MUHAMMAD SALEH ANWAR

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SUMMARY OF SKILLS AND QUALIFICATIONS

- Seasoned Electrical Engineer with over a decade of professional experience spanning Engineering, Data, and AI/ML domains, with a proven track record of deploying business intelligence and data analytics solutions at Ontario Power Generation (OPG).
- Proficient in Python programming, honed through various work and personal projects, alongside mastery in employing libraries and frameworks like Hugging Face (Transformers), LangChain, Scikit-Learn, PyTorch, TensorFlow, Pandas, NumPy, and others for developing and implementing machine learning algorithms, including deep learning and Generative AI solutions leveraging Large Language Models (LLMs) and foundational models.
- Demonstrated expertise in architecting and deploying advanced Generative AI solutions, including the strategic application of Large Language Models (LLMs) and agentic systems to enhance operational efficiency and drive innovation.
- Extensive experience in project and product management through the entire AI Development Lifecycle, leveraging Agile methodologies including Agile Scrum, DevOps, and MLOps for robust model deployment and management, facilitated through tools like Azure DevOps, GitHub, and MLFlow.
- Hands-on experience with Azure's AI platform (including Azure AI Studio, Azure Machine Learning, DataBricks with Unity Catalog) for developing, fine-tuning, pre-training, and deploying scalable AI/ML models and GenAI applications (including agentic systems leveraging function calling), utilizing vector databases where applicable, supplemented by familiarity with data governance tools (e.g., Collibra), other programming languages (C, Java, Perl, Ruby) and SQL/NoSQL databases.
- Adept at crafting interactive dashboards and reports using Microsoft PowerBI for exploratory analytics, enhanced by the application of data engineering techniques for robust data insights.
- Equipped with well-developed verbal and written communication skills, adept at articulating complex ideas, concepts, and issues, showcasing a strong ability to interpret, analyze, and assess intricate scenarios

EDUCATION

PhD, Artificial Intelligence / Engineering Mathematics ***Aug 2025 – Dec 2028 (Planned)***
Dalhousie University, Halifax, Nova Scotia

Master of Science, Artificial Intelligence / Engineering Mathematics ***January 2024 – July 2025***
Dalhousie University, Halifax, Nova Scotia
Cumulative GPA: 4.00 / 4.00

Bachelor of Engineering, Electrical Engineering ***September 2009 – April 2014***
Ryerson University, Toronto, Ontario
Cumulative GPA: 4.19 / 4.33

PUBLICATIONS

- **"Evaluating ChatGPT on Nuclear Domain-Specific Data,"** Canadian Nuclear Society (CNS) Technical Conference, 2024. (Link: https://arxiv.org/abs/2409.00090)

This paper examines ChatGPT's application for Q&A tasks within the nuclear domain, comparing a standalone LLM with a Retrieval Augmented Generation (RAG) approach. Findings highlight improved performance and more accurate, contextually appropriate responses with a RAG pipeline for nuclear-specific queries.

- **"Unlocking the Potential of Large Language Models in the Nuclear Industry using Synthetic Data,"** to be published at the Canadian Nuclear Society (CNS) Technical Conference, 2025.

This work explores leveraging synthetic data generation to transform unstructured text data in the nuclear industry into usable question-answer pairs for LLMs, aiming to enhance information retrieval and decision-making.

- **"Towards Secure and Private Language Models for Nuclear Power Plants,"** to be published at the Canadian Nuclear Society (CNS) Technical Conference, 2025.

This paper introduces a domain-specific LLM for nuclear applications, developed using the publicly accessible Essential CANDU textbook and trained on a single GPU. It demonstrates the feasibility of in-house LLMs that meet stringent cybersecurity and data confidentiality standards, showing early success in generating specialized nuclear vocabulary.

WORK EXPERIENCE

Data and AI ***Artificial Intelligence Lead*** ***May 2023 - Present***
Ontario Power Generation (OPG)

- Lead, mentor, and cultivate innovation within a high-performing AI/ML team, championing Agile/DevOps/MLOps practices and guiding exploration of state-of-the-art techniques (Generative AI, multimodal models).
- Spearhead strategic design and architecture of scalable, high-impact AI solutions (LLMs, deep learning, reinforcement learning) on cloud platforms (Azure, Databricks), ensuring enterprise-level integration via MLOps.
- Development and deployment of agentic AI systems, leveraging LLMs for complex problem-solving and task automation across various business units
- Lead initiatives in fine-tuning and evaluating LLMs for specialized enterprise applications, ensuring optimal performance and alignment with business objectives.
- Champion strategic adoption of emerging AI (Generative AI, reasoning capabilities) for operational efficiency and develop/implement comprehensive standards for responsible AI deployment.
- Establish and enforce a robust Data and AI governance framework, prioritizing data quality, security, privacy, and ethical considerations throughout the AI lifecycle.
- Actively engage with the external AI community, industry forums, and research institutions to translate advancements into actionable strategies.

Digital Innovation & Strategy ***Data and AI Specialist*** ***March 2021 – May 2023***
Ontario Power Generation (OPG)

- Executed end-to-end AI/ML, data, and BI projects using Agile methodologies, managing the full project lifecycle from requirements gathering to solution delivery.
- Engineered scalable Azure data pipelines and developed, trained, and deployed AI/ML models using techniques including NLP, reinforcement learning, and deep learning frameworks (e.g., PyTorch, TensorFlow).
- Applied MLOps practices for effective versioning, testing, and deployment of machine learning models within production environments.
- Developed and deployed advanced semantic search engines/knowledge base chatbots leveraging NLP/foundational models; collaborated with stakeholders on technical specifications for implementation.
- Created compelling PowerBI dashboards and visualizations to deliver actionable, data-driven insights for stakeholder decision-making.
- Drove adoption of new AI/automation tools yielding significant productivity gains (e.g., 4000+ annual hours) and assessed system performance to recommend AI/ML integration opportunities.
- Employed advanced data engineering techniques (cleaning, transformation, feature engineering) for high-quality datasets and integrated UI/UX principles for enhanced application usability.

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Performance Engineering ***Technical Engineer*** ***May 2015 – March 2021***
Ontario Power Generation (OPG)

- Supported electrical systems at Ontario Power Generation Nuclear, Pickering facility as a system engineer, focusing on maintaining equipment performance and reliability through data-driven strategies.
- Extracted and analyzed relevant system data, identifying deficiencies, and evaluating risks, which were communicated to senior leadership for informed decision-making.
- Employed SQL queries and developed workflows to harness data from multiple sources at OPG, streamlining the data gathering process.
- Pinpointed areas for system improvement, crafting corrective action plans and reliability strategies to elevate system performance.
- Developed an automated data trending and analysis tool using Python and PowerBI, enabling effective and efficient monitoring of system parameters and conditions.
- Led the System Health team to identify key system issues and devise data-driven strategies for resolution, enhancing overall system performance and reliability.
- Played a pivotal role in the innovation team at Pickering X-lab, designing and implementing a wireless Battery Monitoring System (BaMS) to foster a culture of continuous innovation.

Standard Cells ***Analog Designer II*** ***May 2014 – May 2015***
Advanced Micro Devices (AMD)

- Implemented a software system for automated quality assurance and compliance checking on electronic circuits, ensuring alignment with foundry design standards, and facilitating data-driven insights into circuit quality.
- Expertly designed electronic circuits, components, and systems using various CAD tools, supporting the production of graphic and computer chips, and embedding analytical frameworks for performance monitoring.
- Conducted thorough investigations into electronic design failures, utilizing data analytics to debug issues and provide critical technical feedback to IP vendors, driving continuous improvement in design quality.
- Executed device simulations and created characterization models to enable physical chip design, leveraging data analytics to optimize design accuracy and performance.