MIT-IBM Watson AI Lab

Upcoming Events

Advances in the quest to understand intelligence

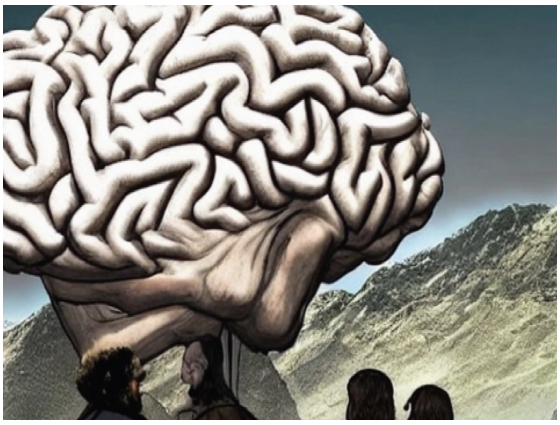
Vision, progress, and the future of research on the Science and Engineering of Intelligence
November 4, 8:30 a.m.–5 p.m. ET

During this hybrid event, researchers from MIT's Quest for Intelligence and its science driver — the Center for Brains, Minds, and Machines — will share, via presentations and conversations, their vision, the latest progress on understanding natural intelligence and how they aim to use that scientific progress to drive the future of AI and other impact areas. Registration required.

Develop better quantum sensors, simulators with solid state spins

Nano Explorations seminar
November 8, 11-11:45 a.m. ET

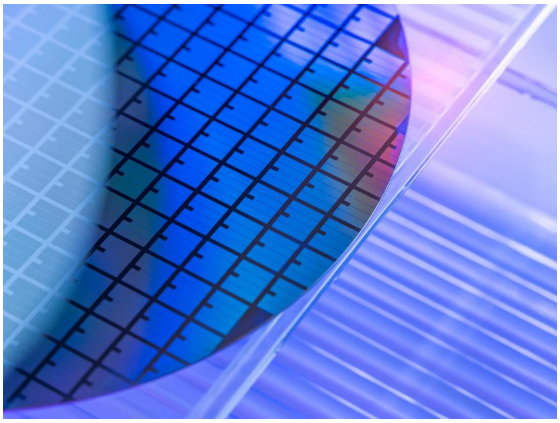
In a Zoom seminar, MIT graduate student Guoqing Wang will present work on quantum sensors: sensing arbitrary-frequency vector signals by using the sensor qubit as a quantum frequency mixer. Wang will also discuss how their contributions are paving the way for building more powerful quantum sensors and simulating more interesting phases. Registration required.



Brains on conlangs

[McGovern Institute special event](#)
November 11, 2-5 p.m. ET

How do human brains create and process constructed languages (conlangs), like Esperanto, Klingon, Dothraki, or Na'vi? In this hybrid event, McGovern Investigators will scan the brains of proficient speakers of five conlangs, while they listen to sentences spoken in the language of interest. Conlang creators will discuss the process of language creation. Linguists will talk about their research relevant to conlangs, linguistic creativity, and linguistic diversity. [Registration required.](#)



Sustainable compute for the broad AI era

[MTL/AI Hardware Program seminar](#)
November 30, 12-1p.m. ET

During this in-person event, John Rozen of IBM Research will discuss type of AI models driving the trend toward broad AI and the emerging approaches to tackle the sustainability issue at different levels — from redefining the fundamental compute unit, to shrinking technology nodes, optimizing design of cores & architecture, building large systems, and integrating into the cloud fabric. [More information.](#)

In the Lab

Expanding the MIT-IBM Watson AI Lab's network of neurons

[MIT students and postdocs learn how to become involved in meaningful applicable research](#)

Nearly 50 students and postdocs from across MIT and locally attended a Lab networking event, showing how they could engage with the Lab through internships or applied research in the area of "broad AI."

Designing nanomaterials that conduct heat in specific ways

[New technique could help fabricate materials that won't overheat or convert waste heat to energy.](#)

Lab researchers Giuseppe Romano and Steven Johnson have developed a way to help dispel heat that's generated during computation in a useful way. Their algorithm and software system can automatically design a nanoscale material that can conduct heat in a preferred direction or a material that can efficiently convert heat into electricity.

Learning on the edge

[A new technique enables AI models to continually learn from new data on intelligent edge devices.]

Researchers working with the Song Han group have developed a new, faster, and more efficient technique that enables on-device training for microcontrollers, using less than a quarter of a megabyte of memory. Other training solutions designed for connected devices can use more than 500 megabytes of memory, greatly exceeding the capacity of most microcontrollers.

Neurodegenerative disease progression patterns identified

[A new method finds patterns of health decline in ALS, Alzheimer's, and Parkinson's diseases.]

Neurodegenerative diseases are complicated, chronic ailments that can progress in a variety of ways. Now, Lab researchers have developed a machine-learning method that can tease apart and categorize disease evolution patterns in ALS patients, as well as Alzheimer's, and Parkinson's, helping to inform future clinical trial designs and mechanism discovery.

Q&A: Global challenges surrounding the deployment of AI

[Co-chairs of the AI Policy Forum discuss key issues facing the AI policy landscape today.]

Aleksander Madry, Asu Ozdaglar, and Luis Videgaray of the AI Policy Forum (AIPF), an initiative of the MIT Schwarzman College of Computing, provide a look into how the AIPF engages with stakeholders, thoughts deploying trustworthy AI and policies for the financial sector, and potential pathways for social media policy reform.

In the Media

Sally Kornbluth is named as MIT's 18th president

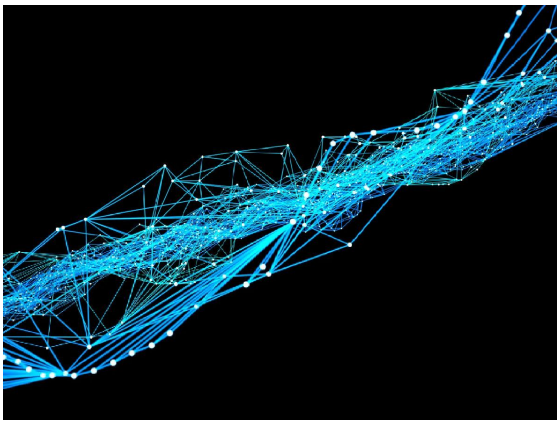
[She will assume the MIT presidency on Jan. 1, 2023, succeeding L. Rafael Reif.]

As Duke University's provost since 2014, she has advocated for faculty excellence and reinforced the institution's commitment to the student experience. "Sally Kornbluth has demonstrated the ability to lead across disciplines, and to catalyze the type of cross-disciplinary initiatives that have been so instrumental to MIT's ability to contribute advances in technology and engineering for the betterment of the world," reports *MIT News.*

IBM welcomes President Biden to Poughkeepsie Site

Here, a new investment will unlock opportunities in computing design and manufacturing.

"As we tackle large-scale technological challenges in climate, energy, transportation and more, we must continue to invest in innovation and discovery - because advanced technologies are key to solving these problems and driving economic prosperity, including better jobs, for millions of Americans," said IBM Chairman and CEO Arvind Krishna for *IBM*.



Synthetic data is the safe, low-cost alternative to real data

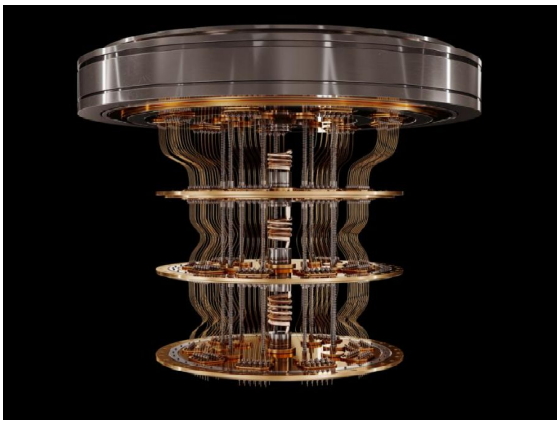
A new solution for data hungry AI

When it comes to training models, using real data can present issues of low quantity, safety and sensitivity, copyright, and bias. Synthetic data can help relieve this problem, writes *The Next Web.* For example, a scalable model from the Lab, Task2Sim, creates data for training image classifiers. Further, in this application, it doesn't make a difference whether fake or real data was used for training of an image classifier.

A new "common sense" test for AI could lead to smarter machines

A benchmark developed in the Lab can assess the reasoning ability of an AI model.

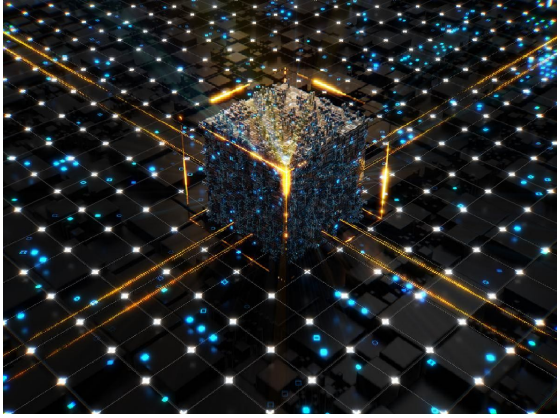
Incorporating common sense, which includes a sense of physics, social ability and reasoning, into AI will go a long way to helping us work on real-world problems and save on computing, reports *The Next Web*. Now, Lab researchers have created a benchmark called AGENT to develop and evaluate "the core psychological reasoning ability of an AI model."



Quantum computing is here

IBM shares its systems of today and roadmap to the future of quantum computing.

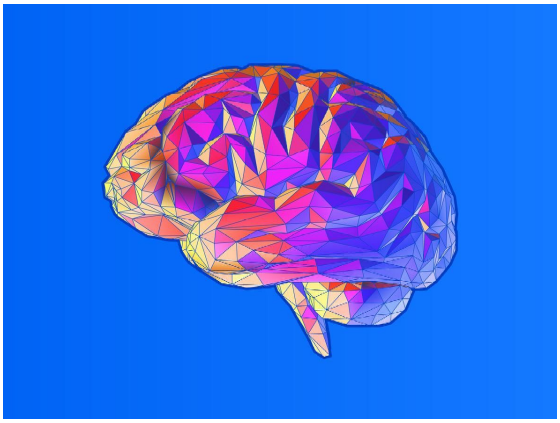
Ian Cutress of *TechTechPotato* tours IBM's quantum research facilities in New York with Dario Gil — Lab IBM chair, IBM senior VP and director of research — who shares advantages of the technology and uses, how quantum computing will fit into everyday computing, and how the next generation of learners and researchers will use and develop quantum computing.



Quantum physics titans win Breakthrough Prize

Recognizing the researchers' "foundational work in the field of quantum information"

IBM Research's Charles Bennett, Gilles Brassard of University of Montreal, David Deutsch of the University of Oxford, and MIT's Peter Shor innovated in quantum cryptography and quantum teleportation, defined the quantum Turing machine, and developed a fast algorithm that could factor large numbers, paving the way for quantum computers, reports *Scientific American.*



How transformers seem to mimic parts of the brain

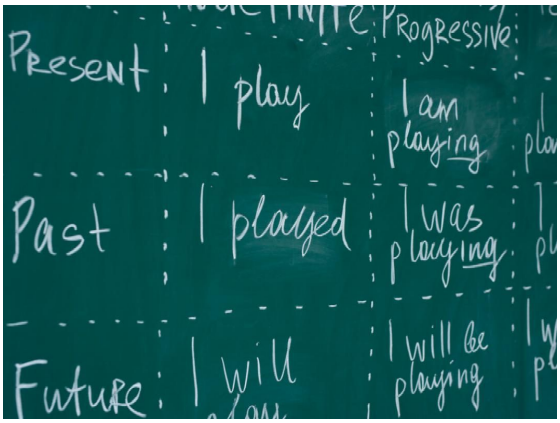
Memory retrieval of locations by the brain's grid cells can be replicated by transformers.

How the brain stores and accesses spatial data, *Quanta Magazine* reports, behaves like a transformer, which uses self-attention. Using a Hopfield network, which builds strong connections between neurons, with a transformer allowed John Hopfield and the Lab's Dmitry Krotov to "store and retrieve more memories compared to the standard Hopfield networks because of more effective connections."

Beyond deep learning

Blending "fast" and "slow" thinking could help machines to reason more like humans.

AI excels at returning statistically optimized responses to inquires, based on lots of data, but without the ability to reason like people, it can be confounded, *PNAS* reports. Dan Gutfreund of IBM Research and the Lab explores how the incorporation of slow and fast thinking into neuro-symbolic systems, like the Lab's 3D Scene Perception via Probabilistic Programming (3DP3), could make them more robust.



AI can learn and recognize language norms and patterns

The machine-learning model can learn patterns, grammar, and rules that govern language.

The method, developed with the Lab groups of Armando Solar-Lezama and Joshua Tenenbaum, can explain, through a set of rules, how words change e.g., when tense, case or gender are expressed differently, reports *Dataconomy*. When the model was tested against linguistics problems, it's explanations and word-form changes often mirrored those of a human expert.

Event Recordings

AI Policy Forum Summit

MIT AI Policy Forum — an initiative of the MIT Schwarzman College of Computing — convened leaders from government, business, and academia for dialogue focusing on the global policy challenges surrounding the deployment of AI in key areas such as development of truly trustworthy AI, the challenge of making AI work for consumers in finance, and charting a viable path towards social media reform.

Understanding quantum computing

Lab researchers Peter Shor and Will Oliver speak with MIT CSAIL Alliances about the current state and future possibilities of quantum computing, including explaining how it operates and advances in error correction, how quantum computing can provide advantages over and work in tandem with classical computers, how it could alter everyday life like security with cryptosystems, limitations and promise for the technology for the future.

Advantages of near-flash computing

Lab researcher Arvind and his group enable the creation and development of high-performance, reliable, and secure computing systems that are easy to interact with. The team is currently conducting research in the areas of computer architecture, hardware synthesis, computer security, and VLSI design. Arvind discusses with MIT CSAIL Alliances details his work in near-storage computing and how he's using flash storage instead of massive amounts of DRAM for big data problems.

Lab Highlights

The Lab is currently accepting applications for summer 2023 interns, who will work on cutting-edge research in areas such as AI, machine learning, quantum computing, security and more.

MIT professor Regina Barzilay was a Falling Walls finalist, recognizing her work predicting future cancer risk from medical imaging.

Lab researcher Hilde Kuehne was part of a team that received the PAMI Mark Everingham Prize for work on UCF101 and HMDB51 datasets, "for pioneering human action recognition datasets." The prize recognizes "selfless contribution of significant benefit to other members of the computer vision community."

Lab co-director Aude Oliva and MIT graduate student Benjamin Lahner received an MIT Prize for Open Data for the Algonauts Action Video (AAV) dataset, which was part of the Lab's Algonauts Project.

MIT professor Daniela Rus received the IEEE Robotics and Automation Award, "for pioneering contributions to the design, realization, and theoretical foundations of innovative distributed, networked autonomous systems."

MIT professor Arvind Satyanarayan received the 2022 IEEE VGTC Visualization Significant New Researcher Award "in recognition of his systematic and theoretically-minded work on new methods for authoring interactive visualizations and insights into how visualizations are used in the public sphere."

MIT professor Peter Shor, Charles Bennett of IBM Research, and their colleagues win the 2023 Breakthrough Prize in Fundamental Physics for "foundational work in the field of quantum information."

MIT professor Caroline Uhler received NIH New Innovator Award for 2022, as part of the High-Risk, High-Reward Research program. The award funds exceptionally creative research from early-career investigators.

MIT professor Mengjia Yan received the Intel Rising Star Faculty Award 2022, which recognizes groundbreaking research in computing-related fields by early-career researchers.