DONALD MCGILLIVRAY

LEAD APPLIED AI DEVELOPER

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SUMMARY

Innovative Machine Learning Engineer with 6+ years of experience designing, developing, and deploying production ML systems that deliver measurable business impact. Expert in LLM fine-tuning, model evaluation, and streaming feature pipelines, with a proven track record of transforming ambiguous business challenges into actionable ML solutions. Experienced in building and optimising full-stack ML infrastructure for healthcare, fraud detection, and financial services applications. Currently, I lead AI/ML development at Goodlabs Studio, where I have successfully shipped LLM integrations for structured summarisation systems and OCR applications with 99% accuracy. My PhD in Chemistry and my diverse technical background have equipped me with exceptional analytical skills and the ability to operate effectively in highly ambiguous environments. I thrive in collaborative settings where I can drive projects from hypothesis formulation to production deployment—continuously monitoring performance to ensure quality while also identifying opportunities for improvement. I value clear, rapid and effective communication, and learning in the open.

SKILLS

- Analytics
- Problem Solving
- Statistics
- Python
- Machine Learning & AI
- Optimization
- Material Science
- Attention to detail
- Quantum Computing
- Chemistry

RELEVANT WORK EXPERIENCE

Goodlabs Studio

Lead Applied AI Researcher and Developer • 2021 - Present

- *Currently engineering an agentic platform that automates the development of real-time data solutions by generating, compiling, and testing production-grade Kafka Streams applications. directly from developer inputs.*
- *Led development of LLM-powered applications from ideation to production, implementing synthetic data generation, fine-tuning pipelines, and distillation techniques for structured summarisation of doctor–patient conversations.*
- *Built and deployed an OCR and Key Information Extraction (KIE) pipeline for fraud detection, implementing cheque field detection and handwriting recognition using Faster-RCNN and CNN-BiLSTM-CTC. Later fine-tuned large open-source models and integrated multimodal models such as CLIP, InternVL, and QwenVL2.5, achieving 99% accuracy in printed text recognition.*
- *Implemented comprehensive model evaluation frameworks that enabled continuous monitoring, quality assurance, and performance improvement across multiple ML systems, ensuring that models maintained high accuracy in production environments.*
- *Engineered streaming data pipelines for real-time speech recognition and anti-spoofing detection, integrating TitaNet models with Confluent Kafka and Apache Flink to process high-volume audio data with low latency.*
- *Engineered ETL solutions for mainframe data migration to cloud storage, processing terabytes of financial transaction data.*
- *Developed and optimised NLP models (BERT, FLAN-T5) for medical information extraction from unstructured clinical dialogues, achieving 92.7% accuracy while maintaining strict data privacy and security requirements.*
- *Formulated payment and financial transactions as combinatorial optimisation problems and leveraged quantum computing along with MILP solvers to increase liquidity usage by 10% in RTGS systems.*

University of Waterloo

Doctoral Researcher/Technition • 2013 - 2019

This was a working PhD in the Waterloo Advanced Technology Laboratory (WATlab), involving both conventional research and a required technical/teaching role.

- *Led research on conducting polymers for optoelectronic applications, combining experimental and computational analysis to optimize performance. Explored novel polymer/semiconductor heterojunctions, enhancing charge transport efficiency for improved device applications.*
- *Maintained and operated multi-million-dollar scientific instruments, collecting and processing high-volume experimental datasets. Developed custom data acquisition scripts to streamline the collection and preprocessing of spectroscopy and imaging data.*
- *Developed computational models predicting electronic behaviour in polymer/semiconductor junctions, directly improving device performance. Conducted extensive statistical analysis to correlate material properties with experimental results, contributing to the optimization of device fabrication techniques.*
- *Published six peer-reviewed papers, presented findings at international conferences, and trained students in computational and experimental methodologies. Provided hands-on training for graduate students in advanced materials characterisation techniques and data-driven modelling approaches.*

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EDUCATION

PhD. Chemistry
University of Waterloo • 2013–2019

Thesis: Enhanced Conducting Polymer PEDOT:PSS/Silicon Photo Sensors: Optimisation of Thin-Film Properties and Heterojunction Interactions

Masters in Science: Material Science
Ontario Tech University • 2011–2013

Thesis: Synthesis and Characterization of Nanostructured Catalyst for Photovoltaic Applications

Bachelor of Science: Physics, minor Math
Ontario Tech University • 2007–2011

Thesis: Synthesis and Functionalization of Carbon Nanotubes for Purpose of Applicaiton in a Photovoltaic Device

College Graduate Certificate: Big Data Solutions Architecture
Conestoga College • 2020–2021

INDUSTRIAL KNOWLEDGE

Programs/Frameworks
proficient in

- *Python ,*
- *Matlab, R,*
- *SQL, Hadoop, RDBMs, noSQL,*
- *bash, Docker, Git, DVC,*
- *DataBricks, Confluent, Flink*
- *Azure, AWS*
- *Linux OS, Windows Suite.*
- *MILP, SCIP, Monte Carlo,*
- *Qiskt, Dwave Ocean,*

Technical Proficiencies
Knowledge of and experience

- *ML Frameworks: PyTorch, DSPy, LangChain, Hugging Face, LoRA, Atomic-Agents, Sikit-learn*
- *NLP & LLMs: Fine-tuning, multimodal learning, RAG, Planning, Reasoning, embeddings..*
- *Computer Vision: OCR, KIE, OpenCV, scikit-image, document analysis*
- *Data Engineering: ETL, Databricks, Azure Data Factory.*
- *Cloud & Deployment: Docker, cloud-based model serving*

Teaching
- *Physical Chemistry, equilibria and kinetics tutorials (2017-2018) University of Waterloo.*
- *Computational Chemistry, density functional theory, and molecular simulations, and analysis, (2013-2018) University of Waterloo.*
- *Physics I and II tutorials, and substitute lecture (2011-2013) Ontario Tech University*

Languages
- *English*
- *French (read, not write)*

VOLUNTEER EXPERIENCE

GCAT - Board of Directors
May 2025 - Current

Member of the board of directors of Guelph Coalition of Active Transportation

NACHA Quantum Working Group
2023 - Current

Develop educational materials and a roadmap to prepare the payments industry for quantum computing.

Immigration Services Guelph Wellington
2020 - 2024

Lead and facilitate English-language conversation circles for newcomers to Canada.

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CONTRIBUTIONS TO RESEARCH AND DEVLOPMENT

Papers

1. C. McMahon, D. McGillivray, A. Desai, F. Rivadeneyra, J.-P. Lam, T. Lo, D. Marsden, V. Skavysh, Improving the Efficiency of Payments Systems Using Quantum Computing. Preprint accepted in Management Science (2024), DOI: 10.1287/mnsc.2023.4336.
2. R. Rhouma., C. McMahon., D. McGillivray., H. Massood., S. Kanwal., K. Meraj., T. Lo., J.-P. Lam., C. Smith., Leveraging Mobile NER for Real-time Capture of Symptoms, Diagnoses, and Treatments from Clinical Dialogues. Preprint submitted to Artificial Intelligence in Medicine (2024). DOI: 10.1016/j.imu.2024.101519
3. J.P. Thomas., Md. A. Rahman., S. Srivastava, J.S Kang., D. McGillivray., M. AbdEllah., N.F Heinig, K.T Leung., Highly Conducting Hybrid SilverNanowire-Embedded PEDOT:PSS for High-Efficiency Planar-Silicon/Organic Heterojunction Solar Cells. ACS Nano 12 (2018) 9495-9503, DOI: 10.1021/acsnano.8b04848
4. McGillivray, D., Thomas, J., Abdellah, M., Heinig, N., Leung, K, T., Performance Enhancement by Secondary Doping in PEDOT:PSS/Planar-Si Hybrid Solar Cells. ACS Appl. Mater. Interfaces. (2016) 8, 34303-34308, DOI: 10.1021/acsami.6b09704
5. Rahman, A., Rout, S., Thomas, T., McGillivray, D., Leung, K, T., Defect-Rich Dopant-Free ZrO2 Nanostructures with Superior Dilute Ferromagnetic Semiconductor Properties. J. Am. Chem. Soc. (2016) 138, 11896-11906, DOI: 10.1021/jacs.6b06949
6. Abdellah, M., Moghimi, N., Zhang, L., Thomas, J., McGillivray, D., Srivastava, S., Leung, K, T., Plasmonic gold nanoparticles for ZnO-nanotube photoanodes in dye-sensitized solar cell application. Nanoscale. (2016) 8, 1658-1664, DOI:10.1039/C5NR08029K
7. Thomas, J., Srivastava, S., Zhao, L., Abd-Ellah, M., McGillivray, D., Kang, J., Rahman, A., Moghimi, N., Heinig, N., Leung, T. Reversible structural transformation andenhanced performance of PEDOT:PSS-based hybrid solar cells driven by light intensity. ACS Appl. Mater. Interfaces. (2015) 7, 7466-7470, DOI: 10.1021/acsami.5b01252
8. Thomas, J., Zhao, L., McGillivray, D., Leung, T. High-efficiency hybrid solar cells by nanostructural modification in PEDOT:PSS with co-solvent addition. Journal of Materials Chemistry A. (2014) 2, 2383-2389, DOI: 10.1039/C3TA14590E
9. Gupta, S., Saltanov, E., Mokry, S. J., Pioro, I., Trevani, L., McGillivray, D. Developing empirical heat-transfer correlations for supercritical CO2 flowing in vertical bare tubes. Nuclear Engineering and Design. (2013) 261, 116-131, DOI: 10.1016/j.nucengdes.2013.02.048

Recent Conferences Presentations

1. McGillivray D., McMahon C., Improving the Efficiency Of Payments Systems Using Quantum Computing. 21st Bank of Finland Simulator Seminar, Helsinki, Finland(2023).
2. McGillivray D., McMahon C., Lo T,. Quantum Annealing on optimization of Payment Transaction Systems. 21st Qubits 2023, Miami, USA (2023).
3. McGillivray D., McMahon C., Lo T,. Payment Optimization using Quantum Computing. 21st Payments Innovation Alliance Spring Meeting, Minneapolis, USA (2022).
4. McGillivray D., Leung K, T., Thickness, Conductivity and Trasparency of PEDOT:PSS in Hybrid Solar Cells. 99th Canadian Chemistry Conference, Halifax, Nova Scotia(2016) MT3: Materials Chemistry, 0941.
5. McGillivray D., Leung K, T., AFM study of conducting polymers PEDOT:PSS and P3HT for use in Hybrid solar cells. Asylum AFM Conference and Workshop, Montreal, Quebec (2016) Invited speaker.