

Amin Abbasishahkoo

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Professional Summary

Machine Learning Engineer and AI Researcher with strong hands-on experience building reliable AI systems across academia and industry. Currently at [Ericsson](#), developing AI/GNN models and DRL agents for RF filter design optimization, achieving $\sim 1,000\times$ simulation speedup. As a researcher, developed *TEASMA* and *MetaSel*, frameworks for evaluating the reliability and trustworthiness of DNN and LLM-based systems, and leveraged Vision-Language Models (VLMs) for fault detection. Previously built scalable systems from the ground up as an ML and Software Engineer at early-stage startup (*Giftpals*). Experienced with agentic AI, MLOps, and end-to-end ML pipelines. Driven by curiosity and innovation, continuously seeking to grow and explore new ideas in AI.

Technical Skills

Programming Languages: Python (+10 years), Java, C/C++, PHP, JavaScript, C#, Shell scripting

AI & ML Frameworks: PyTorch, PyTorch Geometric, TensorFlow, NumPy, Pandas, OpenCV, YOLO

DNN and Gen AIs: CNNs, GNNs, RNNs, Reinforcement Learning (DRL), Transformers, Foundation Models (LLMs, VLMs)

Agentic AI tools: LangChain, LangGraph, MCP (Model Context Protocol)

MLOps & Experiment Tracking: MLflow, Gradio, Docker, Postman

Backend & API Development: REST APIs, Flask, FastAPI, Laravel

Databases: MySQL, SQL Server, Redis

CI/CD & Project Management: Git, GitLab CI/CD, JIRA, Agile, Scrum

Cloud & High-Performance Computing: Compute Canada HPC, AWS, SLURM

Simulation & Domain Tools: Ansys HFSS, PyAEDT

Other Skills: Algorithm Design & Optimization, Debugging, Problem-Solving, Distributed Computing, Engineering Trustworthy AI

Professional Experiences

AI Researcher & Developer (Intern)

May 2026 – Present

[Ericsson](#) | Ottawa, ON, CA

- Designed and built a **AI-based surrogate model** that predicts RF cavity filter performance (center frequency, bandwidth) in **milliseconds**—replacing hours-long **Ansys HFSS** 3D electromagnetic simulations—and developed a **reinforcement learning agent** to autonomously optimize filter geometry toward target specifications.
- Achieved $\sim 1,000\times$ **speedup** ($\sim 0.3s$ vs. ~ 5 min per HFSS simulation) with $R^2 > 0.99$, resonator frequency MAE < 5 MHz, and bandwidth MAE < 1.5 MHz.
- Built an **end-to-end pipeline**—from Latin Hypercube Sampling and HFSS data extraction to **GNN** training, **few-shot fine-tuning**, and **RL-based** optimization.
- Curated a dataset of **4,000+** parametric 3D filter designs across **4 topologies** (3-pole cross-coupled, 7-pole, 9-pole) with automated extraction of **S-parameters**, coupling matrices, and resonant frequencies.
- Achieved **few-shot transfer learning** on an unseen 7-pole topology using only **20 labeled samples**, reaching center frequency MAE < 5 MHz ($R^2 > 0.99$) on held-out data.
- Shipped a production-ready **MLOps** workflow with **PyTorch**, **PyTorch Geometric**, **MLflow** for experiment tracking, **Gradio** for interactive prediction UI, **Docker** for deployment, and **Git CI/CD** for automated testing and integration, all orchestrated through a modular CLI.
- Self-taught **Ansys HFSS** electromagnetic simulation and RF cavity filter design from scratch, enabling independent end-to-end research from physics modeling to ML deployment.
- Collaborated directly with the **Antenna & Filter Design Team** to deploy scalable, automated AI workflows into core engineering processes.

Machine Learning Engineer | AI researcher

Jan 2023 – Present

[Nanda Lab](#) | Ottawa, ON, CA

- Led the design and development of **TEASMA**, an **automated AI testing framework** for evaluating the **reliability**, **safety** and **trustworthiness** of **DNN models** before **deployment**.
- Proposed and implemented **MetaSel**, a Learning-based method for selecting test inputs from **unlabeled** data in **fine-tuned models**, **reducing labeling cost** while improving trustworthiness.
- Developing human-understandable fault detection for vision DNN models using **Vision Foundation Models (VFMs/VLMs)** such as **CLIP/SigLIP** and enhancing the explainability of model weaknesses. Proposed a new metric to detect inputs that lead to faults in DNN models.
- Evaluated developed tools on multiple DNN models and **transformers** and **datasets** with different distribution shift, and large-scale datasets (e.g. **ImageNet**). Achieved average **improvements** of **28.46% to 56.18%** over 10 SOTA baselines.

- Trained models on **HPC**, achieving **5x speedup** by parallelizing, reducing runtime from **5 months to 40 days**.
- Collaborated with cross-functional team, presenting insights and progress in regular meetings.
- Published four papers in **top-tier journals** (refer to the end of the resume)

LLM Research Assistant

Jan 2024 – April 2024

University of Ottawa | Ottawa, ON, CA

- Developed an **LLM-driven** solution to automate compliance mapping between software requirements and regulations.
- Applied and compared three techniques: Multi-Label Classification using **BERT**, **Semantic Textual Similarity (STS)** with Sentence Transformers, and **zero-shot/few-shot prompt engineering** using **Gemini LLM**.
- **Fine-tuned** a base model of BERT and MPNet on datasets for classification, and applying **RAG** for contextual enhancement.
- Engineered **few-shot prompts** for **Gemini** achieving up to **88.63% F1-score** with only 20% training data, strong performance in low-resources scenario.

Machine Learning Engineer | Software Engineer

Jan 2021 – Jan 2023

Giftpals | Cupertino, California, US (remote)

- **Led the development** of the core system architecture from scratch, designing **MVC** structure, **database schema**, and backend using **PHP (Laravel)**, **MySQL**, and **FastAPI**.
- Designed and implemented **ETL pipelines**, a personalized **recommendation system**, and ML models for **customer segmentation** and **demand forecasting**.
- Developed web **crawlers** (BeautifulSoup) to collect product data, reviews, and aggregate over **500,000** profiles.
- Designed a high-performance **Redis**-based caching system and managed **CI/CD** pipelines through **GitLab**. Used **JIRA** for agile project management.

Machine Learning Engineer

Jun 2020 - Sep 2021

Arnika | Tehran

- Engineered **end-to-end ML pipelines** in Python, using **TensorFlow** to build DNN models for accurate forecasting in volatile financial markets and boosted model performance by integrating market sentiment analysis.
- Designed a **Reinforcement Learning Agent** for autonomous **Forex trading** and strategy optimization.
- Developed predictive price models using real-time Forex data and automated market data scheduling through **cron jobs**.
- Built **real-time data APIs** and interactive dashboards with **Flask**, **JavaScript**, and **Highcharts**; implemented **WebSocket** connections for live visualization and tested with **Postman**.

Research Assistant | Machine Learning Engineer

Sep 2018 - Sep 2021

Shahid Beheshti University | Tehran

- Developed **Deep Reinforcement Learning (DRL)** models for autonomous soft tissue manipulation in robotic surgery, optimizing tensioning policies to enhance cutting accuracy.
- Trained neural networks using **Trust Region Policy Optimization (TRPO)** to enhance robotic precision.
- Integrated **Evolutionary Algorithms (EA)** with DRL, accelerating convergence and improving precision by 72.2%.
- Designed **high-performance simulation** using **Cython**, **MuJoCo** and **OpenAI Gym** for surgical environments.
- Published two research papers in **top-tier journals**, contributing to AI-driven robotic surgery advancements.

Education

PhD Candidate in Computer Science | University of Ottawa | GPA: 4/4

MSc in Artificial Intelligence | GPA: 4/4

BSc in Computer Engineering | GPA: 3.5/4.0

Selected Academic Projects

- **LLM-Based Machine-Generated Text Detection with Efficient Fine-Tuning:** Designed and implemented an AI-driven system to accurately identify machine-generated text, leveraging advanced **LLMs** (Microsoft MPNet, DeBERTa, Mistral) with **LoRA** for efficient **fine-tuning**, achieving an accuracy improvement of up to 4.5% over traditional methods, alongside prompt engineering techniques to optimize classification performance.
- **Deep Research Agent:** Developed an asynchronous **LLM-based agent** using a custom **MCP** server and LangChain/LangGraph to analyze local code repositories and answer questions with precise file and line references.
- **Sentiment Analysis of Reviews:** Developed a **BERT & LSTM-based** NLP model to analyze customer reviews, extracting sentiment polarity and actionable insights to improve user experience and business strategies.

Honors and Awards

Merit Student Scholarship, University of Ottawa, 2023

Ph.D. Admission Scholarship, University of Ottawa, 2023 – Present

International Scholarship, University of Ottawa, 2023 – Present

Ranked **3rd** among all graduate peers in **Artificial Intelligence** (Top M.Sc. Student), 2021

Ranked **64th** out of over **25,000** participants in the **Master of Science in Computer Science** entrance exam, 2018

Publications

1. Abbasishahkoo, A., Dadkhah, M., & Briand, L. (2026). *CAFD: Concept-Aware DNN Fault Detection using VLMs*. arXiv preprint arXiv:2605.24008.
2. Abbasishahkoo, A., Dadkhah, M., & Briand, L. (2026). *A Highly Efficient Diversity-based Input Selection for DNN Improvement Using VLMs*. arXiv preprint arXiv:2601.08024.
3. Abbasishahkoo, A., Dadkhah, M., Briand, L., & Lin, D. (2025). *MetaSel: A Test Selection Approach for Fine-tuned DNN Models*. *IEEE Transactions on Software Engineering*. doi:10.1109/TSE.2025.3612253
4. Abbasishahkoo, A., Dadkhah, M., Briand, L., & Lin, D. (2024). *TEASMA: A Practical Methodology for Test Adequacy Assessment of Deep Neural Networks*. *IEEE Transactions on Software Engineering*. doi:10.1109/TSE.2024.3482984
5. Abbasishahkoo, A., & Abin, A. A. (2023). *Deep Reinforcement Learning in Continuous Action Space for Autonomous Robotic Surgery*. *International Journal of Computer Assisted Radiology and Surgery*, 18(3), 423–431.
6. Abbasishahkoo, A., & Abin, A. A. (2023). *Autonomous Tissue Manipulation via Surgical Robot Using Deep Reinforcement Learning and Evolutionary Algorithm*. *IEEE Transactions on Medical Robotics and Bionics*, 5(1), 30–41.