

AmirHossein Yavari

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EDUCATION

University of Oklahoma Ph.D. Student in Biomedical Engineering *Sep 2024 - Present*
Advisor: Dr. Farnaz Zamani Esfahlani

Sharif University of Technology Bachelor of Science in Mathematics *Sep 2017 - May 2023*

RESEARCH FOCUS

I am interested in developing methods to characterize the latent geometric structures in high-dimensional neural activity, enabling principled comparisons of computational strategies across different brains and models.

MANUSCRIPTS IN PREPARATION

- [1] **A. Yavari**, F. Zamani Esfahlani. "Beyond Activation Alignment: The Geometry of Neural Sensitivity." (*In Preparation*).
- [2] **A. Yavari**, J. Faskowitz, R. Betzel, F. Zamani Esfahlani. "Dynamics of Cortico-Subcortical Interactions in Functional Brain Networks." (*In Preparation*).

CONFERENCE PRESENTATIONS

- [1] **A. Yavari**, J. Faskowitz, R. Betzel, F. Zamani Esfahlani. "Dynamics of Cortico-Subcortical Interactions in Functional Brain Networks." *Society for Neuroscience (SfN) Annual Meeting, San Diego, CA, November 2025*.

RESEARCH EXPERIENCE

Biomedical Engineering Department, University of Oklahoma Graduate Researcher *Sep 2024 – Present*

- **Geometric Model Comparison:** Formulating metrics for analyzing the geometry of learned representations across architectures. Focused on distinguishing behavioral similarity from mechanistic similarity using differential- and information-geometric techniques. Built scalable large-model analysis workflows in **JAX** on TPU.
- **Neural Dynamics & State-Space Modeling:** Applied dynamical systems approaches to large-scale neuroimaging data (HCP).
 - Developed a **state-space clustering framework** to map high-dimensional time series into latent regimes of network integration and segregation.
 - Designed permutation-based null models to isolate the temporal coupling structures.

University of Essex Scientific Collaborator *Sep 2020 – Jun 2021*

- Co-developed classifiers for Potentially Idiomatic Expressions (PIE), focusing on the distributional semantics of idiomatic intent.

SKILLS

Frameworks & Languages: JAX, PyTorch, Python, TensorFlow, R, MATLAB, Git.

Mathematical: Differential Geometry, Stochastic Processes, Graph Theory, Linear Algebra.

HONORS & AWARDS

- **2025** GCoE Graduate Student Travel Award.
- **2025** Third place, American Airlines Operation Research Hackathon.

- **2021** Best Poster Award, Eastern European Machine Learning (EEML) Summer School.

RELEVANT COURSEWORK

Neuroscience: Behavioral Neurobiology, Neurobiology of Disease, Neural Data Science.

Mathematics & CS: Functional Analysis, Real Analysis, Topology, Network Optimization, Probability & Statistics, Theory of Computation.