game technology to be therapeutic for patients in 185 hospitals worldwide.



[Vilas Dhar](#) is President and Trustee of the [Patrick J. McGovern Foundation](#), a 21st century philanthropy advancing artificial intelligence (AI) and data solutions to create a thriving, equitable, and sustainable future for all. Under his leadership, the Foundation bridges technological innovation and social impact with a commitment to justice and equity.

These core values sustain his deep optimism that technological advances can ensure a more prosperous and sustainable future for all. Vilas is an entrepreneur, technologist, and human rights advocate with a lifelong commitment to creating more robust, human-centered social institutions. Fusing his experience as a lawyer, an investor, and a philanthropist, he has dedicated his professional pursuits to exploring solutions for some of the world's largest challenges like child labor, refugee crises, and data privacy and sovereignty.

Prior to joining the Foundation, Vilas founded and led two successful social impact organizations, including a field-leading nonprofit incubator and a sustainable public interest law firm. Vilas has also been a leading contributor in the academic study of technology for good as the Gleitsman Fellow on Social Change at Harvard's Kennedy School of Government, and Practitioner Resident on Artificial Intelligence at the Rockefeller Foundation's Bellagio Center in Italy.

A leading voice on equity in a tech-enabled world, Vilas champions a new social compact for the digital age that prioritizes individuals and communities in the development of new products, inspires economic and social opportunity, and empowers the most vulnerable. Vilas has been invited to share his insights through international forums, academic papers, news commentary, and speaking engagements. He is especially passionate about building public awareness about the potential opportunities and impacts of emergent technology on social infrastructure, corporate responsibility, and human behavior. Vilas' work has been published in the Harvard Business Review, Nature, Forbes and Project Syndicate addressing data for good, the role of philanthropy in AI, and how CEOs, policymakers, and civil society leaders can guide their organizations through the AI revolution.

Vilas is actively committed to civic service, serving as a Trustee of the [Christensen Fund](#), Co-Chair of the [Global AI Action Alliance](#) at the [World Economic Forum](#), a Senior Fellow of the [Berggruen Institute](#), Advisor to [MIT SOLVE](#), and as a Director of the [New England International Donors](#).

Vilas holds a J.D. from NYU School of Law, a Master's in Public Administration from the Harvard Kennedy School of Government, and dual Bachelor's degrees in Biomedical Engineering and Computer Science from the University of Illinois.

Connect with Vilas through [LinkedIn](#) and at @vilasdhar on [Twitter](#).

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

The Importance of a Holistic Approach

Dr. Alyssa Bennett

12:30pm EDT, July 28, 2021

Webinar

Late stage design changes can be extremely costly, and failure to consider life cycle requirements can handicap a product's usability. Taking a holistic approach to a design requires engineers to take an interdisciplinary view of the concept in order to consider all aspects of the design, including its life cycle. This allows for a better understanding of the concept challenge while uncovering obstacles earlier in the design process. The United States Navy has adopted a more holistic approach its future strategy for autonomous vehicles by shifting from a platform-by-platform approach to a capabilities-based approach.



Alyssa Bennett grew up in San Antonio, Texas. She quickly became interested in ocean engineering after seeing decommissioned oil platforms along the Texas coast. After competing in science fairs at the international level in high school, she pursued her research interests while studying ocean engineering at Texas A&M University. Her research focused on autonomous underwater vehicles. Upon graduating in 2015 with honors, she was accepted into the PhD program in Naval Architecture and Marine Engineering at the University of Michigan. Her research focused on modeling non-Newtonian fluids within multi-layered plates. In 2019 she defended her dissertation and was hired by the Naval Surface Warfare Center at Carderock. She is a member of the SNAME Academy Working Group, and continues STEM outreach through organizations such as the ISR.

MIT Beaver Works Summer Institute

2021 Summer Program Seminar Series

Learning How to Fly in Mars and Space

Regina Apodaca

12:30pm EDT, July 29, 2021
Webinar

This talk will address the multiple projects that Regina Apodaca has worked in throughout her career. From Mexico to Australia, Israel and now the US, she has traveled the world looking for opportunities to learn more about what is beyond our planet and how we can get there.



M. Regina Apodaca M. is currently a Ph.D. Student at the Space Enabled Research Group, MIT Media Lab. Her research work and interest are tied to the wax propulsion project as well as the Zero Robotics outreach project. Regina was previously a Master student at the Space Propulsion Lab in the MIT AeroAstro Department. Her master thesis was on the study of ionic liquids, or molten salts at room temperature, and Lithium salt mixtures as

ionic sources for electrospray propulsion. She did her B.S. in physics at the National Autonomous University of Mexico. Regina's undergraduate thesis was on the "Fundamental Study into Rotor Outwash and Dusk Kick-up under Mars-like Conditions," a project that is part of the Mars Helicopter Scout collaboration. Regina's research interest and experience are extremely broad, ranging from space propulsion, fluid dynamics and aeromechanics to astronomical instrumentation, observational astronomy and theoretical astrophysics.



MIT Beaver Works Summer Institute



MIT Beaver Works
300 Technology Square (2nd floor)
Cambridge, MA 02139
bws-info@mit.edu

