

Abdelrahman Elewah

📍 Oshawa, Ontario, Canada ✉ :abdelrahman.elewah@gmail.com ☎ 289 939 6665 🔗 elewah.github.io
in [abdelrahman-elewah](#) 🌐 [elewah](#) 🎓 [Google Scholar](#)

Summary

Artificial Intelligence (AI) and Machine Learning Engineer (ML) with over 5 years of experience developing scalable AI and IoT systems. Expertise in LLMs, RAG, and real-time IoT data frameworks. Proven success in designing and implementing innovative solutions that connect AI with practical applications. Skilled in software development, cloud-based platforms, e-commerce systems, and data analytics. Experienced in conducting research and adept at collaborating with cross-functional teams to achieve impactful results.

Technologies

LLM Frameworks & Tools: LangChain - LangGraph - LangSmith - RAG

Programming Languages: Python - C/C++ - JavaScript

Web Technologies: REST APIs - React - HTML - CSS - Bootstrap

Automation Tools: Jenkins - GitLab CI/CD - GitHub Actions Workflow

Cloud & Deployment: AWS EC2 - AWS App Runner - Elastic Container Service - Elastic Beanstalk - CI/CD Pipelines

Database Systems: PostgreSQL - MongoDB - MySQL - NoSQL - SQL - Spark - Hadoop

DevOps Tools: Docker - Docker Compose - Kubernetes - Dev Containers

Development Environments: GitHub - GitLab - VS Code - Anaconda

Experience

Instructional Specialist (part-time), 2U / University of Toronto

Remote
Jan 2023 – Apr 2025

- Contributed to the success of the **University of Toronto** 's online **Data Analytics Boot Camp**, supporting 100+ learners in mastering practical skills for data-driven careers.
- Facilitated hands-on workshops in **Python, Database, Machine Learning, and Data Visualization**, resulting in a **15% increase** in student satisfaction scores.
- Supported the deployment of **real-world capstone projects**, helping learners apply techniques in domains such as **healthcare, HR, and finance**.

Graduate Research Assistant, Ontario Tech University

Oshawa, ON
Jan 2020 – Apr 2025

- Designed the **SensorsConnect** framework, enabling real-time **IoT device interoperability** and scalable data exchange, inspired by the principles of the **World Wide Web**. [Publication](#)
- Developed an **Agentic IoT Search Engine (ASE-IoT)** that integrates **LLMs, RAG**, and autonomous agents to enable **natural language querying** of live IoT data, enhancing search precision and user interaction. [publication](#)
- Co-led an **OVIN-funded project** to develop **autonomous vehicle curriculums** and conduct applied research on **software-defined vehicles (SDVs)** and **digital twins**, contributing to workforce development in emerging mobility technologies.
- Collaborated with **Eagle Aerospace** to prototype an **Aircraft Deceleration Early Warning System**, enhancing runway safety through predictive analytics and early alert mechanisms.

Co-Founder(part-time)Tamra-IoT,

Toronto, ON
May 2019 – Jan 2024

- Architected** secure and scalable **IoT platforms** by integrating **MQTT over TLS**, **cloud infrastructure**, and **mobile control interfaces**, enhancing real-time communication and remote device management.
- Collaborated** on **business management** and strategic planning, contributing to key decisions that optimized resource allocation, improved product direction, supported **mentorship**, and accelerated go-to-market execution.
- Developed a curriculum** to teach **IoT concepts** to high school students, promoting early STEM engagement and empowering the next generation with practical, hands-on IoT experience.
- Designed** and deployed **Over-The-Air (OTA) firmware update mechanisms** and implemented **robust IoT device management systems**, significantly reducing maintenance costs and improving system resilience. [Publication](#)

Education

PhD	Ontario Tech University , Electrical and Computer Engineering	Jan 2020 – Mar 2025
	<ul style="list-style-type: none">• GPA: 4.22/4.3 Link to Transcript issued by Ontario Tech University• Coursework: Real-Time Data For IoT, Communication Networks, Knowledge Discovery & Data Mining, Data Visualizations• Thesis: SensorsConnect: World Wide Web for Internet of Things.	
MSc	Benha University , Electrical Engineering	Feb 2013 – Jan 2018
BSc	Benha University , Electrical Engineering	Sep 2008 – Jun 2012

Projects

Localelive: Agentic Search Engine for Real-Time IoT Data Live Demo	github.com/repo
<ul style="list-style-type: none">• Developed a real-time IoT search engine powered by LLMs and RAG, enabling users to query complex sensor data using natural language, improving query efficiency and decision making.• Implemented a semantic search pipeline using Sentence-BERT and HNSW indexing, reducing query latency by 73% and enhancing relevance in top-k retrieval across diverse IoT datasets.• Managed over 37,000 real-time IoT documents from 500+ service types in MongoDB with geo-indexing, ensuring scalable and location-aware data access for time-sensitive decision-making.• Achieved 92% top-1 accuracy in complex intent detection and information retrieval, surpassing systems like Gemini, and significantly improving user satisfaction and task completion rates.• Applied in real-time urban scenarios—such as locating least-crowded clinics, nearest available parking, and lowest gas prices—demonstrating direct utility for smart city applications.• Technologies: Leveraged LangGraph, Tavily API, OpenRouteService, VectorDB, and Sentence-BERT to build a modular and extensible architecture for dynamic IoT data exploration and retrieval.• Deployed the system in AWS using Docker Compose and Traefik Traefik live dashboard, enabling seamless container orchestration, automated HTTPS provisioning, and scalable reverse proxy management for reliable production-grade deployment.	
Story-to-Movie Recommender Chatbot (RAG-based) Live demo	github.com/repo
<ul style="list-style-type: none">• Developed a retrieval-augmented generation (RAG) system combining vector search with LLMs to deliver context-aware answers, reducing hallucination rates by 30%.• Built a semantic search pipeline, enabling retrievals from 1K+ documents.• Fine-tuned user prompts and applied prompt chaining techniques to improve answer relevance, validated through user feedback and precision metrics.• Leveraged Pandas, OpenAI API, and Tenacity to ensure resilient API usage and robust data handling under real-time loads.	
Apply Lightweight Fine-Tuning to a Foundation Model	github.com/repo
<ul style="list-style-type: none">• Built an end-to-end NLP pipeline using PyTorch and Hugging Face Transformers: loaded a pre-trained GPT-2 model and prepared the AG News dataset for news-topic classification.• Applied parameter-efficient fine-tuning (PEFT) using LoRA adapters to fine-tune GPT-2 while keeping the base model's weights frozen, reducing training time and memory usage by over 60% compared to full fine-tuning.• Achieved a significant improvement: boosted accuracy from 83.16% to 88.95% on the AG News dataset using LoRA-fine-tuning, demonstrating the effectiveness of PEFT in enhancing model performance with minimal compute.	
RadViz-Plotly	github.com/repo
<ul style="list-style-type: none">• Developed RadViz-Plotly, an open-source Python package that generates 2D and 3D Radial Visualization (RadViz) plots for high-dimensional datasets, enabling broader accessibility to dimensionality reduction techniques in research and industry. publication• Enabled data scientists and analysts to explore and interpret complex data distributions interactively using Plotly, significantly improving model explainability and decision-making in analytics workflows.• Facilitated deeper insights into high-dimensional data by revealing hidden clusters, outliers, and trends, increasing user engagement through intuitive visual interfaces.	