

Zayan J. Aly

zayanaly2020@gmail.com | 469-450-0230 | Dallas, TX | U.S Citizen

Education

The University of Texas at Arlington

Dec. 2024

Bachelor of Science in Industrial Engineering, Minor in Computer Science

GPA: 3.50/4.00 | Cum Laude

Awards: The Marjorie and Russell Priest Family Endowed Scholarship in Industrial, Manufacturing, and Systems Engineering

Professional Experience

Idaho National Laboratory

Feb. 2025 – Oct. 2025

Machine Learning R&D Intern

Advanced Remote Monitoring for Operational Readiness (ARMOR) ☑

Supervisor: Dr. Jacob Farber

- Diagnosed critical sensor limitation where data compression eliminated key frequency-domain features, recommended hardware upgrades to enable robust anomaly detection.
- Designed a Bayesian optimization framework to tune OC-SVM, Isolation Forest, GMM, and autoencoder models across multiple equipment types and SNR conditions, parallelized on Wind River HPC cluster for nuclear facility deployment
- Built a three-stage evaluation framework for waterbox inspection covering method benchmarking, geometric transformation robustness, and synthetic anomaly generation with validated ground truth
- Benchmarked 7 feature-matching methods and identified SuperPoint+SuperGlue as optimal (2.8x accuracy over baseline), then implemented a GPU-accelerated homography-based change detection pipeline that flags additions, removals, and translations between prior and current drone inspection footage
- Developed a custom SuperPoint training pipeline for commercial deployment and proposed Vision-Language Model integration for next-generation remote monitoring capabilities

UTA Department of IMSE

Aug. 2023 – Dec. 2024

Research Assistant (Paid Role)

Design and Test Smart Fire Watch Cart for Nuclear Power Plants ☑

Supervisor: Dr. Chen Kan

- Designed and tested Smart Fire Watch Cart for nuclear power plants integrating FLIR A70 thermal cameras, AXIS RGB cameras, and environmental sensors; hardware and software commercialized by Vistra Energy to automate fire watch operations costing \$1M+/month manually
- Collaborated with INL to develop a CNN for fire and smoke detection, achieving 99.3% accuracy with a 0.6% missed-fire rate, using custom data augmentation, mixed-precision training, and fine-tuning
- Established secure edge-to-cloud data pipeline using MQTT over SSL and AWS IoT Greengrass, optimizing for real-time incident response
- Accelerated development via rapid prototyping with 3D-printed components and authored technical documentation that streamlined operator training

UTA Department of IMSE

Aug. 2022 – Jul. 2023

Research Assistant

Energy-Smart and Privacy-Preserving Robotic Sensing Toward a New Paradigm of Condition Monitoring and Surveillance ☑

- Designed a two-stage anomaly detection pipeline for 3D printer monitoring: vibration sensors (50Hz triple-axis accelerometer) flag abnormal layers, triggering an AWS autonomous vehicle with LiDAR and stereo cameras to perform targeted visual inspection
- Trained a CNN to classify print defects, achieving 97.7% accuracy distinguishing normal from severely abnormal cases
- Extracted frequency-domain features via FFT from accelerometer data and applied one-class ML models to forecast equipment degradation and calculate MTBF metrics for maintenance planning
- Deployed inference pipeline on NVIDIA Jetson with CUDA acceleration for real-time edge processing

Publications

Aly, Z.J., DeMoor, M., Farber, J. "Automated Waterbox Inspection Using Drone Technologies: M4 Milestone Report." Technical Report M4LW-25IN0603035, Idaho National Laboratory (2025).

Skills

Programming — Python; C/C++; SQL; Java/JavaScript; R; Slurm

ML / CV — PyTorch; TensorFlow; scikit-learn; OpenCV; NumPy; Pandas; Matplotlib/Seaborn; Weights & Biases; Optuna/Hyperopt; SciPy; Pillow/PIL

Robotics & Edge — ROS 2; CUDA; NVIDIA Omniverse; MQTT

Hardware — NVIDIA H100; NVIDIA Jetson AGX Orin; OMRON LD-90 (mobile robot)

Volunteering

Aga Khan Foundation USA

Planned Legacy Giving Program

- Communicated directly with donors to manage contributions for the \$580 million endowment fund, projected to surpass \$1 billion by 2030, with funds supporting poverty alleviation, education, healthcare, and climate resilience initiatives

Washington D.C.