SHAMANTH KUTHPADI S.

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EDUCATION

University of Massachusetts, Amherst *December 2029*
Ph.D. in Computer Science
Advised by Prof. Deepak Ganesan

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 interests lie in developing end-to-end machine learning pipelines that can be leveraged for impactful advancements in healthcare. The hope is that by doing so, I can help optimize healthcare outcomes and ultimately compute for the common good. I also have a keen interest in designing these ML pipelines in an explainable and interpretable way (whenever possible).

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.