Assistant Professor
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Jason Pacheco

Machine Learning: Graphical Models, Approximate Inference, Information Planning
Signal Processing: Nonlinear Dynamical Systems, Image/Video Analysis, Motion/Tracking
Applications: Protein Structure, Gene Interaction Discovery, Articulated Object Tracking

Education

Doctor of Philosophy, Brown University — Spring 2016
Computer Science
Thesis: *Variational Approximations with Diverse Applications*
Supervisor: Erik Sudderth

Master of Science, Brown University — Spring 2007
Computer Science
Thesis: *Temporal Decomposition for Online Multisensor Multitarget Tracking*
Supervisor: Meinolf Sellmann

Bachelor of Science, University of Massachusetts Dartmouth — Spring 2003
Computer Science

Work Experience

University of Arizona, Computer Science *Assistant Professor*	Tucson, AZ	Aug. 2019 - Present
Massachusetts Institute of Technology *Postdoctoral Associate*	Cambridge, MA	Dec. 2016 - Aug. 2019
Naval Undersea Warfare Center *Research Scientist*	Newport, RI	Sep. 2012 - Dec. 2016
Brown University, Computer Science *Graduate Research Assistant*	Providence, RI	Sep. 2010 - May 2016
Naval Undersea Warfare Center *Software Engineer*	Newport, RI	Jun. 2003 - Sep. 2012

Awards

Air Force Office of Scientific Research (AFOSR) Young Investigator Program (YIP)	2023
Diversity, Equity and Inclusion Award, UA Dept. of Computer Science	2022
Brown University Dept. of Computer Science Dissertation Fellowship	2015
Naval Undersea Warfare Center Fellowship	2014
Naval Undersea Warfare Center Fellowship	2007

Professional Service

Departmental Service

Diversity, Equity and Inclusion Chair	UACS	Fall 2022
Department Head Search	UACS	Fall 2022
Graduate Admissions Committee Member	UACS	2022, 2024-2025
Diversity, Equity and Inclusion Committee Member	UACS	Fall 2021 - Spring 2022
Graduate Admissions Committee Member	UACS	Spring, 2021
Faculty Recruiting Committee Member	UACS	Spring, 2020

Conference Program Committee Member

Co-Organizer : Women in Data Science (WiDS) Tucson	2020-2023
Co-Organizer : International Conference on Data Mining (ICDM) Workshop on Machine Learning for Cybersecurity (MLC)	2023-2024
Area Chair : International Conf. on Machine Learning (ICML)	2025
Area Chair : International Conf. on Artificial Intelligence and Statistics (AISTATS)	2024-2025
Reviewer : Advances in Neural Information Processing Systems (NeurIPS)	2019 - present
Reviewer : International Conf. on Machine Learning (ICML)	2019 - present
Reviewer : International Conf. on Artificial Intelligence and Statistics (AISTATS)	2019 - present
Reviewer : Association of Advances in Artificial Intelligence (AAAI)	2023
Reviewer : International Conf. on Learning Representations (ICLR)	2024-2025

Publications

* Indicates work done substantially as a graduate student.

° Indicates graduate student advisee or postdoctoral mentee.

Conference Publications

[C16] A. Chin, °J. Callahan, J. Pacheco, T. Catanach. "Reverse-Annealed Sequential Monte Carlo for Efficient Bayesian Optimal Experiment Design." *Advances in Neural Information Processing Systems (NeurIPS)*, 2025.

[C15] °A. Granados, R. Ebrahimi, J. Pacheco. "Risk-Sensitive Variational Actor-Critic: A Model-Based Approach." *International Conference on Learning Representations (ICLR)*, 2025.

[C14] °C. Dahlke and J. Pacheco. "Flow-based Variational Mutual Information: Fast and Flexible Approximations." *International Conference on Learning Representations (ICLR)*, 2025.

[C13] J. Birrell, R. Ebrahimi, R. Behnia, J. Pacheco. "Differentially Private Stochastic Gradient Descent with Fixed-Size Minibatches: Tighter RDP Guarantees with or without Replacement." *Advances in Neural Information Processing Systems (NeurIPS)*, 2024.

[C12] °J. Shen and J. Pacheco. "Efficient Variational Sequential Information Control." *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024

[C11] °C. Dahlke and J. Pacheco. "On Convergence of Polynomial Approximations to the Gaussian Mixture Entropy." *Advances in Neural Information Processing Systes (NeurIPS),* 2023

[C10] °C. Dahlke, S. Zheng, J. Pacheco. "Fast Variational Estimation of Mutual Information for Implicit and Explicit Likelihood Models." *International Conference on Artificial Intelligence and Statistics (AISTATS),* 2023

[C9] S. Zheng, D. S. Hayden, J. Pacheco, J. Fisher III. "Sequential Bayesian Experimental Design with Variable Cost Structure." *Advances in Neural Information Processing Systems.* 2020.

[C8] D. S. Hayden, J. Pacheco, J. Fisher III. "Nonparametric Object and Parts Modeling with Lie Group Dynamics." *Conference on Computer Vision and Pattern Recognition.* 2020.

[C7] J. Pacheco and J. Fisher III. "Variational Information Planning for Sequential Decision Making." *International Conference on Artificial Intelligence and Statistics.* 2019.

[C6] S. Zheng, J. Pacheco, J. Fisher III. "A Robust Approach to Sequential Information Theoretic Planning." *International Conference on Machine Learning.* 2018.

[C5] *D. Milstein, J. Pacheco, L. Hochberg, J. Simeral, B. Jarosiewicz, E. Sudderth. "Multiscale Semi-Markov Dynamics for Intracortical Brain-Computer Interfaces." *Advances in Neural Information Processing Systems.* 2017.

[C4] *J. Pacheco and E. B. Sudderth. "Proteins, Particles, and Pseudo-Max-Marginals: A Submodular Approach." *International Conference on Machine Learning.* 2015.

[C3] *J. Pacheco, S. Zuffi, M. J. Black and E. B. Sudderth. "Preserving Modes and Messages via Diverse Particle Selection." *International Conference on Machine Learning.* 2014.

[C2] *J. Pacheco and E. B. Sudderth. "Minimization of continuous Bethe approximations: A positive variation." *Advances in Neural Information Processing Systems.* 2012.

[C1] *J. Pacheco and E. Sudderth. "Improved variational inference for tracking in clutter." *IEEE Statistical Signal Processing.* 2012.

Journal Articles

[J5] R. Ebrahimi, J. Pacheco, J. Hu, H. Chen. "Learning Contextualized Action Representations in Sequential Decision Making for Adversarial Malware Optimization." *IEEE Transactions on Dependable and Secure Computing (TDSC)*, 2024.

[J4] R. Ebrahimi, Y. Chai, W. Li, J. Pacheco, H. Chen. "RADAR: A Framework for Developing Adversarially Robust Cyber Defense AI Agents with Deep Reinforcement Learning." *Management Information Systems Quarterly (MISQ)*, 2024

[J3] X. Chen, H. Wang, A. Razi, B. Russon, J. Pacheco, J. Roberts, J. Wishart, L. Head, °A. Granados. "Network-level Safety Metrics for Overall Traffic Safety Assessment: A Case Study'." *IEEE Access,* 2023

[J2] S. J. Lee, D. Suri, P. Somani, C. L. Dean, J. Pacheco, R. Stoner, I. Perez-Arriaga, J. W. Fisher III, J. Taneja. "How Probabilistic Electricity Demand Forecasts can Expedite Universal Access to Clean and Reliable Electricity." *J. Energy for Economic Growth*, 2021

[J1] J. Belden, M. M. Mansoor, A. Hellum, S. R. Rahman, A. Meyer, C. Pease, J. Pacheco, S. Koziol and T. T. Truscott. "How vision governs the collective behaviour of dense cycling pelotons." *Journal of the Royal Society Interface.* 2019.

Workshop Papers and Technical Reports

[W5] °J. Shen and J. Pacheco. "Efficient Variational Sequential Information Control." *NeurIPS Workshop on Adaptive Experimental Design and Active Learning in the Real World,* 2023

[W4] R. Behnia, M. Ebrahimi, J. Pacheco, B. Padmanabhan "EW-Tune: A Framework for Privately Fine-Tuning Large Language Models with Differential Privacy." *International Conference on Data Mining (ICDM) Workshop on Machine Learning for Cybersecurity (MLC)*, 2022

[W3] E. Mohammadreza, J. Pacheco, W. Li, J. Lee Hu, H. Chen. "Binary Black-Box Attacks Against Static Malware Detectors with Reinforcement Learning in Discrete Action Space."

IEEE S&P Deep Learning and Security Workshop, May 2021.

[W2] C. L. Dean, S. J. Lee, J. Pacheco, J. W. Fisher III. "Lightweight Data Fusion with Conjugate Mappings." *arXiv.* 2020

[W1] *R. Kothapa, J. Pacheco and E. B. Sudderth. "Max-product particle Belief Propagation." *Brown University Technical Report.* 2011.

Invited Talks

Bayesian Optimal Experimental Design

Society for Industrial and Applied Mathematics (SIAM), Computational Science and Engineering (CSE)	Spring 2025
University of Arizona, Engineering	Fall 2024
University of Arizona, Dept. of Mathematics	Fall 2019
University of Arizona, TRIPODS Seminar	Fall 2019

Probabilistic Reasoning in Complex Systems: Algorithms and Applications

UA, Data Science Institute	Oct. 2022
MIT, Computer Science and Artificial Intelligence Lab	Feb. 2019
Dartmouth College, School of Engineering	Feb. 2019
Purdue University, Dept. of Computer Science	Mar. 2019
University of Arizona, Dept. of Computer Science	Mar. 2019
University of Pittsburgh, School of Information Science	Apr. 2019

Robust Information Theoretic Planning

MIT, Consortium for Verification Technology Project Review	Sep. 2017
ExxonMobil Headquarters, Houston TX	Jun. 2017

Diverse Particle Max-Product

UA, Dept. of Management Information Systems	Fall 2021
MIT CSAIL, John Fisher III Laboratory	Jun. 2016
McGill University, Kaleem Sidiqqi Laboratory	May. 2016
Naval Undersea Warfare Center, Division Newport RI	Apr. 2016
Brown University, Guest Lecture: Probabilistic Graphical Models	Mar. 2016
Virginia Tech, Dhruv Batra Laboratory	Feb. 2016
Naval Undersea Warfare Center, Division Newport RI	Apr. 2015
International Conf. on Machine Learning	Jul. 2015
International Conf. on Machine Learning	Jul. 2014
Brown University, Division of Applied Mathematics	Apr. 2014

Tutorial: Graphical Models, Variational Inference, and Message Passing

Naval Undersea Warfare Center, Division Newport RI	Feb. 2012

Research Grants and Funding

External Funding

Robust Maximum Entropy Planning, Learning, and Control in Uncertain Environments
Air Force Office of Scientific Research (AFOSR) Young Investigator Program (YIP)
Principal Investigator, March. 2022 to March. 2025
Total Budget: $422,611, Direct Costs: $294,242, Indirect Costs: $128,369

Inference Methods for use with Simulation Models - 3D Material Simulation Models
Department of Energy (DOE) subcontract : Mission Support and Test Services (MSTS)
Principal Investigator, Jan. 2024 to Dec. 2024

Total Budget: $38,495, Direct Costs: $27,472, Indirect Costs: $11,023

Development of Inference Capabilities for 1D and 3D Material Simulation Models
Department of Energy (DOE) subcontract : Mission Support and Test Services (MSTS)
Principal Investigator, Jul. 2023 to Dec. 2023
Total Budget: $37,126, Direct Costs: $26,403, Indirect Costs: $10,723

Estimation of Stochastic Surface and Region Growth from Temporally Sparse and Spatially Dense Geophysical Data
Department of Energy (DOE) subcontract : Mission Support and Test Services (MSTS)
Principal Investigator, Dec. 2021 to Sep. 2022
Total Budget: $60,000, Direct Costs: $43,033, Indirect Costs: $16,967

IAM: Development and Measurement of Metrics and Data Capture Techniques for ADS-Equipped Vehicle Performance (Phase 2)
Arizona Commerce Authority
PI: Larry Head (UofA), Co-PIs: Jason Pacheco (UofA), Brendan Russo (NAU), Abolfazi Razi: (NAU) , Sep. 2019 to Dec. 2021
Total Budget: $81,062, Direct Costs: $56,169, Indirect Costs: $24,893

Internal Funding

Robust Planning, Learning, and Control with Diverse Particle Approximations
TRIF Eighteenth Mile Seed Grant
Principal Investigator, Jan. 2022 to Jun. 2022
Total Budget: $41,135, Direct Costs: $41,135, Indirect Costs: N/A

Teaching and Advising

University of Arizona

CSC 480 / 580 : Principles of Machine Learning (Fall 2023, Spring 2025)
CSC 380: Principles of Data Science Fall 2021
CSC 535: Introduction to Probabilistic Graphical Models (Fall 2020, Spring 2022, Spring 2023, Fall 2024)
CSC 696H: Advanced Topics in Probabilistic Graphical Models (Fall 2019, Fall 2022, Spring 2024)

Brown University

CSCI 2950-P: Probabilistic Graphical Models (Graduate TA) Spring 2013
CSCI 2950-P: Applied Bayesian Nonparametrics (Graduate TA) Fall 2011
CSCI 1950-F: Introduction to Machine Learning (Graduate TA) Spring 2011

Graduate Supervision

Jake Callahan, *UA, Applied Mathematics, PhD* 2024-Current
Job Placement : (Internship) Sandia National Laboratories

Jianwei "James" Shen, *UA, Computer Science, PhD* 2020-Current

Alonso Granados Baca, *UA, Computer Science, PhD* 2020-Current

Caleb Dahlke, *UA, Applied Mathematics, PhD (completed)* 2020-2024
Job Placement : (Postdoc) University of Michigan

Winston Zeng, *UA, Computer Science, MS (completed)* 2024-2025
Job Placement : PhD at Emory University

Ryan Michael Murphy, *UA, Computer Science, MS (completed)* 2023-2024

Marium Yousuf, *UA, Computer Science, PhD* 2019-2022
Job Placement : (Internship) Argonne National Laboratory

Undergraduate Supervision

Chu Chen, *UA, Computer Science and Mathematics* 2021-2022

Job Placement : (2022 Summer Research Fellowship) Stanford University