

YEAR IN REVIEW | 2023



**MIDAS**

**MICHIGAN INSTITUTE  
FOR DATA SCIENCE  
UNIVERSITY OF MICHIGAN**

*MIDAS Annual Report*

Reflecting on the rapid developments and major strides in Artificial Intelligence (AI) in 2023 alone, it's clear that we are entering a new chapter of research potential and human ingenuity across every sector, from groundbreaking discoveries on nanoparticles to navigating deep space, and everything in between. At the Michigan Institute for Data Science (MIDAS), we are committed to enabling our researchers to stay at the forefront of data science and AI innovation, catalyzing transformative use and guiding future directions in research for broad, societal benefit.

We achieve this through our network of 530 affiliate faculty across the University; they are a vibrant community of world-class researchers, who are leaders in data science and AI and develop tools, methodologies, and applications across a wide variety of domains. I'm proud that MIDAS has been able to support them in multiple ways, funding more than 75 pilot research projects and receiving more than \$215M in external support since the institute's inception. I encourage you to [read about](#) the many research successes of our affiliates. Additionally, our community continues to expand with our two training programs, the Eric and Wendy Schmidt AI in Science Postdoctoral Fellows and the Michigan Data Science Fellows, a group of 25 outstanding early-career researchers who are enabling and accelerating research innovation by incorporating data science and AI techniques into their respective fields.

In 2023, MIDAS has focused on helping researchers adopt rapidly emerging technologies, including generative AI, via developing tools, providing training, and facilitating interdisciplinary research collaboration. Responsible and ethical data and AI also remains a key area of focus; much of MIDAS' programming in 2023 examined data science and AI through the lens of ethics, rigor and reproducibility, social justice and equity, and related themes. In September, we received \$2.3M from the National Institutes of Health to develop a national training program in biomedical research with these focus areas.

Data science and AI lie at the core of MIDAS' efforts, and our team will continue to support cutting-edge research. I'd like to offer sincere gratitude to all MIDAS affiliate faculty, staff, students, and external partners in industry, academia, government, and nonprofit organizations. With your help, our data-driven work translates into lasting, meaningful impact.

Looking forward to 2024,

H. V. Jagadish,  
MIDAS Director



## MIDAS By The Numbers



**530**

**Affiliate  
Faculty**



**\$219M**

External funding  
secured by research  
teams who received  
MIDAS pilot funding



**76**

**MIDAS Funded  
Research Projects**



**50+**

**Working  
Partnerships**

## Mission

MIDAS strengthens University of Michigan's preeminence in Data Science and Artificial Intelligence, and enables their transformative use in a wide range of research disciplines to achieve lasting societal impact.

## Research Pillars



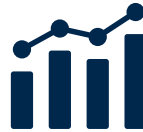
### Responsible Research:

Enhancing the scientific and societal impact of data science and AI through responsible research



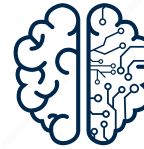
### Data:

Enabling the use of novel data types to measure and understand society.



### Analytics:

Transforming health interventions through the adoption of cutting-edge analytics



### AI:

Catalyzing creative and transformative applications of AI in science and engineering domains



### Emerging Strengths:

Boosting emerging research priorities, such as environmental research

## Research

Support through funding, developing tools and resources for researchers, and encouraging the adoption of new data types, methodologies, and best practices.

## Training

Introducing faculty, postdocs, and researchers to data science, AI, and cutting-edge methodologies.

Two data science and Artificial Intelligence AI postdoctoral training programs. and a graduate certificate program.

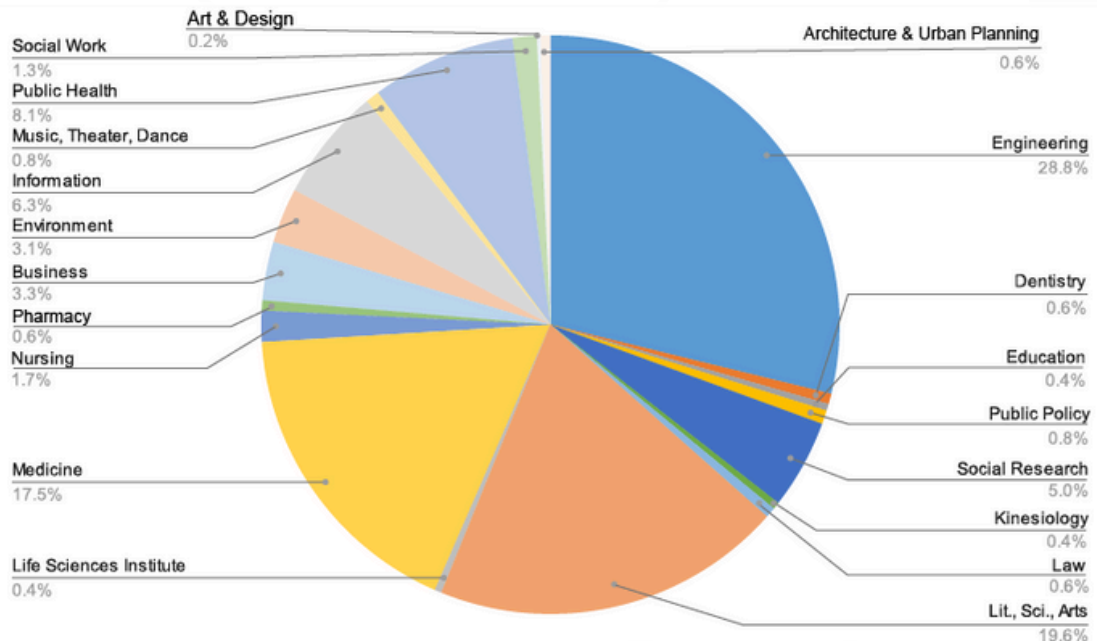
## Collaboration

Fostering interdisciplinary research collaboration with our 530 affiliate faculty and U-M research organizations.

Enabling real-world application of academic research and data- and AI-driven insight in the public and private sectors.

## Research Community

530 MIDAS affiliate faculty members represent all 19 schools and colleges at U-M's Ann Arbor campus, and both the U-M Dearborn and Flint campuses, making MIDAS one of the largest and most scientifically diverse data science institutes at any US university.



# Helping Researchers Adopt Rapidly Emerging Technologies

From academia to industry, generative AI is revolutionizing the landscape of research by enabling unprecedented levels of automation and innovation, and facilitating major breakthroughs across all fields. Through interdisciplinary workshops for faculty, collaborative research roundtables, hands-on tutorials, and events with peer institutions, MIDAS has wholly committed to helping researchers at the University of Michigan seamlessly adopt new technologies such as Generative AI into their research at speed and at scale.

## GenAI Coast-to-Coast Research Discussion Webinar Series

**Fostering a broad community of cross-institutional, interdisciplinary researchers. Building research vision and collaboration.**

Eight prominent speakers from across six institutions, including the University of Michigan, Johns Hopkins University, the Ohio State University, Rice University, the International Computer Science Institute, an Affiliated Institute of University of California, Berkeley, and the University of Washington, joined together to discuss Generative AI in research on a specific theme. The series covered topics including the transformation of medicine and global health metrics by AI and LLMs, cutting-edge technologies and methods that are helping researchers generate new drug structures and peptide sequences, information integrity and the need for thoughtful reflection on AI regulations, the effects of Generative AI on elections, and the importance of moving beyond the one-size fits-all approach to generative AI.

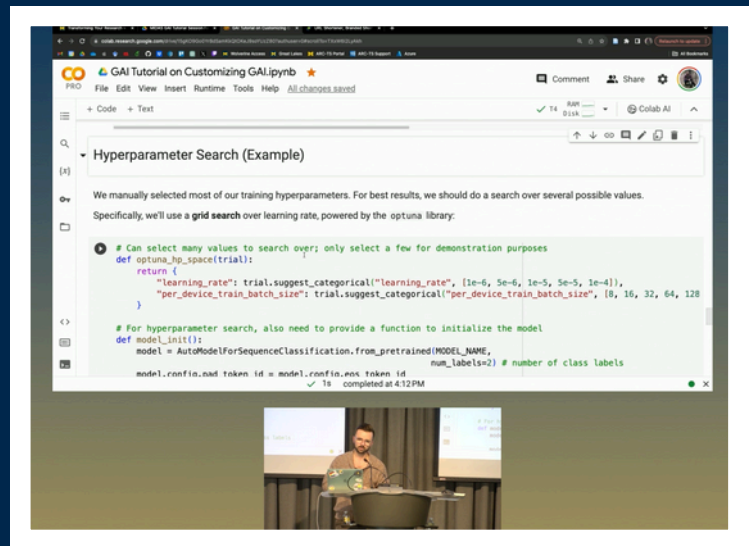
[View the webinars](#)



## Transforming Your Research with GenAI Tutorial Series

To equip researchers with the necessary skills to transform their research with generative AI, the Michigan Institute for Data Science and the Michigan AI Laboratory jointly offered a series of tutorials in the Fall of 2023, sessions consisting of lectures and hands-on demonstrations by U-M experts to train researchers in using generative AI for improving research workflows, coding, building custom models and more.

[Explore the tutorials](#) 



**Caption:** Shane Storks (GSRA, CSE, College of Engineering) leads a tutorial on fine-tuning LLMs.

**See also:** “MIDAS, Michigan AI Lab host interactive generative AI workshop” - *The Michigan Daily*

## Generative AI for Research - Faculty Workshop

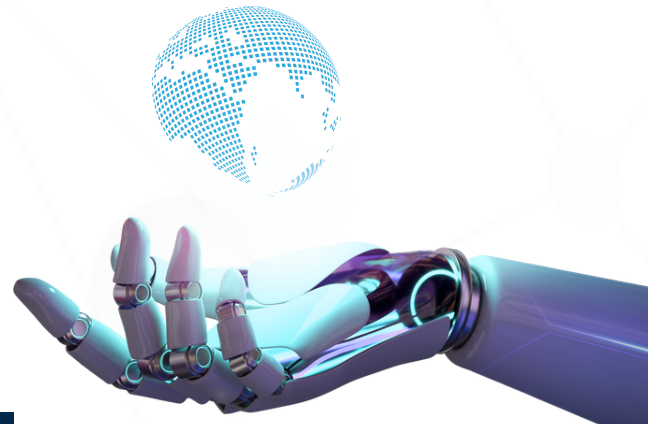
This workshop hosted by MIDAS and the Michigan AI Lab offered a unique launchpad for faculty collaboration and exploration of Generative AI's impact on research. The workshop featured speakers from academia and industry, who presented use cases on GenAI-facilitated research in a wide range of research fields such as drug discovery and architectural design, as well as technical, ethical and infrastructural considerations for deploying Generative AI in research.

 [Read more about the Workshop](#)

## MIDAS Generative AI Resources Hub

Generative AI models, capable of creating novel, diverse, and coherent content, are revolutionizing numerous domains. They've demonstrated their capabilities across the arts, music, chemistry, drug discovery, and much more. The MIDAS Generative AI Resources Hub is being updated frequently with a user's guide and examples of how Generative AI is being used in research and studies developed by U-M researchers.

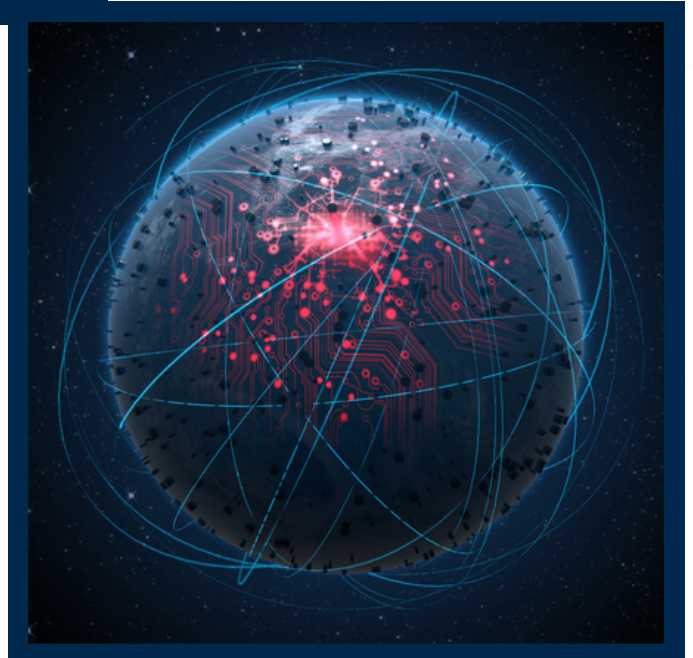
 [Visit the GenAI Resources Hub](#)



## Cutting-Edge Generative AI Development and Use in Research

MIDAS also supports experts who develop the most advanced Generative AI models and enables the use of such models for research breakthroughs. Diffusion models are an emerging, powerful family of Generative AI models. A mini-symposium, co-organized by MIDAS and the Department of Electrical and Computer Engineering, served as a platform to explore the developments, potential, and drawbacks of these models, delving into their applications in scientific and medical fields. Featuring speakers from U-M, University of Texas, Austin, Columbia University, Korea Advanced Institute of Science and Technology, and Google DeepMind.

 [View the presentations](#)



# Promoting Responsible and Ethical Data & AI

As data science and AI become major forces in science and society, so too do issues of bias and equity become major concerns. MIDAS mobilizes researchers to promote ethical data science and AI by developing guiding principles, establishing best practices, improving reproducibility within research, and prioritizing data and AI for social good.

## Future Leaders Summit 2023

The annual Future Leaders Summit (FLS) brings together outstanding graduate students and postdocs from around the US, giving them the opportunity to engage in research discussions and receive career mentoring as they grow to become future research leaders in data science and AI.

As part of the Summit's program, the Responsible Data Science and AI mini-symposium featured presentations on this theme from Summit mentors, which included experts from Microsoft's Office of Responsible AI; the Ohio State University's Translational Data Analytics Institute; and the University of Washington's eScience Institute.

 [See the presentations from the mini-symposium](#)

**See also:** [“Perspectives: Responsible Data Science Gets MIDAS Touch” - Evan Reynolds, PhD](#)



**Caption:** Future Leaders Summit Cohort 2023



**Caption:** FLS mentors lead a session on preparing for the job market in academia and industry.

## MIDAS gets \$2.3M to develop national training program



This September, MIDAS received a grant from the National Institutes of Health to develop a national training program designed to equip faculty and scientists across the United States with the skills necessary to enhance the rigor and reproducibility of biomedical research.

The new Data and AI Intensive Research with Rigor and Reproducibility (DAIR3) program is a collaborative initiative between MIDAS, the College of William and Mary, Jackson State University (a Historically Black University), and University of Texas San Antonio (a Hispanic-Serving Institution). The first round of bootcamps will be offered in the summer of 2024 for 100 attendees, with 50 full scholarships to support trainees from Minority-Serving Institutions, underrepresented demographic groups, and resource-constrained institutions.

[Read more here](#) 

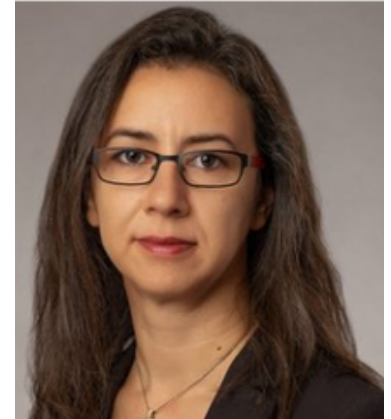
## MIDAS Spotlight: Merve Hickok

Joining MIDAS as Responsible Data and AI advisor, Merve Hickok is a globally renowned expert on AI policy, ethics, and governance. She is collaborating with MIDAS to develop best practices and training for the responsible use of data and AI in academic research, strengthen large U-M grant proposals' responsible data and AI components, and provide insights on AI policy and regulatory priorities to help bridge research with applied work.

Merve is the founder of Alethicist.org; President and Research Director at the Center for AI & Digital Policy; and lecturer at the School of Information.

**Watch:** [“AI Policy in US and EU”](#) - Keynote, 2023 Ethical AI Forum

**Watch:** [“A Conversation on Policy, Ethics, and Generative AI”](#) - GenAI Coast-to-Coast Webinar



Merve Hickok

## Collaboration with Campus Units

AI is rapidly claiming its place in everything we do: it drives cars and fighter planes; it detects cancer in radiological images and black holes in telescope images; it helps government offices decide who gets welfare; it even designs and runs experiments, even faster than scientists are able to.

“Humans constantly grapple with how new technological advances fit into our moral and ethical framework. But the massive amount of data in the world today and how quickly AI is getting more powerful makes this the critical moment for ethical data science and AI.” Says Dr. H. V. Jagadish, MIDAS Director. “We look forward to working with all researchers to tackle this challenge together.”

As a campus-wide organization to support data science and AI research, one focus area of MIDAS is to enable the use of data science and AI to accelerate scientific discovery. For this reason, one of our most pressing priorities this year involved hosting programs and events for units across campus to help highlight the new and exciting opportunities that AI continues to offer, as well as the important questions we need to address in order to make sure we are all using it in a safe and responsible manner.

Read more about our many efforts and collaborations with campus partners, units, and researchers in this [blog post by MIDAS Executive Director Jing Liu](#).

## From Theory to Practice: Building Ethical and Trustworthy AI

AI is rapidly transforming our lives. But do we fully comprehend the real range of potential ethical implications related to its use and regulation? This May, MIDAS partnered with Rocket Companies and the Center for Ethics, Society, and Computing to bring together academics, leaders and scientists in the private sector and policy regulation areas, to share their knowledge and discuss ethical challenges and trends in AI regulation, the trustworthiness of AI, evaluation, biases, and values in machine learning, and more.

AI-Generated image, DALL-E



▶ [View the presentations](#)

**See also:** [“MIDAS hosts forum on ethics in artificial intelligence”](#) - *The Michigan Daily*

# Supporting Research, Training, and Collaboration

## Research Funding: PODS & DATA Grants

### Propelling Original Data Science

The 2023 Round of Propelling Original Data Science (PODS) Grants has awarded funding to nine teams for an array of exciting projects with data science and AI multimodal learning for disease prediction, using video data to study political discourse, text analysis to detect and reduce bias in graduate admissions, and explainable AI for building trust in AI-aided decisions. Since 2016, MIDAS has provided \$12M to 75 research projects, which expanded to 116 follow-up projects with \$125M of external funding.

[Read more about the 2023 PODS Awardees](#)

### **M** | CENTER FOR DATA-DRIVEN DRUG DEVELOPMENT AND TREATMENT ASSESSMENT

The [Center for Data-Driven Drug Development and Treatment Assessment \(DATA\)](#), a unit of MIDAS and a national center sponsored by the NSF's [Industry-University Cooperative Research Center](#) program, awarded funding to its first cohort of research projects in the Spring of 2023. The funded projects employ data science and AI in the design and assessment of clinical treatment through the entire span of pipeline development.

[Read more about the DATA Grants cohort](#)

## Research Working Groups

MIDAS coordinates efforts to bring attention to important research topics across disciplines, fosters interaction between theorists and application scientists, enables innovative ideas and new collaboration, and elevates the quality of data science research across U-M campuses.

In 2023, MIDAS organized two [working groups](#): Sequential Decision Making, and [Social Research with Unstructured Data](#).

## New Postdoctoral Fellows Welcomed

This year we welcomed [two new cohorts of postdoctoral fellows](#). Eleven new fellows joined the Eric and Wendy Schmidt AI in Science Fellowship program in the fall and two new fellows joined the Michigan Data Science Fellowship program.

Both Fellowship programs are components of MIDAS' effort to catalyze the transformative use of Data Science in a wide range of disciplines to achieve lasting societal impact, through research, training, outreach and partnership. The new Fellows will join a close-knit postdoc community with collocated work space at MIDAS and a variety of structured collaborative learning activities.

[Explore the AI in Science and Engineering Annual Symposium](#), organized by the 2022 cohort of Schmidt AI in Science Fellows.

## Summer Academies

Our intensive summer academies equip researchers with the essential skills required to apply advanced data science techniques to their respective fields of study and integrate these methodologies into their grant proposals, while also building a research community that can drive the advancement of data science applications in a wide range of research fields.

During the Summer of 2023, MIDAS hosted three academies with the following research themes:

- [AI In Science and Engineering](#)
- [Biomedical Data Science](#)
- [Environmental Data Science](#)

## Events

### U-M Annual Data Science & AI Summit 2023

The U-M Annual [Data Science and AI Summit 2023](#) was a dynamic, two-day showcase illustrating the breadth and depth of data science and AI research at U-M. With more than 800 attendees, this year's schedule was filled with engaging keynote speakers, research talks, a poster session and much more.

Kicking off the Summit, Dr. Suresh Venkatasubramanian presented on “Responsible AI: from a conference workshop to the White House.” Dr. Venkatasubramanian is the Director for the Center for Technological Responsibility, Reimagination, and Redesign, Data Science Institute at Brown University as well as the Former Assistant Director for Science and Justice, White House Office of Science and Technology Policy.

**See also:** [“8th Annual Data Science and AI Summit looks toward the future of AI and data science research”](#)  
- *The Michigan Daily*



**Captions:** (from upper left, clockwise)  
Dr. Venkatasubramanian; attendees gather for poster session; Dr. Rebecca Cunningham gives opening remarks; attendees take notes during research presentations.

### Data and AI in Society Forum Series

The rapidly changing landscape of data science and AI has permanently altered society, from policy to pedagogy. In 2023, MIDAS introduced a new forum series dedicated to bringing together panels of multi-disciplinary U-M experts to explore the implications and future of data and AI in society.

#### \* [The Impact of AI on the Lives and Rights of Women in the US and the Middle East](#)

Co-organized with the Center for the Education of Women+, Marina Alshawneh and Merve Hickok discussed gender biases in AI algorithms, opportunities and gender inequity in the AI-enabled workforce, and cyber-based violence against women. They also shared their thoughts on how these issues intersect with the political, social, cultural, economic and religious features of different geographic regions.

#### \* [Artificial Intelligence in the Classroom](#)

Our panel of distinguished educators, administrators, and researchers discussed the principles and functionality of large language models like [ChatGPT](#), explored the implications of this new technology, and developed concrete ideas for faculty to adapt AI into a classroom setting.

#### \* [Generative AI, Composition, and Creativity](#)

What happens when we introduce generative AI tools into the creative process? In this panel discussion, a group of experts examined the complex issues that artists and musicians face when using AI to compose music and create art, how AI tools work, and the opportunities and challenges they pose for music and art composition.

# MIDAS Highlights

## Focus: AI-Driven Research Workflows

In November, MIDAS Executive Director Jing Liu was featured in a [Forbes article](#) discussing AI's potential to revolutionize research and scientific discovery.

“By establishing efficient 'research assembly lines,' scientists can liberate their time to think creatively about new research questions that have so far been impossible while AI handles the entire process of designing and executing experiments with unparalleled speed and precision. This development holds great promise for the future of research,” Liu said.

“As one of the world's largest research universities, expertise extends across diverse fields, presenting extensive opportunities to leverage robust AI systems for accelerated research. Encouragingly, an AI-enabled research infrastructure is on the horizon.”

The idea of automated research workflows was at the core of many MIDAS events and presentations this year, including January's colloquium on Automated Research Workflows and October's mini-symposium on AI-driven Research Workflows.

### [Automated Research Workflows Colloquium](#)

A group of national experts presented their vision and work developing and employing ARWs in astronomy, chemical biology and environmental science. In addition, U-M faculty members joined the speakers at a half-day roundtable for intensive discussions, development of future projects and opportunities for future collaboration. [View the presentations](#)

### [AI-driven Research Workflows Mini-symposium](#)

This mini-symposium featured a keynote from Argonne National Lab's Dr. Ian Foster, a pioneer and national leader in advanced computing and AI for scientific discovery. U-M faculty members who have developed and embedded AI-driven components in their research workflows also showcased their ingenious work, forming the basis of faculty roundtable developing plans and collaboration to build AI-driven workflow components.

[View the presentations](#)

## MIDAS Affiliate Faculty Research Highlights

- [‘Dolomite Problem’: 200-year-old geology mystery resolved](#)
- [AI predictive tool holds promise in identifying certain cancers ahead of time, study finds](#)
- [Selective colleges often pick white students over similarly qualified Asian Americans, analysis suggests](#)
- [Africa: transformative change of our relationship with nature - key to saving global biodiversity](#)
- [University of Michigan SEAGULL team wins Alexa Prize SimBot Challenge](#)
- [‘Design me a chair made from petals!': The artists pushing the boundaries of AI](#)
- [Why gorillas are much more resilient than humans](#)

### Grants & Partnerships

- [Sandy Hook Promise, U-M SPH, and NC Dept. of Public Instruction partner on gun violence prevention research](#)
- [\\$7.5 million to predict and communicate flood risk](#)
- [U-M gets \\$9.7M to help forecast harmful space weather](#)
- [U-M receives CDC grant to establish center to help fight disease outbreaks, protect public health](#)
- [U-M center gets \\$5M to study climate change impacts on water](#)
- [U-M to lead \\$30 million complex-particle center](#)

 [Read more about our affiliate faculty's research accomplishments](#)

## MIDAS Leadership



**H.V. Jagadish**  
Director



**Jing Liu**  
Executive Director



**Elizabeth Bruch**  
Associate Director



**Joyce Chai**  
Associate Director



**Kayvan Najarian**  
Associate Director

## MIDAS Team



**Brendon Cho**  
Administrative  
Assistant



**Jennifer Lewis**  
Postdoctoral  
Program Manager



**Kelly Psilidis**  
Faculty Training  
Program Manager



**Ken Reid**  
Data Scientist



**Ben Surgalski**  
Project Manager



**Rachel Sutton**  
Project Manager



**Ivana Tullett**  
Managing Director  
DATA Center



**Beth Uberseder**  
Research Manager

## Winter 2024 Events

**Feb.  
22 - 23** Interdisciplinary Open Science in Social  
& Behavioral Research mini-symposium

**Mar.  
5** Technology Meets Creativity:  
A Workshop on AI & Creative Arts

**Mar.  
18 - 19** AI in Science & Engineering  
Annual Symposium

**Mar.  
21 - 22** Understanding Biodiversity in a  
Changing Planet mini-symposium

**Apr.  
8** Ethical AI Annual Symposium

**Apr.  
29** Health AI Ethics and Policy  
mini-symposium

The mission of the Michigan Institute for Data Science is to strengthen University of Michigan's preeminence in Data Science and to catalyze the transformative use of Data Science in a wide range of disciplines to achieve lasting societal impact.

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