SHAMANTH KUTHPADI S.

+1(732) · 429 · 3666 ◇ skuthpadi@umass.edu
140 Governors Dr. Amherst, MA 01003
www.shamanthkuthpadi.com

EDUCATION

University of Massachusetts, Amherst *December 2025*
M.S. in Computer Science
CGPA: 3.957

University of Massachusetts, Amherst *December 2024*
B.S. in Computer Science
CGPA: 3.944; Cum Laude

RESEARCH INTERESTS

My research focuses on developing advanced AI systems to deepen our understanding of complex biological processes and drive impactful advancements in healthcare. By leveraging causal learning and inference on multimodal data—including the detailed modeling of biological networks like brain connectomes—I aim to reveal fundamental structures and relationships that can guide more accurate diagnostics and innovative therapeutic approaches.

PUBLICATIONS, MANUSCRIPTS & ACADEMIC WRITINGS

A Smart Electrode-Integrated Cooling Patch for Motion-Robust ECG Monitoring and Real-Time 3D Facial Animation Manuscript, First Author
Advised by Dr. Deepak Ganesan and Dr. Phuc Nguyen *WSSL @ UMass Amherst*

- Designed a cross-modal machine learning framework using a 1D CNN to estimate facial landmarks (via MediaPipe) from time-series data collected from wearable sensors mounted on a VR headset.
- Developed continuous 2D and 3D facial reconstructions across nine emotional states to support expressive avatar animation and sensor-aware interfaces; the 3D pipeline included Blender-based meshing and sculpting to validate real-time and real-world applicability.
- Applied Kalman filtering and affine transformations for temporal smoothing and landmark alignment; converted pixel-space coordinates to millimeter-scale using the inter-canthal distance for anatomical consistency.

Assess-and-Evolve: Scalable Generation of Preference Tuning Data for Alleviating Hallucinations in Medical Summaries Manuscript, First Author
Advised by Dr. Andrew McCallum and Dr. Dung (June) Thai *Mendel AI*

- A zero-shot detect-and-revise framework that identifies hallucinated content and guides a large language model to generate more faithful summaries.
- We demonstrate that preference tuning can effectively leverage refined, hallucination-minimized data to reduce hallucinations while preserving the overall quality of the generated summaries.
- We introduce a hallucination detection model that incorporates a Clinical Data Model (CDM) to capture and reason about complex hallucination patterns.

Modeling & Analyzing Structural Brain Connectomes Academic Writing
Advised by Dr. Cameron Musco *UMass Amherst*

- Modeled structural brain connectomes using spectral graph theory and machine learning in an independent study advised by Prof. Cameron Musco.
- Built classifiers to predict brain hemispheres and cortical regions from graph features, achieving up to 99% accuracy using Laplacian eigenvectors.

- Highlighted the effectiveness of spectral features over traditional centrality measures for brain structure classification.

RESEARCH EXPERIENCE

IOMICS Corporation June 2024 - Present
Machine Learning Research Intern *Boston, MA*

- Causal Learning:
  Evaluated and benchmarked 10+ causal inference tools, providing strategic recommendations for integration in production pipelines. Designed and implemented a full-stack causal effect estimation pipeline for treatment-outcome variable pairs on high-dimensional datasets.

- Kolmogorov Arnold Networks (KANs):
  Investigated Kolmogorov–Arnold Networks (KANs) in both supervised and unsupervised learning contexts by developing a system to log internal parameter evolution under varying hyperparameter configurations; designed shock injection experiments to identify parameters critical for robustness and uncertainty mitigation; compiled results into a structured tabular format to support interpretability and software integration; additionally explored the applicability of KANs for topological pattern recognition tasks in knot theory, aiming to uncover their potential for learning complex mathematical structures.

WSSL @ UMass Amherst January 2025 - Present
Graduate Student Researcher *Amherst, MA*

- Developed a multimodal deep learning pipeline to predict continuous 3D facial landmark motion from 6-channel biosignal data.
- Developed visualization tools to overlay predicted and ground truth 3D landmarks on video frames using Kalman filtering and landmark alignment, enabling qualitative and quantitative model analysis.
- Achieved high-fidelity reconstructions on expressive emotions (e.g., happiness, anger); current work focuses on improving the real-time use case by minimizing latency of predictions.

Mendel AI January 2025 - Present
Student Research Extern - Large Language Models *Amherst, MA*

- Fine-tuned advanced language models (LLaMA, MedGemma) employing DPO/CPO methods, optimizing model training, evaluation, and inference pipelines.
- Developed a dual-agent LLM inference pipeline for enhanced hallucination detection and mitigation.
- Led research efforts by reviewing 50+ academic papers in LLM alignment and clinical NLP, and co-authoring a manuscript.

HIGHLIGHT PROJECTS

IOMICS Causal Pipeline (IoCP) Source Code

- Developed a robust, modular Python pipeline for end-to-end causal inference using DoWhy and multiple causal discovery algorithms (PC, GES, ICALiNGAM), featuring automated multi-algorithm comparison and result export.
- Designed and implemented comprehensive functionalities including causal graph discovery, graph and estimate refutation, causal effect identification and estimation leveraging DoWhy's causal modeling framework and visualization.

KANs-IOMICS Source Code

- Implemented and experimented with Kolmogorov-Arnold Networks (KANs) for tasks such as classification, regression, and unsupervised learning.
- Integrated advanced heuristics for relation extraction and symbolic function discovery to enhance model interpretability.
- Integrated a robust "shock" mechanism to perturb model coefficients during training, enhancing exploration and robustness against local minima.

- Developed comprehensive internal logging, including versioned checkpoints, detailed training histories, and parameter statistics, to ensure experiment reproducibility and facilitate in-depth model analysis.

ACADEMIC SERVICE

Undergraduate Course Assistant (UCA)
COMPSCI 198C: Practicum – Introduction to the C Programming Language

- Provided support to students taking the course and directly collaborating with the instructors to make the course better.

Peer Tutor
UMass Amherst Learning Resource Center (LRC)

- Provided support to undergraduate computer science students in all capacities ranging from freshmen-level courses all the way to grad-level courses.

HONORS & AWARDS

Bay State Scholar's Award UMass Amherst
MS in Computer Science

- Awarded a merit-based scholarship covering 50% of tuition. Selected based on academic excellence and rigor.

Chancellor's Award UMass Amherst
BS in Computer Science

- Merit-based scholarship covering 40% of tuition awarded to high-achieving out-of-state students based on academic excellence.