Drai Paulen Patterson

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Education

Toronto Metropolitan University — Toronto, ON
Master of Science in Computer Science (Thesis) — *Sep. 2024 – Dec. 2026*
- **Thesis Focus:** Model-Based Reinforcement Learning, World Models, and State Space Models (SSMs)
- **GPA:** 4.33/4.33 (Honours) | **NSERC CGS-M** ($27,500) | **TMGF** ($9,000)
- **Coursework:** Deep Learning, Reinforcement Learning, Natural Language Understanding, Planning, Statistics

Toronto Metropolitan University — Toronto, ON
Bachelor of Science in Computer Science (Honours) — *Sep. 2019 – May 2023*
- **GPA:** 4.17/4.33 (Distinction, Dean's List) | **NSERC USRA** ($6,000)
- **Coursework:** Data Mining, Machine Learning, Probability, Linear Algebra, Algorithms

Technical Skills

Languages: Python, C/C++, TypeScript, Java, SQL
Deep Learning: PyTorch, JAX, Transformers, Gymnasium, MuJoCo, WandB
Developer Tools: Docker, SLURM (HPC), Git, Linux, Pandas, NumPy, SeaBorn
Core Concepts: NLP, RAG, Reinforcement Learning, State Space Models, World Models, LLMs

Experience

CubeHx / CubeGo — Toronto, ON
Machine Learning Engineer — *Jun. 2022 – Jan. 2024*
- Engineered end-to-end **computer vision pipelines** for Facial Emotion Recognition and Gaze Tracking to quantify user attention and sentiment
- Spearheaded UI/UX optimization systems using **A/B testing frameworks** to validate design decisions against predictive user behavior models
- Developed and deployed **predictive models** for automated ad-effectiveness testing, translating visual metrics into actionable business insights

Toronto Metropolitan University — Toronto, ON
LLM Research Assistant (NSERC USRA Scholar) — *May 2023 – Aug. 2023*
- Awarded **NSERC USRA grant** to lead development on Fake News classification using Large Language Models
- Fine-tuned **BERT**, **RoBERTa**, and **GAN-Transformer** architectures achieving **95% accuracy** on weak labels and **88% accuracy** on synthetic augmented labels
- Co-authored **two papers**, with one published in **Springer Nature - Knowledge and Information Systems**

Projects

Sparse State Space Models for World Modeling | *Python, JAX, Mamba-2, Vector Quantization*
- Achieved **4x faster** inference by implementing **Mamba-2** in **JAX**, enabling linear-time sequence modeling
- Reduced memory usage by **60%** by integrating **Vector Quantization** for discrete latent representations
- Improved long-horizon prediction accuracy by **25%** over recurrent baselines through comparative benchmarking

FakeNewsClassifier Research Package | *Python, PyTorch, Transformers*
- Achieved **95% accuracy** architecting training pipeline for **BERT/RoBERTa** models on **50K+** samples
- Quantified **12%** performance degradation across noise levels by establishing reproducible robustness benchmarks

ChatRAG: RAG-WebUI Chatbot | *Python, LangChain, Vector DB*
- Reduced LLM hallucinations by **40%** by building **RAG** system with semantic search over **1K+** documents
- Achieved **sub-200ms** query latency by implementing **vector embeddings** with optimized similarity retrieval

Publications

Raza, S., **Paulen-Patterson, D.** & Ding, C. *Fake news detection: comparative evaluation of BERT-like models and large language models with generative AI-annotated data.* Knowledge and Information Systems (2025).

Raza, S., Khan, T., Chatrath, V. et al. *FakeWatch: a framework for detecting fake news to ensure credible elections.* Social Network Analysis and Mining (2024).

Earl, E., Ding, C., Valenzano, R. & **Paulen-Patterson, D.** *Constructing Political Coordinates: Aggregating Over the Opposition for Diverse News Recommendation.* Pre-Print (2025).