Joud El-Shawa

MACHINE LEARNING RESEARCHER

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EDUCATION

Master of Science September 2024 - April 2026
Computer Science, Vector Institute Collaborative Specialization in AI
Western University

Honors Bachelor of Science September 2019 - April 2024
Specialization in Computer Science
Western University
- Dean's Honor List all years – GPA: 4.0/4.0
- Entrance Scholarship valued at $10 000 for an average of 95%

AWARDS

Canada Graduate Scholar - 2025
Graduate Scholarship-Master's, valued at $27 000

Gold Medal - 2024
Highest standing in the Honours Specialization degree

RBC Scholarship in Data Science - 2021
Merit-based, valued at $25 000

WORK EXPERIENCE

Graduate Researcher
Vector Institute for Artificial Intelligence September 2024 - Present
- Led climate-AI research with an NGO in the Global South to develop a **Graph Neural Network-based early-warning system** that integrates multi-source data to forecast high-risk events such as floods, enabling policymakers to anticipate climate-driven disasters and allocate resources proactively.
- Tech stack: **PyTorch**, PyTorch Geometric (GNNs), Python, GeoPandas, **NetworkX**, NumPy, Pandas.
- Delivered preliminary results accepted to the **NeurIPS 2025** Tackling Climate Change with Machine Learning Workshop and integrated model outputs into a functional dashboard for real-time monitoring.

Research Intern
Vector Institute for Artificial Intelligence May 2024 - August 2024
- Advanced a research project to develop and implement **Recurrent Neural Networks** for the real-time prediction of laboratory test requirements, significantly reducing unnecessary testing and streamlining diagnostic processes.
- Tech Stack: **Keras**, **TensorFlow**, Python, NumPy, Pandas, scikit-learn.

Researcher - Undergraduate Student Research Award
Natural Sciences and Engineering Research Council of Canada (NSERC) May 2023 - August 2023
- Conducted AI research under the supervision of Dr. Yalda Mohsenzadeh to develop and apply **autoencoder neural networks** for unsupervised tumour detection in brain MRI scans, thereby reducing the need for extensive datasets.

Data Scientist
RBC Borealis (Previously RBC DNA) September 2022 - April 2023
- Built end-to-end ML infrastructure, including a **SHAP-based explainability pipeline** to help stakeholders interpret model behaviour and a **custom spaCy NLP model** for brand-resolution, improving trust and usability across RBC.
- Automated multiple manual workflows and enhanced the data preprocessing pipeline with new cleaning rules and functions, significantly reducing team workload and increasing efficiency.

Amplify Data Scientist
Royal Bank of Canada (RBC) May 2022 - August 2022
- Co-developed NOMI Learn, a mobile micro-learning feature for improving youth financial literacy, leveraging user research, data generation pipelines, and early AI-driven personalization to support engagement and drive measurable client value.

Student Researcher
IBM May 2021 - August 2021
- Investigated risk prediction of software system failures and evaluated **machine learning model stability** for software bug prediction as part of the Western University Undergraduate Student Research Internship under the supervision of Dr. Konstantinos Kontogiannis.
- Created a research poster summarizing findings and providing direction on next steps.

PROJECTS

High-Resolution Temperature Forecasting with Graph Neural Networks

NeurIPS Workshop Paper | Poster | Talk

- Developed a **Graph Neural Network framework** for localized, high-resolution temperature forecasting, achieving MAE 1.93°C (1–48 h) and MAE@48h 2.93°C across Southwestern Ontario.
- Demonstrated model scalability and transfer potential for data-limited Global South regions, enabling equitable early-warning systems for heatwaves.
- Accepted and presented at the **NeurIPS 2025** Tackling Climate Change with Machine Learning Workshop.

Hermes: A Modular Multi-Agent System for Structuring Clinical Text

AAAI Proceedings | Poster | Slides

- Designed Hermes, a **multi-agent LLM system** (Hermes-R/G/Q/A) that transforms unstructured clinical text into structured SOAP-style reports and knowledge graphs.
- Integrated **iterative refinement loops** and semantic validation to enhance factual accuracy, coherence, and consistency across generated outputs.
- Accepted and presented (poster + lightning talk) at the **AAAI 2025** SecureAI4Health Symposium.

ML4Labs

AAAI Proceedings | Poster | Slides

- Built a multi-modal deep learning pipeline integrating **Clinical BioBERT embeddings** with **Long Short-Term Memory** (LSTM) models to predict glucose test ordering using GEMINI multi-hospital data.
- Achieved ROC-AUC 0.92, PR-AUC 0.67, and cross-site generalization 0.84 ROC-AUC under leave-one-hospital-out evaluation; improved performance via **temporal recency cue** design.
- Accepted and presented (poster + lightning talk) at the **AAAI 2025** SecureAI4Health Symposium.

SoQuo

- Collaborated in a team of five in the **CIFAR-OSMO AI4Good Lab** to create an application that enhances a user's social media experience by identifying specific content that has the potential to impact their mental health.
- Used **Python's NLP** and **Random Forest** libraries to classify tweets into categories.
- **Won the AI4Good Lab Edmonton Accelerator Award**, which provided the team with additional funding, the opportunity to write an article about SoQuo, and explore different cloud platforms to store our models.

Bank Yeller

- Created an application that allows users to voice chat with an **AI assistant** to get their latest bank account information and be able to pay their bills vocally.
- Used **Natural Language Understanding** with the help of Dasha AI and deployed an **SQL Database** on **Google Cloud Platform** to mimic a bank's database and demonstrate how this would work in everyday life.
- **Won the Best Use of Dasha AI** category at one of Canada's largest annual student-run hackathons (Hack Western 8).

PUBLICATIONS

El-Shawa, J., Bagheri, E., Verma, A., & Mohsenzadeh, Y. (2025). Predicting Glucose Test Ordering in Hospitalized Patients Using Temporal Models of Clinical Context Embeddings. *Proceedings of the AAAI Symposium Series*, 7(1), 501-505. https://doi.org/10.1609/aaaiss.v7i1.36924

Satsangi, A., **El-Shawa, J.**, Devulapalli, U., & Narayan, A. (2025). Hermes: A Modular Multi-Agent System for Structuring Clinical Text. *Proceedings of the AAAI Symposium Series*, 7(1), 584-589. https://doi.org/10.1609/aaaiss.v7i1.36936

El-Shawa, J., Bagheri, E., Kocak, S. A., & Mohsenzadeh, Y. (2025). A Graph Neural Network Approach for Localized and High-Resolution Temperature Forecasting. In *NeurIPS 2025 Tackling Climate Change with Machine Learning Workshop* (non-archival).

EXTRACURRICULARS

Board Director - *Society of Graduate Students (SOGS)* May 2025 - Present

- Oversaw organizational governance and strategic planning, contributing to decisions on budgeting, financial risk, and long-term direction for 6,000+ graduate students.
- Collaborated with board members to review policies, assess legal/financial risks, and strengthen SOGS's ability to meet student needs.

Vice President of Marketing - *Women+ in Technology Society* April 2023 - April 2024

- Led a team of 7 directors in implementing innovative engagement strategies to increase our online following.
- Introduced initiatives to diversify our digital presence, assigning dedicated roles for our podcast, blog, and social media platforms, thereby enhancing our outreach and impact in the tech community.