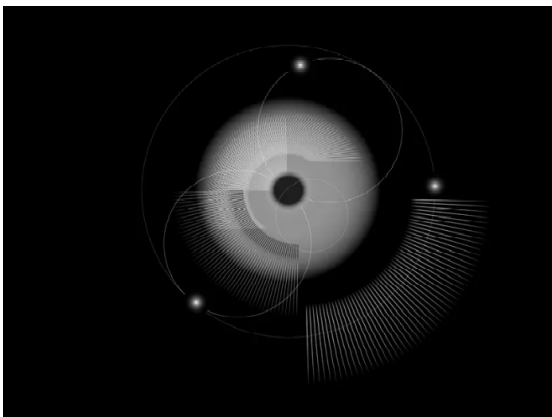


## In the Lab



### AI transformers shed light on the brain's mysterious astrocytes

[Exploring the parallels between how AI transformers and brain process information](#)

A team led by Lab researcher Dmitry Krotov investigated and appreciated the role of the brain's astrocytes, neuron-astrocyte networks, and how these biological computational units might be used to build transformers.



### Advancing social studies at MIT Sloan

[Dean Eckles studies how our social networks affect our behavior and shape our lives.](#)

Lab researcher Dean Eckles research covers social networks and interventions, in the realms of behavioral, social, economic, or biomedical science. A branch of his work specializes in "causal inference," developing ways to identify cause-and-effect connections.



## What is retrieval-augmented generation?

[An AI framework for retrieving facts from an external knowledge base to ground LLMs](#)

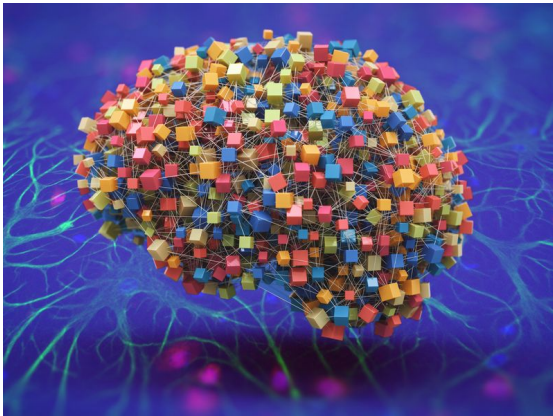
Retrieval-augmented generation (RAG) helps large language models draw from the most accurate, current information that can be verified for trustworthiness by the model's users.



## How machine-learning models can amplify inequities in medicine

[Lab researchers investigate the causes of health care disparities among underrepresented groups.](#)

In medicine, machine-learning models can help with diagnosis and treatment, when analyzing data from a large population but might show bias in subgroups. New work from Lab researchers looked at the fairness of machine-learning models under subpopulation shift, which is critical for ensuring their safe and equitable deployment.



## AI models are powerful, but are they biologically plausible?

[Bridging neuroscience and machine learning offers insights into the role of astrocytes in the brain.](#)

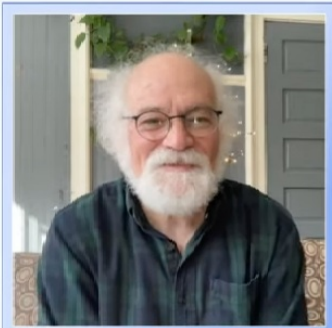
A team including Lab researchers Dmitry Krotov and MIT intern Leo Kozachkov sought to investigate a biological analog for transformers. Their research illuminated the how neuron-astrocyte networks “read” and “write” to memory.



## MIT's DribbleBots vs. The New England Revolution

[Quadrupedal robots compete on the soccer pitch.](#)

In a video demonstration of skill, MIT's [DribbleBots](#), developed by the Lab's Agrawal group, challenged a couple New England Revolution players to a short-sided soccer match. The robots showcased their ability to track the object of interest, maneuver on the turf, and plan ahead and respond in real-time.



## John Cohn's advice for aspiring inventors

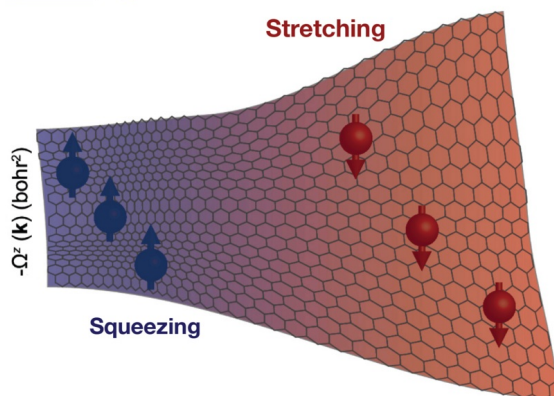
[How to unlock innovation](#)

With over 120 international patents, John Cohn has learned to find happiness in the act of creation. In a short video, the "distinguished agitator" and IBM Fellow Emeritus at the Lab offers advice to aspiring inventors and tech innovators.

## New quantum magnet unleashes electronics potential

[Controlling the anomalous Hall effect and Berry curvature](#)

A team, including Lab researcher Frances Ross, developed a method to manipulate the Hall effect in magnetic materials by squeezing and/or stretching. The work has widespread and significant ramifications for creating flexible quantum magnets for use in computers, robotics, and sensors.



## A faster way to teach a robot

[Understanding why a robot failed and then fine-tuning it to perform a task effectively](#)

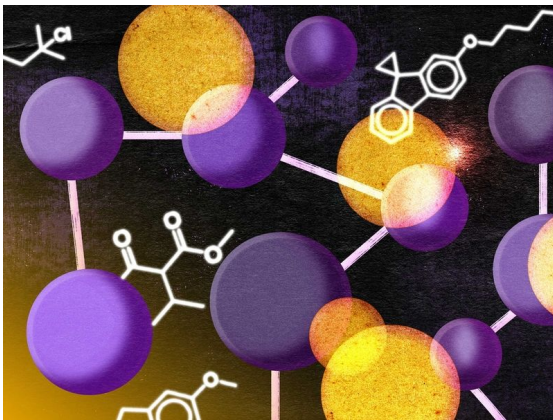
The Lab's Agrawal group and others developed a technique that allows a human, with very little effort, help a failing robot succeed. For this, the robot generates counterfactual explanations for why issues arose and then with a human's help and these explanations, creates new data to retrain the robot to successfully and efficiently prevail.

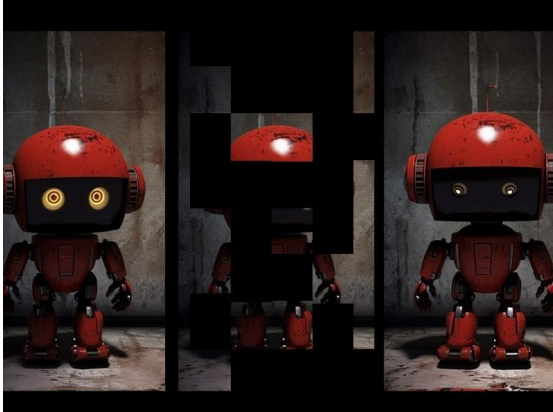


## Learning the language of molecules

[This AI system only needs a small amount of data to predict molecular properties.](#)

The Lab teams of Wojciech Matusik, Veronika Thost, Payel Das, and Jie Chen created framework that uses graph learning and a "grammar" to understand how to produce valid molecular structures and efficiently predict their properties, potentially speeding up drug discovery and material development.





## Computer vision system marries image recognition and generation

[MAsked Generative Encoder \(MAGE\) can infer the missing parts of an image.](#)

By combining these two tasks into one system, MAGE can accurately identify images and create new ones with striking resemblance to reality. Applications include finding and classifying objects in an image, learning from just a few examples, generating images with specific conditions such as text or class, editing existing images, and more.

## In the Media



### Imagination in Action: AI Frontiers & Implications

During MIT's Imagination in Action, Lab co-director Aude Oliva shared her expertise into human perception, providing insights into the tools her group uses to make the inner workings of the human brain more transparent. [Watch the video](#) and [read more at Forbes](#).



### The Complicated Interplay: AI and Government

In a conversation with the [Data-Smart City Pod](#), from Harvard University's Data-Smart City Solutions, MIT Schwarzman College of Computing Dean Daniel Huttenlocher discusses artificial intelligence, use cases for generative AI in government, and balancing the human with the digital in a bureaucracy.



### 2023 Sloan Research Fellows

Lab researchers Rafael Gómez-Bombarelli, Song Han, and Jonathan M. Ragan-Kelley were among those selected for [2023 Sloan Research Fellowships](#). These "early-career scholars represent the most promising scientific researchers working today. Their achievements and potential place them among the next generation of scientific leaders in the U.S. and Canada."

## Upcoming Events

# Quantum's Impact on Security



## Quantum's Impact on Security

[A Conversation with MIT CSAIL and MIT CQE](#)

October 2, 3:30-5 p.m. ET

During an in-person event, MIT experts and Lab researchers Daniela Rus, Peter Shor, William Oliver, and Vinod Vaikuntanathan will explore what the current field of quantum computing research looks like, its impact on security, and how the work happening today might impact society in the future. [Learn more and register.](#)

## Lab Highlights

This fall, the Martin Trust Center for MIT Entrepreneurship and the Lab are co-sponsoring the [MIT Ignite: Generative AI Entrepreneurship Competition](#), which seeks to foster innovative projects within the realm of generative AI. Teams can include undergraduates through postdocs.

Lab researcher Kenney Ng has accepted a new role as the Lab's [science program manager](#), helping to shape and drive research strategy and execution.

The MIT Case Studies in Social and Ethical Responsibilities of Computing (SERC) aims to advance new efforts within and beyond the MIT Schwarzman College of Computing and regularly shares [findings in its issues](#).

Lab researcher Jacob Andreas received the [Junior Bose Award](#) from the MIT School of Engineering, given to a junior faculty member who has made outstanding contributions as an educator.

The MIT School of Engineering honored Lab researcher Elsa Olivetti with the [Capers \(1976\) and Marion McDonald Award for Excellence in Mentoring and Advising](#), presented for advancing "the professional and personal development of students and colleagues."

Lab researchers Armando Solar Lezama, Daniela Rus, David Sontag, Dina Katabi, Jacob Andreas, Antonio Torralba, Leslie Kaelbling, Neil Thompson, Polina Golland, Pulkit Agarwal, Stefanie Jegelka, Tomas Lozano-Perez, Una-May O'Reilly, and Yoon Kim presented their research, ranging from cybersecurity and the human brain and perception to language models, AI in medicine, and AI economics at MIT's Imagination in Action. [Watch the video](#) and [read more at Forbes](#).

Lab researcher Jonathan Ragan-Kelley received the [MIT EECS Outstanding Educator Award](#).

MIT granted [tenure](#) to Lab researchers Tamara Broderick, Rafael Jaramillo, Benedetto Marelli, and Justin Solomon.

Lab researcher Armando Solar-Lezama named [inaugural Distinguished Professor of Computing](#) in the MIT Schwarzman College of Computing.

MIT EECS awarded Murat Onen SM '19, PhD '22 the Jin Au Kong [PhD Thesis in EE award](#) for "Devices and Algorithms for Analog Deep Learning", supervised by Lab researcher Jesus Del Alamo.

## Online Learning

### [Machine Learning in Business](#)

A joint MIT CSAIL and the MIT Sloan School of Management Course begins October 4.

### [Artificial Intelligence: Implications for Business Strategy](#)

A joint MIT CSAIL and MIT Sloan School of Management Course begins October 4 and November 22.

### [Making AI Work: Machine Intelligence for Business and Society](#)

A joint MIT Sloan & Schwarzman College of Computing Executive and Professional Course begins November 15.

### [Unsupervised Machine Learning: Unlocking the Potential of Data](#)

A joint MIT Sloan & Schwarzman College of Computing Executive and Professional Course begins  
November 15.