# Afnan Alabdulwahab

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## EDUCATION

Jun 2024 – May 2025 University of Virginia | Charlottesville, VA
**Master of Science in Data Science**
Relevant Coursework: Ethics of Big Data, Bayesian Machine Learning, Deep Learning, Decoding LLMs

Aug 2012 – May 2017 Old Dominion University | Norfolk, VA
**Bachelor of Science in Electrical Engineering, Minor in Applied Mathematics**
**Bachelor of Science in Computer Engineering, Minor in Computer Science**

## PROJECTS

**UVA Capstone: LLM Evaluation Research (Deloitte-Anthropic Collaboration)** | Oct 2024 – May 2025

*AI Safety, Responsible AI, Python, LLMs, NLP, Bias Datasets, RAGAS, promptfoo, DeepEval, TruLens, Empath, Stanford CoreNLP, LLM-as-a-Judge*

- Led bias detection research stream in Deloitte-sponsored capstone project, designing comprehensive evaluation methodology comparing LLM-as-a-Judge frameworks against traditional NLP methods across 8 key metrics including bias, toxicity, and hallucination detection
- Implemented multi-dataset bias evaluation pipeline using WinoBias and CrowS-Pairs datasets to assess gender bias and social bias detection across 9 demographic categories (race, gender, religion, etc.)
- Implemented counterfactual testing framework measuring LLM response consistency when sensitive attributes were altered
- Co-authored research paper and developed interactive leaderboard application providing evidence-based framework selection guidance for responsible AI deployment

**Benchmarking GPU Matrix Operations Optimizations** | Feb 2025 – May 2025

*C++, CUDA, Python, CUTLASS, cuBLAS, CuTe, Tensor Cores, NVIDIA Nsight Systems, GPU Profiling Tools, Optimization, Parallel Programming*

- Implemented and benchmarked CUDA kernels for matrix transpose optimization across NVIDIA RTX 2080 Ti (Turing) and A100 (Ampere) GPUs, exploring opportunities to reduce latency and improve GPU resource utilization for transformer-based models
- Developed multiple custom implementations—including naive baseline, shared memory tiling with padding, swizzled indexing, vectorized memory access using float4 data types, and warp shuffle primitives—and compared performance to optimized libraries (cuBLAS, CUTLASS, CuTe)
- Analyzed performance across matrix sizes (32×32 to 8192×8192), evaluating throughput, memory bandwidth utilization, and access patterns to identify optimal architecture- and dimension-specific optimization strategies

## EXPERIENCE

**Emerson Automation Solutions (Acquired from GE)** | **Charlottesville, VA**

**Senior Software Engineer/Product Owner** | Jan 2022 – Jun 2022

- Acted as individual contributor (IC) and Product Owner of Emerson's PLC programmer (PME), focusing on creating and managing product backlogs, crafting detailed user stories, guiding developers, and delivering production software
- Collaborated with cross-functional teams to define and translate high-level requirements into detailed user stories and actionable plans for complex projects
- Optimized hardware configuration performance through implementing solutions (C++) for power management issues, improving runtime efficiency and reliability
- Enhanced team collaboration and productivity through leadership in Agile processes, backlog refinement, and cross-functional communication

**Senior Software Engineer** | Jun 2021 – Dec 2021

- Led development of support for new family of Emerson's PACSystems Controllers (PLCs) in a large-scale 14-million-line legacy COM-based desktop application (C, C++, C#) used by customers to configure and program Industrial Control Systems
- Provided mentorship, guidance, and pair programming to new team members, contributing to their successful onboarding and growth within the team
- Communicated progress and technical concepts to stakeholders and team leads, improving transparency and alignment

**Firmware Engineer** | Sep 2019 – Jun 2021

- Developed low-level (C/C++) firmware for real-time embedded systems for the PACSystems controllers using WindRiver's VxWorks RTOS
- Collaborated across engineering teams to debug and resolve complex cross-stack firmware issues that spanned multiple system layers

**GE Automation & Controls** | **Charlottesville, VA**

**Software Engineer** | Jan 2018 – Sep 2019

## SKILLS

**Programming Languages:** Python, R, C++, C#, C, SQL, CUDA
**Libraries and Frameworks:** Tidyverse, Pandas, NumPy, Matplotlib, PyTorch, TensorFlow, scikit-learn, HuggingFace Transformers
**Development Tools and Methodologies:** VxWorks RTOS, Git, VS Code, Jupyter Lab, RStudio, CICD, Agile, Scrum, SAFe
**Machine Learning:** Regression, Penalized Regression, Classification, Clustering, Decision Trees, Random Forest, Boosting, Support Vector Machines
**Statistical Analysis:** Resampling Methods, Bayesian Statistics, Probabilistic Programming (Stan/brms), Statistical Modeling, Inferential Statistics
**Large Language Models:** Transformer Models (RoBERTa), Tokenization, Parameter-Efficient Fine-tuning (LoRA)
**AI Safety:** LLM Safety Assessment, Bias and Fairness Evaluation, Safety Guardrails Evaluation, Evaluation Frameworks, Counterfactual Testing