# Aneesh Komanduri

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**CONTACT INFORMATION**

**Cell:** (479) 544-8693
**Email:** akomandu@uark.edu
**Website:** https://akomand.github.io/
**GitHub:** https://github.com/akomand

**RESEARCH INTERESTS**

My research interests generally lie in the areas of causal inference, representation learning, and generative modeling, with applications in trustworthy and robust machine learning. I am also interested in exploring interpretability and control in large-scale pretrained generative models.

**EDUCATION**

**University of Arkansas** — Fayetteville, Arkansas

**Ph.D.**, Computer Science, GPA: 4.0 — **Aug 2021 - May 2026**

- **Advisor:** Dr. Xintao Wu
- **Relevant Courses:** Statistical Methods, Regression Analysis, Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Advanced Information Retrieval, AI Ethics

**B.S.**, Computer Science/Engineering & Applied Mathematics — **Aug 2017 - May 2021**

- Graduated *Summa Cum Laude*

**RESEARCH EXPERIENCE**

**Social Awareness & Intelligent Learning Lab (SAIL)** — Fayetteville, Arkansas

*Graduate Research Assistant* — **Oct 2021 - Present**

- Working at the intersection of causal inference and representation learning using generative models to obtain disentangled causal representations for robust learning in downstream tasks
- Proposed theory and learning frameworks toward identifiable causal representation learning in the label-supervised setting using VAE and flow-based models
- Currently working on counterfactual generation via diffusion-based causal representation learning, applications of causal generative models in fairness-aware learning, and causality in large-scale generative models such as large language models (LLMs)

**Data Science & Artificial Intelligence Lab** — Fayetteville, Arkansas

*Undergraduate Research Assistant* — **Aug 2019 - May 2021**

- Research focused on graph representation learning and using Bayesian methods to account for uncertainty in noisy graph data to improve node classification
- Designed and developed a cyber-argumentation discourse-based platform and utilized natural language processing and knowledge graph-based deep learning models to understand how user opinions change over time

**PEER-REVIEWED PUBLICATIONS**

**Aneesh Komanduri**, Xintao Wu, Yongkai Wu, and Feng Chen. "From Identifiable Causal Representations to Controllable Counterfactual Generation: A Survey on Causal Generative Modeling." *Transactions on Machine Learning Research (TMLR).* 2024.

**Aneesh Komanduri**, Chen Zhao, Feng Chen, and Xintao Wu. "Causal Diffusion Autoencoders: Toward Representation-Enabled Counterfactual Generation via Diffusion Probabilistic Models." *CVPR Workshop on Generative Models for Computer Vision (GCV@CVPR).* 2024.

**Aneesh Komanduri**, Yongkai Wu, Feng Chen, and Xintao Wu. "Learning Causally Disentangled Representations via the Principle of Independent Causal Mechanisms." *Proceedings of the 33rd International Joint Conference on Artificial Intelligence (IJCAI),* 2024.

**Aneesh Komanduri**, Yongkai Wu, Wen Huang, Feng Chen, and Xintao Wu. "SCM-VAE: Learning Identifiable Causal Representations via Structural Knowledge." *2022 IEEE International Conference on Big Data (BigData)*, 2022.

**Aneesh Komanduri** and Justin Zhan, "Neighborhood Random Walk Graph Sampling for Regularized Bayesian Graph Convolutional Neural Networks." *2021 20th IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2021.

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| TEACHING & MENTORSHIP EXPERIENCE | **UNITE, Army Educational Outreach Program (AEOP)** Fayetteville, Arkansas |

**UNITE, Army Educational Outreach Program (AEOP)**      Fayetteville, Arkansas

*Lead Research Mentor* (https://github.com/akomand/AEOP_Research_2021)     **2020, 2021**

- Guided High School students from underrepresented communities with research in data science and machine learning
- Created lesson plans to teach data/text preprocessing, classification/regression, word embeddings, entity extraction, topic modeling, language models, transformers, implementations in Python, deep learning pipeline in PyTorch (including fine-tuning large language models), and applications in sentiment analysis and question answering
- Assisted students in the development of a machine learning research paper and helped students present research to be evaluated by the Department of Defense education initiative
  **Mentored Manuscript:** Kate Pearce, Tiffany Zhan, **Aneesh Komanduri**, Justin Zhan. "A Comparative Study of Transformer-based Language Models on Extractive Question Answering". *arXiv*. 2021.

**University of Arkansas**      Fayetteville, Arkansas

*Teaching Assistant*      **Jan 2020 - Dec 2020**

- **Courses:** CSCE 2004 (Programming Foundations I) and CSCE 3193 (Programming Paradigms)
- Topics include C++ in a UNIX environment, object-oriented programming, web programming, and functional programming
- Taught two lab sections weekly for a total of over 45 computer science & engineering students and held office hours for over 200 students
- Created, debugged, graded, and provided feedback on object-oriented and functional programming assignments (C++/Java/Python) and exams and held office hours for 200+ computer science students

| HONORS AND AWARDS | | |
|---|---|---|
| | Doctoral Academy Fellowship | 2021-2025 |
| | Congressional Letter for STEM Outreach, U.S. House of Representatives | July 2021 |
| | Blanche Bledsoe Rosecrans and Clarence J. Rosecrans Scholarship | 2020-2021 |
| | Lawrence Jesser Toll, Jr. Endowed Scholarship (Dept. of Mathematical Sciences) | 2020-2021 |
| | Silas Hunt Distinguished Scholarship | 2017-2021 |

SERVICE

Reviewer
- Springer International Journal of Data Science and Analytics, 2024
- IEEE International Conference on Machine Learning and Applications, 2024 (PC member)
- ICML Workshop on Structured Probabilistic Inference and Generative Modeling, 2024

Research Mentor for Army Educational Outreach Program (AEOP), 2021

University of Arkansas ACM Student Hackathon Judge, 2023

SKILLS

- Languages: Python, C/C++, Java, Javascript, SQL
- ML Frameworks: PyTorch, Tensorflow, scikit-learn, Pyro

- Technologies: Flask, Django, AWS, Databricks, Postgres, Apache Spark, ReactJS
- Applications: LaTeX, Jupyter Notebook, VSCode, PyCharm, Git, RStudio, MATLAB

<table>
<tr><td>INDUSTRY<br>EXPERIENCE</td><td>**Phillips 66**</td><td>Bartlesville, Oklahoma</td></tr>
<tr><td></td><td>*Digital Security and Cloud Engineering Intern*</td><td>**May 2020 - Aug 2020**</td></tr>
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- Developed infrastructure as code templates with Terraform and built CI/CD pipelines for the creation of resources such as SQL Servers, Blob Storages, Key Vaults, and Firewall rules for Azure Data Factory in a production environment
- Utilized AWS Security Console and Dome9 to keep inventory on cloud instance security group rules for accounts throughout the company and automated the process by creating a Python script to pull data using the Dome9 REST API