Christopher Francisque

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EDUCATION

University of Pennsylvania — Philadelphia, PA
Master of Computer Science — June 2027
Relevant Coursework: Computing in Python & Java, Discrete Math, Operating Systems, Data Structures & Algorithms

University of Massachusetts Amherst — Amherst, MA
B.S. Mechanical Engineering — June 2024

SKILLS

Languages: Python, C++, MATLAB, Java, SQL, Bash, JavaScript
Frameworks: PyTorch, Transformers, Hugging Face, TensorFlow LoRA, Pandas, NumPy
Tools: Google Cloud Platform, Git, Weights & Biases, AWS, Jupyter, Docker, Linux

EXPERIENCE

Brandeis University — Waltham, MA
Machine Learning Researcher — June 2025 - Present

- Implemented 3 research papers including LoRA and 2025 ICLR mask fine-tuning, achieving 82-90% accuracy while training only 0.037% of parameters
- Developed pruning pipelines using learned binary masks to identify redundant parameters, improving weak models by 4% while discovering negative effects on well-trained models
- Created a gradient tracking system to analyze parameter evolution during training, identified critical embedding layers whose removal caused complete model collapse despite being less than 0.01% of weights
- Built distributed training pipeline across 8 TPU cores handling 110M parameters and 67K samples, solved PyTorch XLA synchronization deadlocks that were causing training failure

Raytheon — Andover, MA
Manufacturing Engineer — June 2022 - June 2025

- Developed Python and C++ scripts to automate analysis of production data, leveraging STL containers and file I/O to extract insights on defect rates, operator trends, and process performance
- Led root cause analysis and implemented corrective actions for a product damage incident, resulting in projected annual cost savings of $60,000
- Programming of PVA Selective Spray, Palomar Die Bonding, Palomar Wire Bonding and Nordson Automated Dispensing System for $100,000+ of cost reductions
- Designed multiple custom fixtures and jigs that reduced process times by 10-30% while improving operator ergonomics
- Led development of standardized training protocol that reduced operator certification time by 25%

Amherst Mobile Car Detailing — Amherst, MA
Founder — Sep 2021 - June 2024

- Generated $40,000 in sales while managing end-to-end service delivery
- Developed and executed an innovative marketing strategy, achieving a CAC of ~$5 and an LTV of ~ $300
- Maintained a profit margin of 80% and ROAS of ~ $66

PROJECTS

Parameter-Efficient Fine-tuning Comparative Study | Code — June 2025 - Present

- Implemented mask fine-tuning (MFT) methodology from 2025 ICLR paper achieving 4.24% accuracy improvement on under-trained models
- Conducted empirical comparison of FFT, LoRA, and MFT methods on BERT-base model to investigate parameter centric learning
- Developed memory-efficient gradient analysis system handling 110M parameters using heap-based storage on local machine
- Implemented checkpointing strategy at multiple epochs to analyze parameter importance across training stages

Aircraft 6 Degree-of-Freedom Simulation | Code — December 2024 - March 2025

- Developed a high-fidelity simulation in C++, using physics-based model and implementing numerical integration for accurate flight dynamics
- Optimized computational performance by leveraging efficient data structures to minimize memory overhead, refining numerical integration for stability, and reducing redundant calculations in aerodynamic and atmospheric models to enhance real-time simulation accuracy
- Integrated data visualization using matplotlibcpp to analyze simulation results and validate against NASA data