Robert A. Frenken

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EDUCATION

The Ohio State University *Columbus, OH*

Ph.D. in Industrial & Systems Engineering *August 2021 – Present*
M.S. in Industrial & Systems Engineering *May 2024*
B.S. in Industrial & Systems Engineering *May 2021*

MS GPA: 3.83 / BS GPA: 3.63

PROFESSIONAL EXPERIENCE

Graduate Research Assistant *2021 – Present*

Ohio State University

Center for Automotive Research (2024 – Present)
- Developing a classification model for distinguishing attack-free and malicious messages within a CAN bus system. This supervised ensemble model combines VGAE and GAT.
- Created a federated learning testing bed configurable to be either centralized or decentralized, with the ability to change dataset, model, graph topology, and aggregation strategy.

Spine Research Institute (2021 – 2024)
- Created multiple supervised and unsupervised machine learning models to classify lower back pain from wearable data of over 1000 participants. The supervised ensemble CNN model achieved 90% accuracy.

Data Science Intern *2020*

Ford Motor Co. | Columbus, OH (Remote)

- Leveraged HPC tools (Spark, Hadoop, HIVE, SQL) and Python to query, merge, and aggregate trip data.
- Developed a decision tree model analyzing the correlation between oil life efficiency and warranty repair rates.

Machine Learning Research Assistant *2020 – 2021*

Ohio State University

- Built web-scraping program to automate extraction of weekly FanDuel player metrics. Conducted clustering and sentiment analysis to inform lineup decisions.

Quality Systems Data Analyst Co-op *2019*

Momentive

Built Python/Excel data pipeline for HVAC metrics, production yields, and machine reliability tracking.

Project Engineering Co-op *2018*

DuPont

Executed 12 capital projects ($1M+ total), averaging 10% under budget. Installed roller lifts, pallet yards, and pumps.

PUBLICATIONS

- **R Frenken**, SG Bhatti, H Zhang, Q Ahmed (2025) "KD-GAT: Combining Knowledge Distillation and Graph Attention Transformer for a Controller Area Network Intrusion Detection System" *IEEE ITSC* (to appear).
- **R Frenken**, SG Bhatti, H Zhang, Q Ahmed (2025) "Multi-Stage Knowledge-Distilled VGAE and GAT for Robust Controller-Area-Network Intrusion Detection" (preprint).

PROJECTS

Ohio Campaign Finance Dashboard   *2026 – Present*

Interactive data visualization platform (ohtransparencymaps.com) exploring political contributions and spending across Ohio legislative districts. Built with D3.js, DuckDB-WASM, and Observable Framework. Features 6 pages with 18+ chart types (choropleths, Sankey diagrams, network graphs), real-time filtering across 28K+ contribution records, and LLM-assisted donor/expenditure classification.

Center for AI Safety (CAIS) 2025 Capstone Project   *2025*

C Leet, **R Frenken**. Tacit Coordination: Coordination without Communication — empirical investigation of LLM behavior in game-theoretic scenarios (prisoner's dilemma, battle-of-the-sexes, duopoly markets).

Mobility Systems Lab Documentation   *2026 – Present*

Creator and maintainer of the lab's technical knowledge base (osu-car-msl.github.io/lab-setup-guide). Onboarding resource covering HPC workflows, PyTorch/PyG setup, SLURM job management, and ML best practices — reducing new student ramp-up time and serving as a persistent reference for the research group.

SKILLS & TRAINING

ML/DL:	PyTorch, PyTorch Geometric, Ray, scikit-learn, Weights & Biases
Data:	DuckDB, Spark, Hadoop, SQL, Pandas, NumPy
Infrastructure:	AWS, Azure, SLURM, Git, Linux
Languages:	Python, Java, SQL, MATLAB, HTML/CSS
Coursework:	High Performance Computing, Nonconvex Optimization, Computer Vision, Human Centered ML, Reinforcement Learning, Data Mining, Machine Learning, Data Structures & Algorithms, Database Design, Linear & Non Linear Programming, Statistics.

SERVICE & MENTORSHIP

Reviewer: ITSC 2025, AAAI 2025

Mentorship:
- Hanqin Zhang — B.S. Computer Science '25, Ohio State · now M.S. Georgia Tech
- Drew Ralston — B.S. Computer Science '28 (expected), Ohio State
- Chunyu Gu — B.S. Mathematics '28 (expected), Ohio State