

Liam Liu

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HIGHLIGHTS OF QUALIFICATIONS

- **Software and Machine Learning engineer** with experience building cloud-native applications, data platforms, ML pipelines, and applied AI systems across financial and industrial domains.
- Developed **production-oriented software** using Python, Java, TypeScript, FastAPI, REST APIs, SQL, Spark, AWS, Azure, Docker, and Kubernetes.
- Built **end-to-end ML and GenAI systems** spanning Agentic RAG, multimodal models, forecasting, vector retrieval, reranking, explainability, and model deployment.
- Applied **PyTorch, Hugging Face Transformers, scikit-learn, LangGraph, MCP, PEFT/QLoRA, and MLflow** across research and engineering workflows.
- Created **reliable production systems** with automated testing, CI/CD, infrastructure as code, monitoring, LLM evaluation, guardrails, and human review.

EDUCATION

Master of Engineering, Systems and Technology

McMaster University

Jan. 2025 -- Dec. 2026

Hamilton, ON

- **Coursework:** Machine Learning, Deep Learning, Cloud Computing, Web Applications, Optimization, Internet of Things

Bachelor of Engineering, Artificial Intelligence

Zhejiang University of Finance and Economics

Sep. 2020 -- Jun. 2024

China

- **Coursework:** Data Structures and Algorithms, Operating System, Database Systems, Linear Algebra, Probability, Computer Vision

EXPERIENCE

Software Engineer Intern

TD Bank Group, TD CPB

May 2026 -- Aug. 2026

Toronto, ON

- Built **Real-Time Aeroplan Points Balance** for TD EasyWeb's Angular 20 micro-frontend, integrating a live loyalty API across responsive English and French user flows.
- Implemented **reusable TypeScript components, account-grouping logic, API state management, independent error handling, feature-toggle rollback, and Adobe Analytics**.
- Added **unit and integration tests and automated delivery support**, collaborating with design, accessibility, backend, and QE teams through production sign-off.

Data Engineer Intern

TD Bank Group, TD Insurance

Jan. 2026 -- Apr. 2026

Toronto, ON

- Developed reusable **PySpark and Spark SQL data pipelines** for policy, premium, claims, exposure, and customer data in Databricks and Delta Lake.
- Engineered **modular transformations, schema validation, data-quality checks, logging, and automated workflows** for reliable downstream consumption.
- Created **model-ready feature datasets** with leakage-safe labels, temporal validation strategies, versioned data, and feature documentation.
- Supported **ML experimentation and monitoring** through distribution-shift detection, experiment tracking, and reproducible validation workflows.

Machine Learning Engineer Intern

Air Products and Chemicals, Inc.

May 2025 -- Dec. 2025

Hamilton, ON

- Developed **modular Python services and data-processing components** for plant telemetry, electricity prices, production demand, and equipment constraints.
- Containerized **data and inference workflows with Docker and AWS**, adding automated validation, logging, deployment, and model monitoring.
- Built a **forecasting and optimization pipeline** combining operational signals, surrogate regression models, and constrained scenario evaluation.
- Compared **statistical, tree-based, and neural-network approaches** using time-aware validation, sensitivity analysis, MLflow, and SHAP explainability.

PROJECTS

AtlasMind - Multimodal Agentic Research Assistant | Python, PyTorch, LangGraph, RAG, MCP, QLoRA, FastAPI 2026

- Designed **containerized FastAPI services** for document ingestion, vector retrieval, agent execution, evaluation, and monitoring.
- Built **stateful agent orchestration with LangGraph, MCP, and tool calling** for document search, database queries, code execution, and source verification.
- Developed a **multimodal Agentic RAG pipeline** using semantic retrieval, reranking, evidence-grounded generation, and vector databases.
- Adapted an **open-source multimodal model using PEFT and QLoRA** with reproducible experiment tracking.
- Created an **LLM Evaluation Harness** covering faithfulness, citation accuracy, retrieval relevance, tool selection, guardrails, and human review.

DocAgent - AI Document Transformation | Python, FastAPI, RAG, python-docx, DOCX 2026

- Built a **modular Python document-processing pipeline** with deterministic DOCX parsing, typed intermediate representations, validation, and traceable outputs.
- Integrated **semantic retrieval and constrained LLM transformation** while preserving document structure and formatting requirements.
- Added **evaluation workflows for factual consistency, retrieval quality, structural preservation, and human review**.

SCAM-GAN - Unpaired CT-to-MR Image Synthesis | Python, PyTorch, CycleGAN, CBAM, Computer Vision 2023

- Engineered **reusable PyTorch pipelines** for preprocessing, augmentation, model training, checkpointing, evaluation, and experiment reproduction.
- Designed an **attention-augmented CycleGAN** with spatial and channel attention for unpaired CT-to-MR image translation.
- Evaluated **paired and unpaired baselines using MAE, PSNR, SSIM, ablation studies, qualitative inspection, and anatomical error analysis**.

TECHNICAL SKILLS

Languages: Python, Java, TypeScript, JavaScript, SQL, C/C++

Software / Backend: FastAPI, Node.js, Angular, REST APIs, Microservices, PostgreSQL, API Integration, Distributed Systems

Data Engineering: PySpark, Spark SQL, Databricks, Delta Lake, ETL Pipelines, Data Validation, Feature Pipelines

Cloud / DevOps: AWS, Azure, Docker, Kubernetes, Terraform, GitHub Actions, Jenkins, CI/CD, Monitoring

Machine Learning: PyTorch, Hugging Face Transformers, scikit-learn, XGBoost, pandas, NumPy, SHAP, Computer Vision

GenAI / Agentic AI: RAG, Agentic RAG, LangGraph, MCP, Tool Calling, Context Engineering, Vector Databases, Reranking

LLM Optimization & Evaluation: PEFT, LoRA, QLoRA, Quantization, LLM Evaluation Harnesses, Guardrails, Human-in-the-Loop

Engineering Practices: Unit & Integration Testing, Git, Code Review, Logging, Production Debugging, Agile, Linux

Certifications: AWS Certified Cloud Practitioner

PUBLICATIONS

Liu, S. "SCAM-GAN: Generating brain MR images from CT scan data based on CycleGAN combined with attention module." *Journal of Physics: Conference Series*, 2023, 2646, 012018.