Edmond Cunningham

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Education

University of Massachusetts — Amherst, MA
M.S./Ph.D. in Computer Science (Advisors: Madalina Fiterau and Daniel Sheldon) — 2019–Aug 2026

- Thesis: *Orthogonal coordinates for representation learning*

University of Michigan — Ann Arbor, MI
B.S.E in Computer Science with Math Minor, *Magna Cum Laude* — 2013–2016

Experience

University of Massachusetts — Amherst, MA
Graduate Research Assistant, Information Fusion Lab — Sep 2019 – Aug 2026

- Developed thesis research on orthogonal coordinates for representation learning, studying how flow-based generative models and Riemannian metrics encode low-dimensional and disentangled structure in data.
- Produced first-author conference papers at AISTATS and ICML, workshop papers at ICML and ICLR workshops, and a NeurIPS submission.
- Implemented research methods in JAX and released supporting libraries for generative modeling, stochastic processes, and differential geometry.

SRI International — Menlo Park, CA
Computer Science Laboratory - Research Intern — Jun 2021 – Aug 2021

- Led research project on finding principal structure in normalizing flow models.
- Developed theory and algorithms to extract low-dimensional structure from normalizing flow models.
- Intern project resulted in paper that was accepted at ICML 2022.

Garmin — Olathe, KS
Sensors and Algorithms Team / GPS Positioning — Jul 2017 – May 2019

- Used sensor measurements from wrist-mounted watch to develop machine learning models.
- Developed real-time routing and positioning algorithm to build optimal race pace segments.
- Built Python testing framework for C++ algorithms, drastically reducing algorithm development time.

Apple — Cupertino, CA
Apple Watch Team - Software Engineering Intern — May 2016 – Aug 2016

- Developed automated testing framework for Apple Watch software, reducing manual QA effort for the team.
- Implemented features in Objective-C, Swift, and Python for the Apple Watch software platform.

Publications

[1] **E. Cunningham**, *Disentanglement Beyond Generative Models with Riemannian ICA*, Preprint, under review, May 2026. arXiv: 2605.22531.

[2] A. Bhide, A. Gupta, **E. Cunningham**, and J. Domke, "Stacking-Based Weighting for Large Language Bayes in M-Open Settings", in *2nd Workshop on Epistemic Intelligence in Machine Learning at ICML 2026*, 2026.

[3] **E. Cunningham**, *Conformal Coordinate Frames for Disentanglement*, Accepted, ICLR 2026 Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM), 2026.

[4] **E. Cunningham**, A. Cobb, and S. Jha, "Principal Component Flows", in *International Conference on Machine Learning (ICML)*, 2022.

[5] **E. Cunningham** and M. Fiterau, "A Change of Variables Method For Rectangular Matrix-Vector Products", in *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2021.

[6] **E. Cunningham**, R. Zabounidis, A. Agrawal, M. Fiterau, and D. Sheldon, "Normalizing Flows Across Dimensions", in *ICML Workshop on Invertible Neural Networks, Normalizing Flows, and Explicit Likelihood Models*, 2020.

[7] **E. Cunningham**, D. Schlegel, and A. DeOrio, "Explainable Inheritance Pattern Prediction", in *NeurIPS Workshop on Machine Learning for Health (ML4H)*, 2018.

[8] D. Schlegel, **E. Cunningham**, X. Zhang, Y. Abdulhak, A. DeOrio, and T. Jayasundera, *Inheritance Pattern Prediction - An Ophthalmic Model for Digital Pedigree Feature Extraction and Machine Learning*, National Society of Genetic Counselors Conference (NSGC), 2017.

Software

- **local_coordinates**
  Riemannian geometry in JAX with automatic curvature tensors, geodesics, and coordinate transforms.
- **linsdex**
  JAX library for linear SDEs that supports diffusion, flow matching, and state space models.
- **generax**
  Implementation of a wide array of normalizing flow layers and models in JAX.

Skills

- **Research:** Normalizing flows, independent component analysis, diffusion models, flow matching, stochastic optimal control, optimal transport, variational inference, Boltzmann sampling, differential geometry, time series modeling, self-supervised representation learning.
- **Programming:** Python, JAX, PyTorch, NumPy, C++

Scholarships and Awards

- Spaulding-Smith Fellowship 2019–2020, 2024–2025