

# Jennifer J. Sun

Appointments	<b>Cornell University</b> , Ithaca, NY. <span style="float: right;"><b>08/2024</b></span> Assistant Professor Department of Computer Science
	<b>Google DeepMind</b> , Los Angeles, CA. <span style="float: right;"><b>08/2023–present</b></span> Research Scientist
Education	<b>California Institute of Technology</b> , Pasadena, CA. <span style="float: right;"><b>09/2017–09/2023</b></span> Doctor of Philosophy in Computing and Mathematical Sciences Advisors: Pietro Perona, Yisong Yue
	<b>University of Toronto</b> , Toronto, Canada. <span style="float: right;"><b>09/2012–06/2017</b></span> Bachelor of Science in Engineering Science (Electrical and Computer Engineering) Minor in Robotics and Mechatronics
Research Interests	My research centers on developing general expert-in-the-loop frameworks to accelerate scientific discovery. I build machine learning and computer vision methods that learn from both symbolic domain knowledge and experimental data. I collaborate closely with scientists across domains, such as behavioral neuroscientists and medical doctors, to integrate my methods in practice.
Honors and Awards	Ben P.C. Chou Doctoral Prize (Caltech). <span style="float: right;"><b>2023</b></span>
	Rising Star in EECS (University of Texas at Austin). <span style="float: right;"><b>2022</b></span>
	Caltech Chen Institute Diversity and Inclusion Award. <span style="float: right;"><b>2022</b></span>
	Amazon AI4Science Fellowship. <span style="float: right;"><b>2022</b></span>
	Rising Star in Data Science (University of Chicago). <span style="float: right;"><b>2021</b></span>
	Best Student Paper Award, Conference on Computer Vision and Pattern Recognition (CVPR). <span style="float: right;"><b>2021</b></span>
	Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarships. <span style="float: right;"><b>2019</b></span>
	Caltech Kortschak Scholar Program. <span style="float: right;"><b>2017</b></span>
	University of Toronto W. S. Wilson Medal for top graduating student in engineering science. <span style="float: right;"><b>2017</b></span>

(\* denotes equal contribution)

**Peer-Reviewed Conference and Journal Publications**

L. Zhao, N. B. Gundavarapu, L. Yuan, H. Zhou, S. Yan, **J. J. Sun**, L. Friedman, R. Qian, T. Weyand, Y. Zhao, R. Hornung, F. Schroff, M. Yang, D. A. Ross, H. Wang, H. Adam, M. Sirotenko, T. Liu, B. Gong, VideoPrism: A foundational visual encoder for video understanding. *International Conference on Machine Learning (ICML)*. 2024.

A. Sehgal, A. Grayeli, **J. J. Sun**, S. Chaudhuri, Cosmos: Neurosymbolic Grounding for Compositional World Models. *International Conference on Learning Representations (ICLR)*. 2024.

**J. J. Sun\***, M. Marks\*, A. Ulmer, D. Chakraborty, B. Geuther, E. Hayes, H. Jia, V. Kumar, S. Oleszko, Z. Partridge, M. Peelman, A. Robie, C. E. Schretter, K. Sheppard, C. Sun, P. Uttarwar, J. M. Wagner, E. Werner, J. Parker, P. Perona, Y. Yue, K. Branson, A. Kennedy. MABe22: A Multi-Species Multi-Task Benchmark for Learned Representations of Behavior. *International Conference on Machine Learning (ICML)*. 2023.

**J. J. Sun\***, P. Karashchuk\*, A. Dravid\*, S. Ryou, S. Fereidooni, J. Tuthill, A. Katsaggelos, B. Brunton, G. Gkioxari, A. Kennedy, Y. Yue, P. Perona. Self-Supervised 3D Keypoint Discovery in Multi-View Videos. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2023.

K. Luxem\*, **J. J. Sun\***, S. P. Bradley, K. Krishnan, T. D. Pereira, E. A. Yttri, J. Zimmermann, M. Laubach, Open-Source Tools for Behavioral Video Analysis: Setup, Methods, and Development. *eLife*. 2023.

E. Zhan\*, **J. J. Sun\***, A. Kennedy, Y. Yue, S. Chaudhuri. Unsupervised Learning of Neurosymbolic Encoders. *Transactions on Machine Learning Research (TMLR)*. 2022.

**J. J. Sun\***, S. Ryou\*, R. Goldshmid, B. Weissbourd, J. Dabiri, D. J. Anderson, A. Kennedy, Y. Yue, P. Perona. Self-Supervised Keypoint Discovery in Behavioral Videos. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2022.

A. Tseng, **J. J. Sun**, Y. Yue. Automatic Synthesis of Diverse Weak Supervision Sources for Behavior Analysis. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2022.

**J. J. Sun**, T. Karigo, D. Chakraborty, S. P. Mohanty, B. Wild, Q. Sun, C. Chen, D. J. Anderson, P. Perona, Y. Yue, A. Kennedy. The Multi-Agent Behavior Dataset: Mouse Dyadic Social Interactions. *In Neural Information Processing Systems (NeurIPS), Datasets and Benchmarks Track*. 2021.

**J. J. Sun**, A. Kennedy, E. Zhan, D. J. Anderson, Y. Yue, P. Perona. Task Programming: Learning Data Efficient Behavior Representations. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2021. **(Oral) Best Student Paper Award.**

L. Zhao, Y. Wang, J. Zhao, L. Yuan, **J. J. Sun**, F. Schroff, H. Adam, X. Peng, D. Metaxas, T. Liu. Learning View-Disentangled Human Pose Representation by Contrastive Cross-View Mutual Information Maximization. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2021. **(Oral)**

T. Liu\*, **J. J. Sun\***, L. Zhao, J. Zhao, L. Yuan, Y. Wang, L.C. Chen, F. Schroff, H. Adam. View-Invariant, Occlusion-Robust Probabilistic Embedding for Human Pose. *International Journal of Computer Vision (IJCV)*. 2021.

C. Segalin, J. Williams, T. Karigo, M. Hui, M. Zelikowsky, **J. J. Sun**, P. Perona, D. J. Anderson, A. Kennedy. The Mouse Action Recognition System (MARS): a software pipeline for automated analysis of social behaviors in mice. *eLife*. 2021.

A. Shah\*, E. Zhan\*, **J. J. Sun**, A. Verma, Y. Yue, S. Chaudhuri. Learning Differentiable Programs with Admissible Neural Heuristics. *In Neural Information Processing Systems (NeurIPS)*. 2020.

**J. J. Sun**, J. Zhao, L.C. Chen, F. Schroff, H. Adam, T. Liu. View-Invariant Probabilistic Embedding for Human Pose. *In Proceedings of the European Conference on Computer Vision (ECCV)*. 2020. **(Spotlight)**

#### **Peer-Reviewed Workshop Publications**

J. Flashner, **J. J. Sun**, D. Ouyang, Y. Yue. Learning Expert-Interpretable Programs for Myocardial Infarction Localization. *AI for Science Workshop at NeurIPS*. 2023.

**J. J. Sun\***, M. Tjandrasuwita\*, A. Sehgal\*, A. Solar-Lezama, S. Chaudhuri, Y. Yue, O. Costilla-Reyes. Neurosymbolic Programming for Science. *AI for Science Workshop at NeurIPS*. 2022.

S. Talukder\*, **J. J. Sun\***, M. Leonard, B. Brunton, Y. Yue. Deep Neural Imputation: A Framework for Recovering Incomplete Brain Recordings. *Learning from Time Series for Health Workshop at NeurIPS*. 2022.

M. Tjandrasuwita, **J. J. Sun**, A. Kennedy, S. Chaudhuri, Y. Yue. Interpreting Expert Annotation Differences in Animal Behavior. *CV4Animals Workshop at CVPR*. 2021.

**J. J. Sun**, T. Liu, G. Prasad. GLA in MediaEval 2018 Emotional Impact of Movies Task. *MediaEval Workshop*. 2018.

## **Patents**

J. Lam, A. Huda, **J. J. Sun**, Image processing method for generating training data. US Patent Number: US10672143B2.

A. M. Rotenstein, A. Bachoo, C. Sutanto, **J. J. Sun**, A. Kelman, Three-dimensional detection and tracking pipeline recommendation using performance prediction. US Patent Number: US20200105001A1

## Invited Talks & Panels

### *Unifying AI Approaches towards Human and Animal Well-being*

- Symposium on Artificial Intelligence in Veterinary Medicine, 2024
- CV4Animal workshop at CVPR, 2024

### *AI for Scientists: Perception & Discovery*

- JAX Short Course on Application of Machine Learning for Automated Quantification of Behavior, 2023

### *The Role of Perception in Simulated Bodies*

- Simulated Bodies: Whole Body Biomechanical Models Conference, 2023

### *Self-Supervised Learning for Behavioral Neuroscience*

- CAJAL Training Course on Machine Learning in Neuroscience, 2023

### *AI for Scientists: Accelerating Discovery through Knowledge, Data & Learning*

- Cornell University Computer Science Seminar, 2023
- Cornell Tech Seminar, 2023
- Microsoft Research Machine Learning Seminar, 2023
- University of Waterloo Computer Science Seminar, 2023
- MIT EECS / Broad Institute Seminar, 2023
- UCSD Cognitive Science Seminar, 2023
- Emory University Computer Science Seminar, 2023
- Georgia Tech Computational Science and Engineering Seminar, 2023
- UCI Computer Science Seminar, 2023
- UCSB Computer Science Seminar, 2023
- Duke Biostatistics and Bioinformatics Seminar, 2023
- Rice Computer Science Seminar, 2023
- University of Toronto Computer Science Seminar, 2023
- Symposium on Frontiers of ML and AI at USC, 2022
- UCSD Halıcıoğlu Data Science Institute Seminar, 2022
- Rising Stars in EECS at UT Austin, 2022
- Neurosym Webinar Series at MIT, 2022
- ML Reading Group at the University of Arizona, 2022
- AI4Life Group at Harvard, 2022

### *AI for Science: Learning from Experts and Data*

- Janelia Computing and Theory Seminar, 2022
- Rising Stars in Data Science at UChicago, 2021
- Vision & ML groups at UChicago/TTIC, 2021
- Cognitive Science Talk Series at MIT, 2021

### *Perception and Modeling of Human and Animal Behavior*

- Disney Research, 2022

### *Machine Learning for Behavior: Methods and Datasets*

- Chicago Sensorimotor Consortium, 2022
- Caltech Chen Building Seminar Series, 2022

*Measuring Social Behavior from Video and Trajectory Data of Interacting Animals*

- o Automatic Behavior Recognition in Rodents Symposium at Measuring Behavior Conference, 2022

*Behavior Quantification: Pose to Actions*

- o Behavior Quantification Symposium at the 8th Annual BRAIN Meeting, 2022

*Neurosymbolic Programming Tutorial Series*

- o Summer school on Neurosymbolic Programming, 2022

*Deep Learning Careers in Academia*

- o Neuromatch Professional Development Session Panel, 2022

## Academic Services

### **Workshop & Tutorial Organization**

The 3rd Workshop on Multi-Agent Behavior: Properties, Computation, and Emergence (MABe). Workshop at CVPR 2023.

Workshop Co-organizer

Neurosymbolic Programming. Tutorial at NeurIPS 2022.

Co-organizer

The 2nd Workshop on Multi-Agent Behavior: Representation, Modeling, Measurement, and Applications (MABe). Workshop at CVPR 2022.

Workshop and Competition Co-organizer

The 1st Workshop on Multi-Agent Behavior: Representation, Modeling, Measurement, and Applications (MABe). Workshop at CVPR 2021.

Workshop and Competition Co-organizer

The 1st Workshop on Affective Understanding in Video (AUVi). Workshop at CVPR 2021.

Workshop and Competition Co-organizer

### **Area Chair**

ICLR 2024

## **Reviewing**

ICLR (*highlighted reviewer in 2022*)

NeurIPS

NeurIPS Datasets and Benchmarks

CVPR

ICML

ECCV

Artificial Intelligence Journal

IEEE Transactions on Geoscience and Remote Sensing

Nature Communications

International Journal of Computer Vision

## **Teaching Experience**

Summer School on Machine Learning in Neuroscience, **07/2023–07/2023**  
*Instructor.*

Designed a lecture and hands-on notebook for unsupervised and self-supervised learning for a group of students at the CAJAL Machine Learning in Neuroscience course.

Summer School on Neurosymbolic Programming, **07/2022–07/2022**  
*Co-Instructor.*

Designed a tutorial on neurosymbolic programming for behavior analysis and led hands-on exercises for a group of graduate students in computer science.

Caltech CS159 Representation Learning for Science, **03/2022–06/2022**  
*Head Teaching Assistant.*

Co-designed a machine learning course with a focus on representation learning in real-world scientific applications, and mentored multiple student projects end-to-end.

Computing and Mathematical Sciences Department, **09/2019–06/2021**  
*Teaching Fellow.*

Mentored teaching assistants (TAs) in the department on effective and inclusive teaching, managed feedback between department and TAs, and designed teaching workshops.

Caltech CMS144 Networks: Structures and Economics, **01/2019–04/2019**  
*Head Teaching Assistant.*

Coordinated a group of teaching assistants to support students in the course, designed assignments, and hosted office hours.

Computing and Mathematical Sciences Department, **09/2018–04/2019**  
*Preliminary Exam Prep Lead.*

Mentored students on the preliminary exam process at Caltech and organized practice problems and discussions.

## Professional Experience

- Google DeepMind, *Venice, CA.* **08/2023–present**  
Research Scientist  
Developing methods for video understanding.
- Google Research, *Venice, CA.* **06/2019–12/2019**  
Mobile Vision Team, Research Intern  
Developed a method for view-invariant probabilistic embedding of 2D poses (ECCV 2020 Spotlight)
- Google Research, *Venice, CA.* **06/2018–09/2018**  
Mobile Vision Team, Research Intern  
Built a dataset and model for affective video analysis (led to the Affective Understanding in Video workshop at CVPR 2021)
- University of Toronto, *Toronto, Canada.* **09/2016–04/2017**  
Institute for Aerospace Studies, Undergraduate Thesis Student  
Studied and developed methods to enable human-robot shared control of a mobile manipulator (mentor: Prof. Jonathan Kelly, STARS Lab).
- Epson Research and Development, *Markham, Canada.* **05/2015–08/2016**  
Robotics and AR Teams, Algorithm Research Intern  
Developed algorithm prototypes for integration into augmented reality systems (led to two US patents).
- ETH Zurich, *Zurich, Switzerland.* **05/2014–08/2014**  
Institute for Dynamic Systems and Control, Summer Research Student  
Worked on time-of-flight based localization algorithms for ultra-wideband radios.
- University of Hamburg, *Hamburg, Germany.* **05/2013–08/2013**  
Center for Free-Electron Laser Science, Summer Research Student  
Profiled laser-generated plumes on water using interferometry.