Learning Robots

A MachineLearningApplications@CSAIL Theme

Executive Summary

Across industries, automation is rapidly evolving from fixed, rule-based systems to intelligent machines that can adapt, adjust, and collaborate. Learning Robots—a theme within our successful MachineLearningApplications@CSAIL (MLA) research initiative—explores the next frontier in automation: intelligent robots that learn from experience, interact safely in human environments, and perform complex tasks in unstructured, real-world settings.

Led by CSAIL Associate Professor Pulkit Agrawal, Learning Robots will advance the state of the art in methods and technologies that empower robots with more human-like abilities to dynamically respond to their environments and gain concrete, applicable understanding. This initiative aims to advance algorithms and tools that will increase robotic capabilities through interaction and exploration rather than relying on labor-intensive programming.

Learning Robots will serve as one of several themes under the MLA umbrella, offering member companies access to CSAIL's thriving robotics research ecosystem as well as the broader technological developments that come out of the initiative as a whole.

MLA@CSAIL allows industry partners to steer and navigate the transformative potential of machine learning by providing direct access to groundbreaking CSAIL research, faculty expertise, and rising student talent. Through a collaborative, consortium-style structure, Learning Robots member companies will:

• Gain early insights into emerging capabilities,
• Inform real-world R&D directions for their company and the broader industry,
• Participate in advancing the field of research and available technology,
• Inform the future of intelligent robotic systems.

As machine learning reshapes what robots can do, MLA@CSAIL's Learning Robots will serve as a strategic hub for innovative companies to understand and implement adaptive, data-driven, efficient robotics in high-impact environments.

Our Approach

CSAIL is MIT's largest lab, spanning all aspects of computer science and artificial intelligence with more than 1700+ people, 130+ faculty researchers, 1000+ graduate students, and 900+ active projects. Our approach to collaboration via our research initiatives is comprehensive: member companies engage with the lab by participating in future-focused innovation sessions, explore technology development and pathways, advise and inform research challenges to address concerns where no commercial products are currently available, connect to startups deploying the latest technologies to jump start innovation, and engage with talented students for employment opportunities. MLA@CSAIL's Learning Robots involves the entirety of CSAIL and our broader MIT and industry community.

Leadership

Faculty Director of MachineLearningApplications@CSAIL: Daniela Rus
Professor Rus is the Erna Viterbi Professor of Electrical Engineering and Computer Science and Director of the Computer Science and Artificial Intelligence Laboratory (CSAIL) at MIT. The focus of her work is developing the science and engineering of autonomy, toward the long-term objective of enabling a future with machines pervasively integrated into the fabric of life, supporting people with cognitive and physical tasks.

Leading Learning Robots: Pulkit Agrawal
Professor Agrawal is an Associate Professor of Electrical Engineering and Computer Science at MIT as well as a member of CSAIL. His lab's research focus is to build machines that have similar manipulation and locomotion abilities as humans.

Benefits

THE MEMBERSHIP MODEL
Through initiatives, member companies engage in close interactions with researchers and students in robotics, machine learning/AI, and beyond. Member companies have the opportunity to interact with multiple research projects that span the full spectrum of ML/AI in various industry sectors and applications. CSAIL researchers collaborate closely with industry to provide real-world applications and drive impact. It is anticipated there will be 5-10 projects launched each year.

MachineLearningApplications@CSAIL (MLA) Learning Robots Theme industry partners will:

- Participate in the Advisory Board. The board will advise the initiative on industry needs, feedback on existing research, and **future research direction** through seeded projects. The board will help shape the priorities of the initiative. Each member company will have one (1) representative on the board.
- Access in-depth exploration of CSAIL research in machine learning, robotics, artificial intelligence, data analytics, and visual computing, and leverage the work of 13+ existing researchers. Members will have unprecedented access to the research and the research teams.
- Test application of tools developed to real-world situations and explore new projects.
- Participate in in-depth interactions and shared learning on topics of particular interest to each company. Members will have close interaction with the researchers engaged in what matters most to their company.
- Attend one **(1) annual meeting per year** (up to 10 representatives from each member company) to enable broad exposure to teams who are working on these issues. Members will also be invited to participate in the **MLA/ Learning Robots lecture series** and workshops held throughout the year.
- Attend the meetings, lectures, and workshops of other initiatives (though not vote on the other boards).
- Access additional research groups, researchers, and students within MIT's Computer Science and Artificial Intelligence Laboratory through **CSAIL's Alliance Program (CAP) at the Affiliate level.** Details include:
    - Access to the lab-wide, annual, 3-day, member-only CSAIL Alliances Annual Meeting held in the spring each year in addition to the MLA annual meeting.
    - Connect with the latest CSAIL research from across all 60+ research groups in the lab: Robotics, Computer Vision, Security, Natural Language, Computational Biology, Data Systems, Artificial Intelligence, and Machine Learning.
    - Access technical talks from our world-renowned researchers and visiting researchers held on campus each month both live and virtually.
    - Access our "Student Profile Book" containing resumes and research summaries of current CSAIL students published each year as well as a searchable online database.

- Advertise open position announcements within CSAIL.
- Host two tech talks/info sessions per academic year.
- Feature your company logo on the CSAIL Alliances website, on the member wall at CSAIL, and in conference materials.
- Visit CSAIL for a private lab visit, tour, demos, and meetings with faculty/researchers.
- Network with faculty, students, and other members at events throughout the year.
- Join our member-only site with search functionality, which offers papers, student projects, the resume book, research updates, tech talk and seminar videos, demos, conference slides, business use cases, and more.
- 10% discount on professional education classes through MIT School of Engineering.
- 15% discount on open enrollment executive education courses with MIT Sloan School of Management.
- 20-30% discount on CSAIL professional programs.
- Receive research briefings and/or research summaries highlighting the latest CSAIL research 3-4 times per year.
- Opportunity to participate in working groups developing white papers on pressing computer science topics.
- Access to all Startup Connect, Startup Connect Plus, and other innovation ecosystem activities and events.

Optional Additional Engagements

In addition to accessing the existing research and shared learning on specific topics of interest, each member company may also enter into company–specific activities such as:

- **Sponsored Research**
  If a member company becomes interested in a particular research project and wants to sponsor the future development of that project, CSAIL Alliances can work with members to scope the project and additional funding required. All sponsored research is handled through MIT's Research Administration Services.

- **Visiting Industry Researcher** (with or without sponsored research)
  Member companies may leverage the CSAIL Visiting Industry Researcher Program to embed a researcher within a specific research group. The visiting researcher remains an employee of the member company and works alongside CSAIL researchers and students in a specific area. In addition, the Visiting Industry Researcher is connected to CSAIL and MIT with a customized schedule of lectures, workshops, classes, meetings, and events. CSAIL Alliances coordinates this effort and meets monthly with all Visiting Industry Researchers.

- **Consulting**
  Researchers may be available for consulting opportunities with our industry partners. Consulting agreements are arranged between the researcher and the member company directly.

- **Technology Licensing**
  Member companies interested in licensing developed software and patentable inventions may work with our MIT Technology Licensing Office (TLO) for licensing agreements and options.

Intellectual Property

The goal of a CSAIL Alliances Research Initiative is to conduct research that will significantly impact the field of machine learning and AI over the next decade and beyond.

- **Publication**
  The majority of the research results will be broadly disseminated via publication. We realize that confidentiality is a particular concern to our partners and we have standard practices to ensure no partner's proprietary information will be released in any publication. Papers generated from this research initiative will be available to our partners.

- **Open-source and Licensing**
  Members may be able to utilize software tools developed through this initiative for research testing internally. Additionally, it is likely that the software tools developed will be released as open source and available for use by member companies via MIT's open source license unless stated otherwise.

- **Member Intellectual Property**
  All pre-existing IP owned by the member coming into this initiative will remain the member's intellectual property.

- **Creation of Joint Intellectual Property**
  If member representatives work with MIT researchers on projects to invent and/or author inventions and software, US laws and rules with regard to joint ownership of patents and copyrights will be applied. Please note, however, if members make significant use of MIT resources, funds, and/or facilities or invent in an area outside the scope of initiative projects, their IP rights will be assigned to MIT.

Leveraged Resources: Existing Research Projects

Member companies have access to research and testing opportunities in several current non-industry-sponsored projects at CSAIL and can provide guidance for new seed projects as part of the collaborative initiative.

Participating Researchers

Faculty Director of MachineLearningApplications@CSAIL:
Daniela Rus
Professor, MIT CSAIL
Director, MIT CSAIL

Learning Robots Lead:
Pulkit Agrawal
Associate Professor,
MIT CSAIL

Programmable Therapeutics Lead:
Manolis Kellis
Professor, MIT CSAIL

Visual Computing Lead:
William Freeman
Professor, MIT CSAIL

Visual Computing Lead:
Fredo Durand
Professor, MIT CSAIL

Professor Hal Abelson

Professor Randall Davis

Associate Professor Manya Ghobadi

Professor Polina Golland

Professor Tommi Jaakkola

Principal Research Scientist Boris Katz

Professor John Leonard

Professor Ankur Moitra

Associate Professor Justin Solomon

Professor Russell Tedrake

Professor Ted Adelson

Associate Professor Jacob Andreas

Assistant Professor
Sara Beery

Assistant Professor
Andreea Bobu

Senior Research
Scientist **Jim Glass**

Assistant Professor
Dylan Hadfield-Menell

Associate Professor
Phillip Isola

Professor
Leslie Kaelbling

Assistant Professor
Yoon Kim

Assistant Professor
Mina Konaković Luković

Professor
Tomas Lozano-Perez

Professor
Nick Roy

Professor
Julie Shah

Assistant Professor
Vincent Sitzmann

Professor
Josh Tenenbaum

Professor
Antonio Torralba

Professor
Brian Williams

Associate Professor
Wojciech Matusik

Senior Research Scientist
Aude Olivia

Learn More

For additional information on joining this research initiative theme at MIT please contact:

Lori Glover, JD
CSAIL Alliances: Managing Director, Global Strategic Alliances
Executive Director, MachineLearningApplications@CSAIL
Massachusetts Institute of Technology
Computer Science and Artificial Intelligence Laboratory
E: lglover@mit.edu | P: (617) 715-2460

Visit the Machine Learning Applications Initiative website.

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Machine Learning Applications
Initiative