2023

MIT MOBILITY INITIATIVE
ANNUAL REPORT

LEADING THE TRANSORMATION TOWARDS TOMORROW'S MOBILITY SYSTEM

MIT MOBILITY INITIATIVE

MIT MOBILITY **INITIATIVE**

TABLE OF CONTENTS

MIT MOBILITY INITIATIVE
MISSION

MISSION

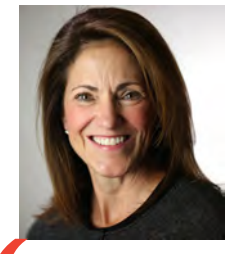
The MIT Mobility Initiative is a global platform to accelerate a safe, clean and inclusive mobility system through research, education, entrepreneurship and engagement

The mobility system is undergoing profound transformation with new technologies colliding with new and evolving priorities and objectives including decarbonization, public health, and social justice. The time frame for these changes, decarbonization in particular, is short in a system with massive amounts of fixed, long-life assets and entrenched behaviors and cultures.

Anantha Chandrakasan, Dean, MIT School of Engineering

As cities grapple with the challenges of congestion, pollution, and vehicle-related fatalities, new mobility systems offer the possibility for dramatic urban transformation

Hashim Sarkis, Dean, MIT School of Architecture and Planning



MIT thinks about transportation, logistics, and mobility as a system, and that approach relies on people with a lot of different expertise such as urban planning, engineering, operations research to come together, like at MMI.

Cynthia Barnhart, Provost, MIT

Entrepreneurship

Leverage MIT's innovation ecosystem to spin off mobility tech startups and support existing startups

Engagement

Foster direct interaction with leaders from business and government on the "front lines" of the mobility revolution

Research

Catalyze cross-disciplinary research that provides insight to strategic challenges for industry and society

Education

Manage and enhance MIT's transportation degree programs and expand the executive education offering

MIT MOBILITY INITIATIVE

MESSAGE FROM THE **DIRECTORS**

JOHN MOAVENZADEH
Executive Director, MMI

JINHUA ZHAO
Founder & Faculty Director, MMI

2022 was a challenging year for mobility. The tidal wave of SPACs in mobility technology startups abruptly abated. The collapse of Argo AI and headlines such as Business Week's cover story Even After $100 Billion, Self-Driving Cars are Going Nowhere, contributed to an increasingly pessimistic sentiment.

Yet massive structural changes in mobility – from robotaxis to streets designed to prioritize people over cars – will come. Roy Amara, an MIT alum and former president of the Institute for the Future, famously said "we tend to overestimate the impact of technology in the short term, and underestimate the impact in the long term". That feels like where we are with many mobility technologies today: wallowing in the trough of disillusionment of the hype cycle while progress relentlessly advances.

The MIT Mobility Initiative was founded as a global resource to accelerate the transition to a safe, clean and inclusive mobility system. Our mission is to ensure that technology benefits people. Among MMI's key accomplishments in 2022 toward achieving this mission:

We developed and advanced the MMI research agenda and deployed funding from our first three members to launch two research projects: Resiliency of V2X connectivity to cybersecurity threats, led by Prof Sanjay Sarma, and Quantifying autonomous mobility safety, led by Prof Cathy Wu. We published our first research briefing on US EV charging infrastructure reliability authored by David Keith and Jim Womack. We secured funding from the Energy Foundation to research Alternatives to the gas tax to finance transportation infrastructure with increased adoption of electric vehicles and proposed a transit research consortium under the leadership of Jim Aloisi.

We deepened MMI engagement and community through events and building relationships. We hosted our second annual Vision Day at the new headquarters of The Engine with record participation. We convened multiple members meetings and special workshops, such as our Energy-Mobility Dinner with AlphaStruxure and our ARPA-I workshop with The Engine and MIT Washington Office. We grew the on-line audience for our popular MMI Friday Forum series with strong participation from leading mobility thinkers. We launched and convened the MMI Global Advisory Board composed of senior executives from leading mobility and non-mobility businesses. We grew our membership base from 3 to 10 members, announcing our first cohort of five member companies (Hyundai, Ferrovial, Intel, Liberty Mutual, Toyota) with an MIT News article in July. We signed an agreement with Michigan Central to structure a long-term partnership and engage in research on two mobility topics.

We continued to advance MIT's transportation educational program, with courses such as Mobility Ventures entering the third year, and exploring executive education offerings with a large automotive OEM.

We look forward to MMI's role in shaping a better mobility future for all in 2023.

MMI COMMUNITY & EVENTS
MOBILITY VISION DAY 2022

Setting a research agenda for the future of transportation

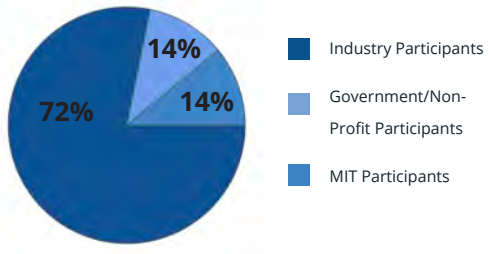
On November 3rd, 2022, the Mobility Initiative hosted its second annual Vision Day. 110 in-person participants engaged in a rich and highly interactive series of discussions to shape the research agenda around five key topic areas: AV Safety, Connected Infrastructure, Electrification, Integration and Envisioning the future of mobility.

The second annual MMI Mobility Vision Day packed a large punch with rich discussion, new connections, and deep insights. The event saw nearly 110 attendees in person. 21 percent of attendees were CEOs or founders and all attendees had been carefully chosen to represent key perspectives and actively engage in an event with a clear purpose: to identify today's most pressing mobility challenges and develop a research agenda that can help move today's mobility system towards a future that is safe, clean, and inclusive.

A series of rich discussions followed: each of the five core topics--first featured panel presentations followed by discussions on the panel content among all participants (centered at each round-table). Participants were encouraged to switch tables throughout the day in order to engage with new stakeholders and to enliven the exchanges.

Participants asked many of the key questions facing today's mobility system. How safe is safe enough in autonomy? Who should be investing in connected infrastructure? What role should each stakeholder take in driving electrification forward? How can we develop an effective framework for sharing and integration micromobility and Public Transit that is essential both for safety and system efficiency? What are the different spectra that we should be considering in order to ensure equity within a mobility system that is very much in flux? The Mobility Initiative team successfully captured the many nuances of the rich discussions, collecting research ideas, questions, and needs.

Mobility Vision Day 2022 was structured around participant discussions interspersed with expert panels. Attendees were encouraged to rotate tables throughout the day to engage with stakeholders from across the spectrum.



MOBILITY VISION DAY
SPEAKERS

Building the Next Generation of Transportation Infrastructure

Dimitris Bountolos, Chief Information and Innovation Officer, Ferrovial
Firas Ibrahim, Director, Office of Research Development and Technology, USDOT
Sanjay Ravi, General Manager, Automotive, Mobility & Transportation Industry, Microsoft
Sanjay Sarma, Professor of Mechanical Engineering, MIT
Sameer Sharma, General Manager, Cities and Transportation, Intel

Moderated by Laura Chace, President and Chief Executive Officer, ITS America

Autonomous Vehicles: How Safe Is Safe Enough?

David Blessing, Liberty Mutual Mobility Solutions Co-Lead , Liberty Mutual
Ryan Harrington, Vice President of Safety, Motional
Chris Mullen, Senior Director, Safety, Aurora
Mark Rosekind, Chief Executive Officer, California Mobility Center
Bernard Soriano, Deputy Director, California Dept of Motor Vehicles

Moderated by: Jane Lappin, Chairperson, TRB Standing Committee on Road Vehicle Automation, Transportation Research Board

Electrification: Drivers of the Transformation

Steven Kaye, Chief Technology Officer, Our Next Energy (ONE)
Juan Macias, Chief Executive Officer, AlphaStruxure
Trent Mell, Chief Executive Officer, Electra Battery Materials
Milo Werner, General Partner, The Engine

Moderated by: Alex Mitchell, Senior Vice President Unlocking Innovation, LA Cleantech Incubator (LACI)

Mobility Integration: Public Transport and Micromobility

Daniel Berkovits, Vice President, Strategy, Via Transportation
Assaf Biderman, Founder & Chief Executive Officer, Superpedestrian
David Block-Schachter, Chief Business Officer, Transit
Molly Poppe, Chief Innovation Officer, Chicago Transit Authority

Moderated by: Jinhua Zhao, Founder & Faculty Director, MIT Mobility Initiative

Envisioning our Collective Mobility Future

Diane Hoskins, Co-CEO, Gensler
Josh Sirefman, Chief Executive Officer, Michigan Central
Jamey Tesler, Secretary of Transportation, Commonwealth of Massachusetts
Andrew Wishnia, Asst Deputy Secretary for Climate Policy, US Dept of Transportation

Moderated by John Moavenzadeh, Executive Director, MIT Mobility Initiative

MMI: BY THE NUMBERS

110

Mobility Vision Day Attendees

14,000

Mobility Initiative Followers

32

Transportation Courses Offered

102

Mobility Initiative Events

8

New MMI Members added in 2022

250

Average Mobility Forum Attendance

MOBILITY FORUM
SPEAKERS: SPRING 2022

Efficient Deep Learning for Automotive Applications

Song Han
Assistant Professor, Department of Electrical Engineering & Computer Science

February 11, 2022

Regional Air Mobility: Initial Thoughts

David Mindell
Professor of Aeronautics and Astronautics & Dibner Professor of the History of Engineering and Manufacturing

February 18, 2022

Bumps along the Road to Widespread Adoption of Electric Vehicles

Donald Sadoway
John F. Elliott Professor of Materials Chemistry

February 25, 2022

Transit Oriented Development in Disruptive Time

Robert Cervero
Professor Emeritus of City & Regional Planning, UC Berkeley

March 4, 2022

The Impact of Data Science on Freight Transportation Procurement

Chris Caplice
Executive Director, Center for Transportation & Logistics

March 11, 2022

Making Roads Safer by Making Drivers Better

Hari Balakrishnan
Fujitsu Professor of Computer Science and Artificial Intelligence, Department of Electrical Engineering and Computer Science

March 18, 2022

Shared Mobility and Automated Vehicles: Responding to Socio-Technical Changes and Pandemics

Susan Shaheen
Professor In-Residence, Energy, Civil Infrastructure and Climate, Transportation Engineering, UC Berkeley

March 25, 2022

Highway construction and displacement in African American neighborhoods: 1940-2000

Brent Ryan
Head of the City Design and Development Group and Associate Professor of Urban Design and Public Policy, Department of Urban Studies and Planning

April 1, 2022

Human-Centered Driving Research at Toyota Research Institute

John Leonard
Samuel C. Collins Professor of Mechanical and Ocean Engineering, Department of Mechanical Engineering

April 8, 2022

Future of Work and Urban Mobility

Jinhua Zhao
Director, MIT Mobility Initiative and Associate Professor of City and Transportation Planning, Department of Urban Studies and Planning

April 15, 2022

Certifiable Perception Algorithms and High-level Scene Understanding for Autonomous Vehicles

Luca Carlone
Leonardo Career Development Associate Professor, Department of Aeronautics and Astronautics

April 22, 2022

Transportation from Earth to Space and back - latest developments

Olivier de Weck
Apollo Program Professor of Astronautics and Engineering Systems

April 29, 2022

MOBILITY FORUM
SPEAKERS: FALL 2022

Shifting Gears

Susan Handy
Professor, Department of Environmental Science and Policy at the University of California at Davis

September 16, 2022 at 9:30:00 PM

Public Transit in the US : Challenges & Opportunities

Jim Aloisi & Fred Salvucci
Lecturer of Transportation Policy and Planning & Senior Lecturer and Senior Research Associate

September 23, 2022 at 9:30:00 PM

Tough To Decarbonize Transportation : MIT Climate Grand Challenge

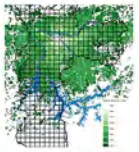
Steven Barrett & Bill Green
Director, Laboratory for Aviation and the Environment & Hoyt C. Hottel Professor in Chemical Engineering

September 30, 2022 at 9:30:00 PM

The Future Of Working From Home

Prof. Nicholas Bloom
William D. Eberle Professor of Economics , Stanford

October 7, 2022 at 9:30:00 PM



Roads, Transit, and the Denseness of São Paulo's Urban Development

Chris Zegras, Adriano Borges Costa, Siqi Zheng
Professor of Mobility and Urban Planning, Department Head DUSP & Post-doctoral Researcher & STL Champion Professor of Urban and Real Estate Sustainability

October 14, 2022 at 9:30:00 PM

Credit-based Congestion Pricing for Win-Win Traffic Solutions

Kara Kockelman
Dewitt Greer Centennial Professor of Transportation Engineering at UT, Austin

October 21, 2022 at 9:30:00 PM

VISTA 2.0: An Open, Data-driven Simulator for Multimodal Sensing and Policy Learning for Autonomous Vehicles

Daniela Rus & Alexander Amini
Andrew (1956) and Erna Viterbi Professor of Electrical Engineering and Computer Science and Director of the Computer Science and Artificial Intelligence Laboratory (CSAIL) at MIT & Postdoctoral Researcher in the Computer Science and Artificial Intelligence Laboratory (CSAIL)

October 28, 2022 at 9:30:00 PM

New paths for solving emergent problems of the EV sector

John Paul MacDuffie
Professor of Management, Wharton

November 11, 2022 at 10:30:00 PM

Flexibility and coordination in on-demand transportation: from ride-sharing to micromobility

Alex Jacquillat
Assistant Professor, Operations Research and Statistics

November 18, 2022 at 10:30:00 PM

Entry and Coordination in the U.S. Electric Vehicle Charging Industry

Jing Li
William Barton Rogers Career Development Professor of Energy Economics

December 2, 2022 at 10:30:00 PM

EV Policy and Regulation As Seen by a Regulator, Academic, and Policy Wonk

Dan Sperling
Founding Director, ITS-Davis;Distinguished Blue Planet Prize Professor of Civil and Environmental Engineering, and Environmental Science

December 9, 2022 at 10:30:00 PM

The Supply of AVs in Open Platforms

Daniel Freund
Assistant Professor of Operations Management

December 16, 2022 at 10:30:00 PM

MOBILITY FORUM
SPEAKERS: SPRING 2023

Envisioning Profitable Autonomous Transit Networks

It has been almost 20 years since the DARPA "SmartDrivingCar" Challenges and 15 years since Google jumped in with the objective of ...

Read more

Alain Kornhauser
Professor of Operations Research & Financial Engineering
Director, Transportation Program, Princeton university

February 17, 2023 at 12:00:00 PM

Telemobility, Hybrid Work and the Next Normal

The world has changed considerably for transportation planners since April 2020—and it is still changing, in many ways that are fundamental to...

Read more

Hani Mahmassani
W. A. Patterson Chair in Transportation; Director, Northwestern University Transportation Center

February 24, 2023 at 12:00:00 PM

Tectonic shifts in science, technology, and industrial policy: looking ahead

Several factors are converging to drive a new industrial revolution in the U.S and beyond. Advances in manufacturing technologies are reducing ...

Read more

Liz Reynolds & David Mindell
Lecturer, DUSP, MIT; Former Special Assistant to the President for Manufacturing and Economic Development at the National Economic Council & MIT Professor, Executive Chairman at Humatics, Co-founder at Unless

March 3, 2023 at 12:00:00 PM

Modelling Sustainable Options - the importance of habit and perceptions

Habit and its potential hysteresis effect, have been recognized as difficult problems in travel demand modelling and forecasting for over 45 years. ...

Read more

Juan de Dios Ortuzar
Emeritus Professor at Pontificia Universidad Católica de Chile

March 10, 2023 at 12:00:00 PM

The case against transportation policy priority one being electrified personal cars

At the COP in Glasgow, in the Inflation Reduction Act (the US's largest infrastructure commitment since Eisenhower), in wealth country subsidie...

Read more

Robin Chase
co-founder and former CEO of Zipcar, Buzzcar and GoLoco

March 17, 2023 at 12:00:00 PM

From Reinforcement Learning to Sequential Decision Analytics with Applications in Transportation and Logistics

Sequential decision problems are an almost universal problem class, spanning dynamic resource allocation problems, control problems, ...

Read more

Warren Powell
Professor Emeritus at Princeton University, Chief Innovation Officer at Optimal Dynamics

March 24, 2023 at 12:00:00 PM

How safe is safe enough for Autonomous Vehicles

A pressing question for deploying autonomous vehicles is: will they be safe enough? The usual answer of "at least as safe as a human driver" ...

Read more

Philip Koopman
Associate Professor, Carnegie Mellon University, Author - How Safe Is Safe Enough? Measuring and Predicting Autonomous Vehicle Safety

March 31, 2023 at 12:00:00 PM

Moving from Citations to Collective Wisdom in Travel Behavior Research

This talk focuses on the disconnect between the incentives for academic researchers and the production of collective wisdom to inform ...

Read more

Joan Walker
Professor, Dept of Civil and Environmental Engineering, UC Berkley

April 7, 2023 at 12:00:00 PM

MOBILITY FORUM
SPEAKERS: SPRING 2023

What about pedestrians in urban mobility

After a century of car-oriented urban growth, cities around the world are implementing policies and plans that aim to make their neighborhoods …

Read more

Panel : Andres Sevtsuk, Peter Norton & Kris Carter
Associate Professor of Urban Science and Planning, MIT,
Associate Professor of History Department of Engineering and Society, University of Virginia, & Chair, New Urban Mechanics, City of Boston

April 14, 2023 at 12:00:00 PM

Last-mile logistics on steroids: how to connect humans, machines, and algorithms to deliver to the future needs of consumers

Dr. Matthias Winkenbach, Director of the MIT Megacity Logistics Lab, will discuss how novel technologies and advanced algorithms can enable …

Read more

Matthias Winkenbach
Director of the MIT Megacity Logistics Lab & Research Scientist at the MIT Center for Transportation & Logistics

April 21, 2023 at 12:00:00 PM

Traffic Management Challenges in Advanced Air Mobility

Advanced Air Mobility (AAM) operations—characterized by electric and hybrid aircraft, and highly-automated or even autonomous operations—…

Read more

Hamsa Balakrishnan
William E. Leonhard (1940) Professor of Aeronautics and Astronautics, MIT

April 28, 2023 at 12:00:00 PM

AI and Public Transit

Prof. Zhao and MIT Transit Lab researchers will showcase three sets of A.I. applications in public transportation: prediction, monitoring, and control…

Read more

Jinhua Zhao
Director, MIT Mobility Initiative and Associate Professor of City and Transportation Planning, Department of Urban Studies and Planning

May 5, 2023 at 12:00:00 PM

Entrepreneurship Returning to Automotive Industry: Electric Vehicle as a case study

Innovation and Entrepreneurship (I&E) often go together. Following the 19th Century product innovations of Karl Benz, the most important auto …

Read more

Charlie Fine
Chrysler Leaders for Global Operations Professor of Management at MIT Sloan

May 12, 2023 at 12:00:00 PM

Photo top

Graduate students, research scientists, and faculty members from MIT's Urban Mobility Lab at TRB Jan 2023.

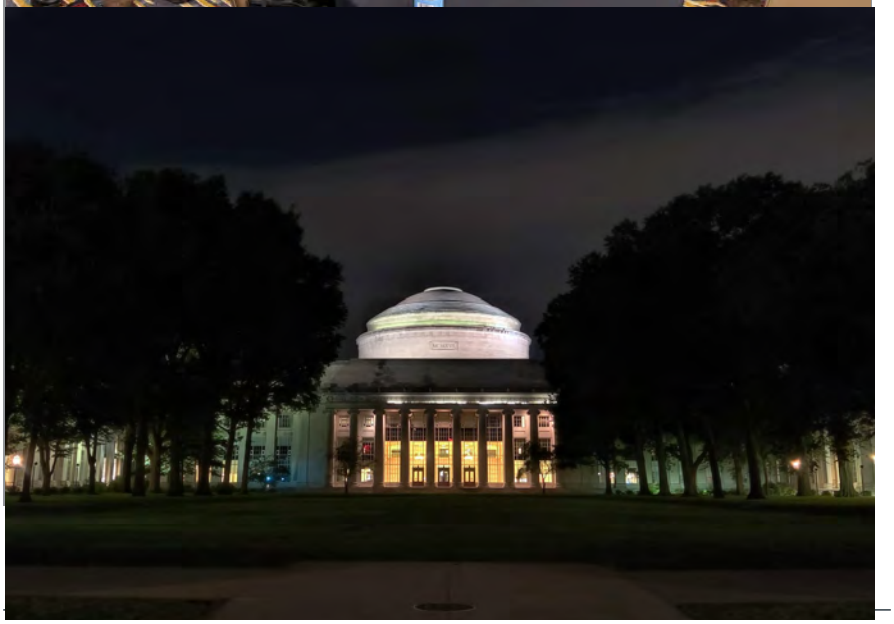


Photo bottom

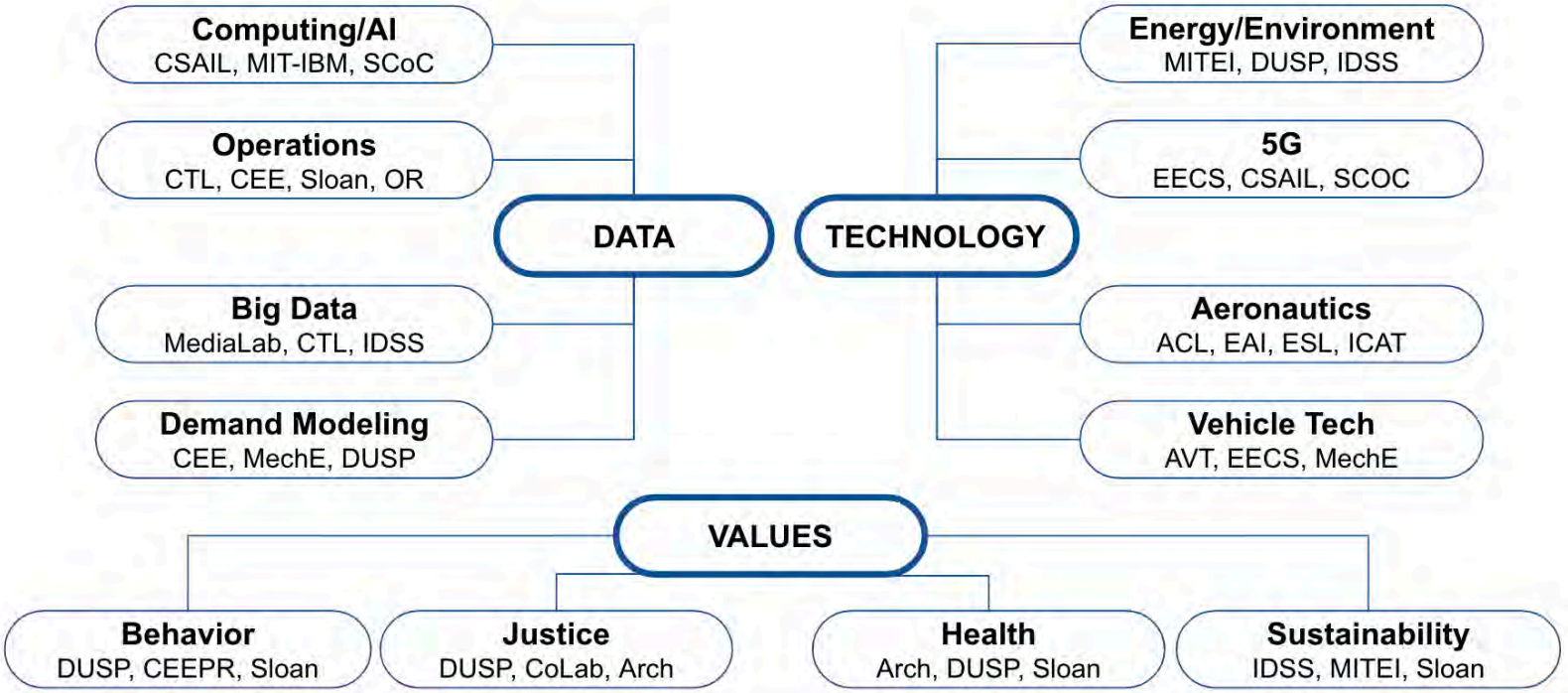
The MIT Dome at night.

MOBILITY INITIATIVE **RESEARCH**

Groundbreaking mobility insights

MIT has a rich array of on-going research in the mobility space. MIT Mobility Initiative faculty members hail from departments as diverse as Electrical Engineering and Computer Science, Chemical Engineering, the Sloan School of Business, Civil and Environmental Engineering, Urban Planning, and more. The Mobility Initiative is a central node for exchange and access to MMI faculty members' research, as well as an independent hub for cross-disciplinary research through its research consortia.

MMI RESEARCH FRAMEWORK MAPPED TO MIT SCHOOLS, DEPARTMENTS & LABS



AVT: Advanced Vehicle Technology Consortium; CEE: Civil and Environmental Engineering; CSAIL: Computer Science & Artificial Intelligence Laboratory; CTL: Center for Transportation and Logistics; DUSP: Department of Urban Studies and Planning; EECS: Electrical Engineering & Computer Science; MechE: Mechanical Engineering; OR: Operations Research; SCoC: Schwarzman College of Computing; IDSS: Institute for Data, Systems, and Society; ACL: Aerospace Controls Laboratory.

MMI RESEARCH CONSORTIA

Cross-disciplinary research

Research Consortia are the core of the MIT Mobility Initiative. Research Consortia gather public and private stakeholders from across the globe to conduct research on the most pressing and relevant topics within mobility. The output of the roundtables is used to guide policy, shape standards, coordinate across actors, and, ultimately, accelerate the transformation towards a safe, clean and inclusive mobility system.

Research Consortia offer a unique opportunity for coordination across diverse stakeholders (from multiple industries, academia, and governments) to better chart a path forward in the new world of mobility. Research Consortia support a portfolio of research projects that can help us better understand today's trends and offer new and innovative ways to shape the future.

In addition to rich discussions among and between participants, there are two types of products produced by Research Consortia: **Primary Research Projects** submitted and conducted by MIT faculty faculty members and **Research Briefings** presenting in-depth overviews of selected topics, including technologies or methodologies related to that topic; insights into the various theories or approaches pertinent to that topic; and recommended areas for future research.

FACULTY RESEARCH

On-going knowledge development

MMI Faculty Members conduct research across a wide array of fields ranging from urban planning to machine learning to operations research and beyond. MMI is the central location to keep a finger on the pulse of all groundbreaking mobility-related projects, ideas & innovations at the Institute.

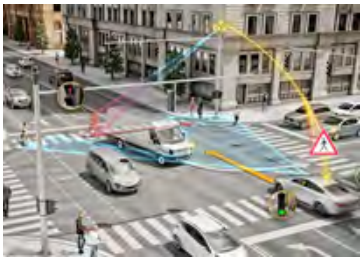
The above graphic conveys the rich array of on-going research at the Institute. An inherently cross-disciplinary subject matter, transportation touches on many traditional discplines. Ongoing research can be placed into three overarching buckets that together enable a systems approach to mobility: data (exploring modeling, optimization, artificial intelligence & machine learning), technology (developing sensors, batteries, 5G, and more) and values (examining behavior, health, equity, and sustainability).

The MMI is at the center of aggregating this on-going research by approaching the analysis of key areas with a systems lens. MIT has long thrived as an epicenter of systems analysis--a methdology that is particular pertinent for the complexity of today's mobility system in order to develop a comprehensive understanding that can lead to the design of safe, clean, inclusive, efficient & robust systems and networks.

RESEARCH PORTFOLIO - Autonomous & Connected Mobility

Launched March 2022 with two fully-funded research projects being extended to Year 2.

Overarching Research Questions:
1.) Determining acceptable levels of risk
2.) Identifying opportunities for V2X value
3.) Ensuring cybersecurity of V2X



Research Project:
Collective Sensing as an Enabler for Cyber-resilient Connected Mobility
Sanjay Sarma
Dajiang Suo

Research Project:
Safety as a Performance Metric in Autonomous Mobility
Cathy Wu
Ao Qu

RESEARCH PORTFOLIO - Electrification Grand Challenges

Launched April 2022 with one project and one published research brief.

Overarching Research Questions:
1.) Exploring challenges related to EV charging infrastructure
2.) Replacing declining gas tax revenue
3.) Security of battery materials, recycling/reuse of batteries

Research Briefing:
EV Charging Infrastructure Reliability
Charlie Fine
David Keith
Jim Womack

Research Project:
Replacing Declining Gas Tax Revenue with EV Adoption
Jim Aloisi
Bhuvan Atluri
Jinhua Zhao
Yunhan Zheng
Seamus Joyce-Johnson

RESEARCH PORTFOLIO - MMI Transit Research Consortium

Goals:
Launched Dec 2022 with a one year long project and multiple knowledge sharing workshops.
Facilitate exchange of best practices among large public transit agencies and conduct research on shared topics of interest.

Current Members - CTA, King County Metro, LA Metro, MBTA, NY MTA, SFMTA, WMATA

Research Project:
Transit Rider Return & Growth
Jim Aloisi
Bhuvan Atluri
Jinhua Zhao
Anson Stewart
Haris Koutsopoulos

INDUSTRY MEMBERS

The future of mobility is shaped within a complex and highly dynamic ecosystem of startups, established transportation companies, Big Tech, and a myriad of firms large and small across the industrial spectrum. Governments at all levels – from cities to international bodies – are also actively rewriting the legal and regulatory frameworks for mobility. MIT recognizes the importance of engaging with the business, startup and government leaders who are "on the front lines" of the mobility revolution. Business participation in the MMI is through membership. MMI counts among its members global firms from across the industrial spectrum, from automotive to technology to infrastructure to energy to insurance to public transportation.

MOBILITY INITIATIVE
EDUCATION

Largest and Most Diverse Mobility Ventures Cohort for Fall 2022 - 39 students - 20% larger than 2020/21

- *10 from Sloan*
- *13 from Harvard*
- *13 from MIT*

Instructors:

- *Jinhua Zhao*
- *John Moavenzadeh*
- *Jenny Larios Berlin*

TA: Bhuvan Atluri

Educating the leaders of tomorrow's transportation system

Led by MIT's Mobility Initiative, the Institute's cross-disciplinary **graduate program** in transportation provides a variety of graduate degrees for students interested in transportation studies and research. Students choose from a wide range of introductory and advanced subjects related to transportation and engage with real-world projects and challenges resulting in an education that prepares them to be the leaders of tomorrow's transportation system.

MIT offers over 30 courses related to transportation across a wide array of disciplines, including computer science, operations research, civil engineering, urban planning, and more. **2022** saw the introduction of new coursework to address the changes in today's transportation system, including Mobility Ventures, Decarbonizing Urban Mobility, and Entrepreneurship in Aerospace and Mobility Systems.

Mobility Ventures explores technological, behavioral, policy and systems-wide frameworks for innovation in transportation systems, complemented with case studies across the mobility spectrum, from autonomous vehicles to urban air mobility to last-mile sidewalk robots. **Decarbonizing Urban Mobility** focuses on measuring and reducing emissions from passenger transportation including reviewing existing approaches to transport decarbonization and evaluating new mobility technologies through their potential to contribute to (or delay) a zero emission mobility system. And **Entrepreneurship in Aerospace and Mobility Systems** examines concepts and procedures for new venture creation in aerospace and mobility systems, and other arenas where safety, regulation, and infrastructure are significant components.

The applicant pool for the 2022/2023 academic year was the largest one to date, underscoring the growing importance of the field of transportation and the value of our emphasis placed on cross-disciplinary education. Program requirements have been updated to reflect the diverse array of students engaged in the program. Masters students are required to learn foundational skills and take courses in analytics & computation and policy, technology, and society.

SPOTLIGHT
STUDENTS

Educating the leaders of tomorrow's transportation system

Dan O'Neil

Dan is a second-year master's student in the JTL/Transit Lab who will be graduating this spring. His undergraduate degree is from the University of Oregon. Prior to MIT, he briefly spent time in economic consulting before moving into transportation and going to work for TriMet and C-TRAN, two public transit agencies in the Portland, Oregon area. Dan's research is centered on the confluence of post-pandemic transit use and agency fare policies. He is interested in the impacts of transit costs and fare product design on travel volumes, transportation funding, and rider equity. To understand these complex interactions, he leverages existing automated data collection systems, synthesizing disparate sources to provide both more granular insight on journeys at an individual level and greater clarity on aggregate impacts across rider segments.

Jiayu (Kamessi) Zhao

Kamessi is a third-year PhD student in the Operations Research Center at MIT, advised by Prof. Daniel Freund. Before she joined MIT, she graduated Summa Cum Laude from Columbia University in 2020 with a B.S. degree in Operations Research.Kamessi's research focuses on dynamic decision-making in revenue management and market design. She is mostly interested in transportation and online marketplaces, with her works spanning both (1) traditional operations management (OM) problem such as the overbooking control in the airline industry, and (2) modern applications such as contracting for autonomous vehicles supply chain. She aims to develop and apply OM methodologies to solve issues that emerge in modern transportation settings.

Leann Thayaparan

Leann Thayaparan is a 4th year PhD student in the Operations Research Center. Prior to becoming a PhD student Leann worked for McKinsey. She received her undergraduate degree from Princeton University and her Masters degree in Business Analytics from MIT Sloan. Her research focuses on sustainability and electric vehicles and how optimization and machine learning can make a difference. Energy storage in electric vehicles (EVs) is likely to play a major role in the transition as the electric grid attempts to move towards net-zero emissions. In this research, we collaborate with a major American electric vehicle manufacturer to understand the capacity EVs can offer the grid through modelling driver behavior and optimizing charging patterns. Through this work we aim to help stakeholders understand the potential that individual drivers can offer the grid.

Rounaq Basu

Dr. Rounaq Basu works on sustainable city planning, integrated urban systems, and relationships among mobility access, economic opportunity, and quality of life. He is particularly interested in ways to reduce dependence on private automobiles without forgoing their accessibility benefits. We need to balance the sustainable mobility transition with equity progress that enables safe, affordable mobility and improved accessibility for all. Rounaq's research addresses this complex challenge by conceptualizing cities as integrated urban systems, at the center of which is mobility. He uses a theoretically-grounded analytic lens to explore pathways to accelerate the sustainable mobility transition from the individual-level up to the city-level.

SPOTLIGHT
STUDENTS

Educating the leaders of tomorrow's transportation system

Steven La

Steven has a passion in Transit Oriented Development with a global reach from Australia, Hong Kong and the United States. He holds a Masters of Science in Real Estate Development from the Massachusetts Institute of Technology, a Masters of Construction Law from the University of Melbourne and a Bachelor of Civil Engineering from the University of Sydney. The transportation and real estate industries together account for up to 55% of the world's global greenhouse gas emissions. The convergence of these two sectors through the form of Transit Oriented Developments can yield substantial benefits that can contribute to the fight against climate change. Steven's thesis investigated greener and cheaper financing options for Transit Oriented Developments which can be more attractive to developers and thus can help promote more and higher quality TODs to build cities which are less car centric.

Steven Parks

Steven is a third-year PhD Candidate at the Megacity Logistics Lab in the Center for Transportation and Logistics. He holds an M.S. in Transportation Engineering from U.C. Berkeley and a B.S. in Mechanical Engineering from Santa Clara University. Steven's work employs optimization and data science techniques to design recurring last-mile delivery routes that follow similar paths on city road networks from day to day. The methodology he is developing leverages historical package demand knowledge to create consistency and predictability for both drivers and customers. As E-commerce demand climbs and, in response, delivery strategies become more complex, this work could help logistics service providers streamline the daily route-planning process.

Xiaotong Guo

Xiaotong is a fourth-year Ph.D. student in the Transportation program at MIT, advised by Prof. Jinhua Zhao. Before joining MIT, Xiaotong completed an M.S. degree in Transportation Systems Engineering from Cornell University and a B.E. degree in Traffic Engineering from Tongji University. His research interests lie in building a robust integrated urban mobility system, with a specific focus on public transit and shared mobility systems. He has been working on 1) shared mobility market structures and drivers' multihoming behaviors, 2) robust vehicle rebalancing in ride-hailing, 3) planning responses to uncertainty in transit, and 4) integrated transit and ride-sharing system design. His research leverages large-scale discrete optimization techniques and machine learning techniques to solve real-world urban transportation problems.

Zhongxia "Zee"

YanZee is a 5th year PhD student in the Electrical Engineering and Computer Science department. Prior to joining MIT, he received his Bachelor's and Master's degree in Electrical Engineering and Computer Science at UC Berkeley. Zee's research focuses on the potential of machine learning for better coordination of multi-vehicles systems in today's increasingly automated world. These systems include congestion-reducing autonomous vehicles in the traffic system, delivery vehicles for fulfilling customer orders, and mobile robots for transporting goods within automated warehouses. More efficient coordination of vehicles will ultimately reduce travel time and emissions in transportation systems, reduce operating costs, and improve throughput in industrial and commercial systems.

MOBILITY INITIATIVE
ENTREPRENEURSHIP

Driving innovation & change in the field of mobility

Innovation has existed in the genes of MIT since its very founding and is one of the core pillars of the MIT Mobility Initiative. We are engaging with a wide array of entrepreneurs via new coursework related to entrepreneurship, and mentor-ship of early stage mobility innovators across the Institute.

As one of the nation's first land-grant colleges, MIT was designed to deliver a practical education—one that emphasizes learning by doing and prioritizes developing solutions to complex (yet invariably compelling) problems. The MIT Mobility Initiative has internalized this ethos, emphasizing innovation and real-world implementation as part of its educational programs and ecosystem engagement: over 15 start-ups participated in November's Mobility Vision Day.

The Mobility Initiative partners with a wide array of entities across MIT's existing robust entrepreneurial ecosystem to help support mobility-specific innovation.

Mobility is one of today's most exciting fields for entrepreneurs. From technology to new business models, there is a large appetitite for disruption across the world of mobility.

Bill Aulet, Director of the Trust Center for Entrepreneurship, co-instructs Mobility Ventures, a course that gives students from a wide array of disciplines the tools to identify core gaps in the mobility system and to develop business plans for how to fill them.

PARTNERS

designx

A unique initiative that involves academic courses, data-informed research, and an entrepreneurship program, **DesignX** supports innovation that aims to transform cities and the built environment.

The **Martin Trust Center** supports students with an entrepreneurship curriculum, programming, coaching and mentoring from connections in the broader entrepreneurial MIT communities.

MIT innovation initiative

The Innovation Initiative works to combine opportunities for hands-on innovation and entrepreneurship education at MIT, building a dynamic innovation infrastructure across Schools and disciplines.

MOBILITY INITIATIVE
CIVIC ENGAGEMENT

Building a better world

Partnerships with public sector and non-profit stakeholders to help effect real-world impact lie at the core of the Mobility Initiative. MMI undertook an array of high impact projects in 2022 on topics ranging from researching and publishing a EV charger reliability brief paper to forming a public transit research consortium with the 6 largest public transit agencies in the US.

At the Mobility Initiative, we work to offer cutting edge analysis, research, and innovation in service to society. This involves working with governments, organizations, and students to build a better world through social, environmental, and technological change. As part of that mission, the Mobility Initiative engages with cities and communities to better understand their challenges and to offer platforms and solutions to address their needs.

We published our first research briefing on US EV charging infrastructure reliability authored by David Keith and Jim Womack. A well functioning, reliable public charging network is key to the adoption of Electric Vehicles, and the MMI is working with various public & private stakeholders to ensure the transition from ICE vehicles to EVs is a successful and equitable one.

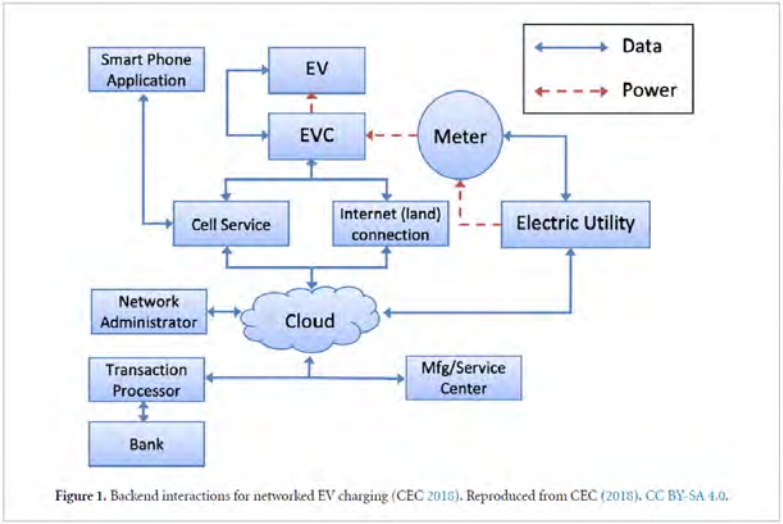


Figure 1. Backend interactions for networked EV charging (CEC 2018). Reproduced from CEC (2018). CC BY-SA 4.0.

IOP Publishing Environ. Res. Lett. 18 (2023) 011004 https://doi.org/10.1088/1748-9326/acae30

ENVIRONMENTAL RESEARCH LETTERS

PERSPECTIVES

Building and sustaining reliable public EV charging in the United States

OPEN ACCESS

RECEIVED 20 October 2022
REVISED 2 December 2022
ACCEPTED FOR PUBLICATION 23 December 2022
PUBLISHED 11 January 2023

David Keith* and Jim Womack

MIT Mobility Initiative, Massachusetts Institute of Technology, Cambridge, MA, United States of America
* Author to whom any correspondence should be addressed.

E-mail: dkeith@mit.edu

Keywords: electric vehicles, EV charging, infrastructure, reliability

MOBILITY INITIATIVE

Dan and Eva Roos Thesis Prize

The MIT Mobility Initiative is soliciting nominations for the 2023 Dan and Eva Roos Thesis Prize to be awarded to the outstanding MIT PhD dissertation in the field of transportation. Doctoral dissertations meeting the following criteria are eligible for consideration:

The dissertation should have been completed and submitted as part of the degree lists from September 2021-June 2023. The dissertation is in the area of transportation and mobility, broadly defined. It can be submitted to any department or PhD-granting program at MIT, and can address any aspect of transportation systems (e.g., research related to any mode of transport; passenger or freight transportation; theoretical or applied problems; technological, economic, planning or policy analysis; etc.)

The award is hosted by MIT's Mobility Initiative (MMI).

Application Process

Submit the following documents via email to Bhuvan Atluri (bpatluri@mit.edu) by June 30, 2023:

- CV of the student
- A pdf copy of the complete dissertation
- An extended abstract (4 to 5 pages) describing the work, its contributions, and the relevance.
- A letter of nomination from the dissertation supervisor supporting the submission and highlighting the importance of the research

Prize Selection Committee 2023

Prof. Amedeo Odoni

Prof. Alexandre Jacquillat

Prof. Jinhua Zhao (Chair)

Timeline:

Announcement: April 27, 2023

Application due: Jun 30, 2023

Result announcement: Aug 25, 2023

Awardees are invited to present at the MIT Mobility Forum in Fall 2023

Prizes in the Prior Years

2021:

Winner: Dr. Shenhao Wang, Deep Neural Networks for Choice Analysis

Honorary Mentions:
Dr. Arthur Delarue: Optimizing School Operations
Dr. Wilko Schwarting: Learning and Control for Interactions in Mixed Human-Robot Environments

Prize Selection Committee:Yossi Sheffi, Cindy Barnhart, Alexandre Jacquillat, Jinhua Zhao (Chair)

2018:

Winner: Dr. Gabriel Kreindler

"Essays on the Economics of Urban Transportation" (Extended Abstract \| Full Thesis)

Prize Selection Committee: Ali Jadbabaie, Yossi Sheffi, Hamsa Balakrishnan, Co-Chair, Jinhua Zhao, Co-Chair

MORE 2022
HIGHLIGHTS

Photos from left to right, top to bottom:

Mobility Vision Day participants discuss how safe is safe for autonomous vehicles.

Mujeeb Ijaz,Founder & CEO, Our Next Energy, offers insights on batteries & electrification to Mobility Ventures students.

Kyle Vogt, CEO, Cruise, talks about his journey and also about the AV industry to Mobility Ventures Students.

July 26, 2022 - Imagining ARPA-I workshop hosted by MMI with The Engine

MOBILITY INITIATIVE **TEAM**

Faculty & leadership

MMI FACULTY

Overview

The Mobility Initiative includes over 75 faculty members and researchers from across the Institute. Faculty members engage in activities across all four Mobility Initiative pillars, including research, education, entrepreneurship, and civic engagement. More details about MMI faculty can be found at mmi.mit.edu/mi-people.

MMI LEADERSHIP

JINHUA ZHAO

Founder & Faculty Director

Jinhua is Professor of City and Transportation Planning at MIT and Director of the MIT Mobility Initiative. He brings behavioral science and transportation technology together to shape travel behavior, design mobility system, and reform urban policies, developing methods to sense, predict, nudge, and regulate travel behavior

JOHN MOAVENZADEH

Executive Director

John is Executive Director of the MIT Mobility Initiative, where he developed and co-teaches the graduate-level Mobility Ventures course. John is also Founder and Managing Partner at Mobility Nexus LLC, Operator Advisor at Assembly Ventures, and serves as an independent advisor to several companies leading the transformation of transportation.

BHUVAN ATLURI

Program Manager

Bhuvan Atluri is Program Manager at the MIT Mobility Initiative. Bhuvan is a mobility & automotive technology enthusiast who is extremely passionate about solving the problems mobility faces today. He has interests across Electric Vehicle Adoption & Charging Equity, Autonomous Mobility & Safety, and Multi-Modal Urban Mobility. He brings to the role 11 years of product, marketing and business development experience.

MOBILITY INITIATIVE
GOVERNING BOARD

CYNTHIA BARNHART
Provost, MIT

ANANTHA CHANDRAKASAN
Dean, MIT School of Engineering

DAN HUTTENLOCHER
Dean, MIT Schwarzman College of Computing

HASHIM SARKIS
Dean, MIT School of Architecture and Planning

SANJAY SARMA
Professor, Mechanical Engineering, MIT

DAVID SCHMITTLEIN
John C Head III Dean, MIT Sloan School of Management

MOBILITY INITIATIVE
ACADEMIC ADVISORY COMMITTEE

SAURABH AMIN
Associate Professor of Civil and Environmental Engineering

HAMSA BALAKRISHNAN
Professor of Aeronautics and Astronautics

MOSHE BEN-AKIVA
Edmund K. Turner Professor in Civil Engineering

ERAN BEN-JOSEPH
Professor of Landscape Architecture and Urban Planning

DIMITRIS BERTSIMAS
Professor of Management & Operations Research, Associate Dean of Business Analytics

CHARLIE FINE
Chrysler Leaders for Global Operations Professor of Management

JOHN HEYWOOD
Professorof Mechanical Engineering

ALI JADBABAIE
JR East Professor of Engineering

PATRICK JAILLET
Dugald C. Jackson Professor in EECS, Co-Director, Operations Research Center

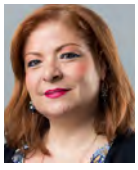
TOM MAGNANTI
Institute Professor and a Professor of Operations Research at the MIT Sloan School of Management

DAVID MINDELL
Dibner Professor of the History of Engineering and Manufacturing, Professor of Aeronautics and Astronautics

AMADEO ODONI
T. Wilson Chair Professor Emeritus of Aeronautics & Astronautics

ASU OZDAGLAR
Distinguished Professor & Department Head, EECS; Deputy Dean of Academics, SCoC

SANDY PENTLAND
Toshiba Professor of Media Arts & Science



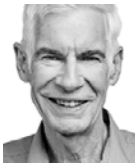
GEORGIA PERAKIS
William F. Pounds Professor of Management, EMBA Faculty Director, ORC Co-Director

DAN ROOS
Japan Steel Industry Professor, Emeritus, Civil and Environmental Engineering

MOBILITY INITIATIVE
ACADEMIC ADVISORY COMMITTEE

DANIELA RUS
Andrew (1956) and Erna Viterbi Professor of Electrical Engineering and Computer Science

YOSSI SHEFFI
Director of the MIT Center for Transportation & Logistics



NIGEL WILSON
Professor Emeritus, Civil and Environmental Engineering

CHRIS ZEGRAS
Professor of Transportation and Urban Planning

MOBILITY INITIATIVE
GLOBAL ADVISORY BOARD

Mary Chan
Managing Partner
Vecto!Q

Karl Iagnemma
President & Chief
Executive Officer Motional

Gill Pratt
Chief Executive Officer
Toyota Research Institute

Joshua Sirefman
Chief Executive Officer
Michigan Central

Diane Hoskins
Co-Chief Executive
Officer Gensler

Khaled Fakhuri Senior
Vice President
Schneider Electric

Andres Sacristan Chief
Executive Officer
Cintra

Ann Stanberry
Chief Strategy Officer
Liberty Mutual

MOBILITY INITIATIVE
FACULTY MEMBERS

SAURABH AMIN
Robert N. Noyce Career Development Associate Professor

JIM ALOISI
Lecturer of Transportation Policy and Planning

JOHN ATTANUCCI
Lecturer, Research Associate and Manager of the MIT Transit Research Program

BILL AULET
Professor, Sloan School; Managing Director, Martin Truast Center, MIT

HAMSA BALAKRISHNAN
Professor of Aeronautics and Astronautics

HARI BALAKRISHNAN
Fujitsu Chair Professor in the EECS Department

GEORGE BARBASTATHIS
Professor of Mechanical Engineering

CYNTHIA BARNHART
Chancellor, Ford Professor of Engineering

STEVEN BARRETT
Director, Laboratory for Aviation and the Environment

PETER BELOBABA
Principal Research Scientist

MOSHE BEN-AKIVA
Edmund K. Turner Professor in Civil Engineering

ERAN BEN-JOSEPH
Professor of Landscape Architecture and Urban Planning

DIMITRIS BERTSIMAS
Professor of Management and Operations Research, Associate Dean of Business Analytics

BRUCE CAMERON
Director, MIT System Architecture Group

CHRIS CAPLICE
Executive Director, MIT Center for Transportation & Logistics

LUCA CARLONE
Charles Stark Draper Assistant Professor, Department of Aeronautics and Astronautics

JOSEPH F. COUGHLIN
Director, MIT AgeLab

FÁBIO DUARTE
Principal Research Scientist and Lecturer of Transportation Policy and Planning

MOBILITY INITIATIVE
FACULTY MEMBERS

OLIVIER DE WECK
Professor of Aeronautics and Astronautics and Engineering Systems

JOSEPH FERREIRA
Professor of Urban Studies & Planning

RANDALL FIELD
Executive Director, MIT Energy Initiative's Mobility Systems Center

CHARLIE FINE
Chrysler Leaders for Global Operations Professor of Management

DANIEL FREUND
Assistant Professor of Operations Management

ROBERT FREUND
Theresa Seley Professor in Management Science at the Sloan School of Management at MIT

STEPHEN GRAVES
Abraham J. Siegel Professor of Management and Professor of Operations Management

BILL GREEN
Hoyt C. Hottel Professor in Chemical Engineering

SONG HAN
Assistant Professor, Electrical Engineering and Computer Science

JOHN HANSMAN
T. Wilson (1953) Professor of Aeronautics and Astronautics

JOHN HEYWOOD
Professor of Mechanical Engineering

JONATHAN HOW
Richard Cockburn Maclaurin Professor of Aeronautics and Astronautics

JASON JACKSON
Ford Career Development Assistant Professor of Political Economy

ALEXANDRE JACQUILLAT
Assistant Professor, Operations Research and Statistics

ALI JADBABAIE
JR East Professor of Engineering

PATRICK JAILLET
Dugald C. Jackson Professor in EECS, Co-Director of the Operations Research Center

VALERIE KARPLUS
Assistant Professor of Global Economics and Management

SERTAC KARAMAN
Associate Professor of Aeronautics and Astronautics

MOBILITY INITIATIVE
FACULTY MEMBERS

DAVID KEITH
Assistant Professor, System Dynamics

CHRIS KNITTEL
George P. Shultz Professor of Applied Economics

KENT LARSON
Principal Research Scientist

JOHN LEONARD
Samuel C. Collins Professor of Mechanical and Ocean Engineering

JING LI
William Barton Rogers Career Development Professor of Energy Economics

THOMAS MAGNANTI
Institute Professor & Professor of Operations Research

DAVID MINDELL
Dibner Professor of the History of Engineering and Manufacturing, Professor of Aeronautics & Astronautics

JELENA NOTAROS
Robert J. Shillman (1974) Career Development Assistant Professor of Electrical Engineering and Computer Science

AMEDEO ODONI
T. Wilson Chair Professor Emeritus of Aeronautics and Astronautics

JAMES B. ORLIN
E. Pennell Brooks (1917) Professor in Management

CAROLINA OSORIO
Visiting Associate Professor

ASU OZDAGLAR
Distinguished Professor and Department Head, EECS; Deputy Dean of Academics, SCoC

SERGEY PALTSEV
Deputy Director of the MIT Joint Program on the Science and Policy of Global Change

SANDY PENTLAND
Toshiba Professor of Media Arts & Science

GEORGIA PERAKIS
William F. Pounds Professor of Management, EMBA Faculty Director, Operations Research Center Co-Director

CARLO RATTI
Professor of Urban Technologies and Planning, SENSEable City Lab Director

DANIEL ROOS
Japan Steel Industry Professor, Emeritus, Civil and Environmental Engineering

NICK ROY
Professor of Aeronautics and Astronautics

MOBILITY INITIATIVE
FACULTY MEMBERS

DANIELA RUS
Andrew (1956) and Erna Viterbi Professor of Electrical Engineering and Computer Science

DONALD SADOWAY
John F. Elliott Professor of Materials Chemistry

FRED SALVUCCI
Senior Lecturer and Senior Research Associate

TOBIAS SALZ
Castle Krob Career Development Assistant Professor of Economics

PAOLO SANTI
Principal Research Scientist, MIT Senseable City Lab

SANJAY SARMA
Vice President for Open Learning at MIT

ANDRES SEVTSUK
Charles and Ann Spaulding Career Development Associate Professor of Urban Science and Planning

YOSSI SHEFFI
Director of the MIT Center for Transportation & Logistics

DAVID SIMCHI-LEVI
Professor of Civil and Environmental Engineering

ANSON STEWART
Research Scientist

KATHLEEN THELEN
Ford Professor of Political Science

JESSIKA TRANCIK
Associate Professor of Energy Studies

CHINTAN VAISHNAV
Senior Lecturer, Operations Management

ANDREW WHITTLE
Edmund K. Turner Professor of Civi & Environmental Engineering

SARAH WILLIAMS
Associate Professor of Technology and Urban Planning

NIGEL WILSON
Professor Emeritus

MATTHIAS WINKENBACH
Director of the MIT Megacity Logistics Lab; Director of the MIT CAVE Lab

CATHY WU
Gilbert W. Winslow (1937) Career Development Assistant Professor

MOBILITY INITIATIVE
FACULTY MEMBERS

CHRIS ZEGRAS
Professor of Transportation and Urban Planning

JINHUA ZHAO
Edward H. and Joyce Linde Associate Professor of Transportation and City Planning

SIQI ZHENG
Samuel Tak Lee Professor, CRE, DUSP and SA+P

MIT MOBILITY INITIATIVE

9-514
77 Massachusetts Avenue
Cambridge, MA 02139

Email
bpatluri@mit.edu

Website
mmi.mit.edu