Rayen Ghali

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Education

University of Moncton, Faculty of Engineering **Expected Feb 2026**
Master of Applied Science (MASc) | CGPA: 4.15/4.3 *New Brunswick, Canada*

University of Carthage, National Institute of Applied Science and Technology (INSAT) **Sept 2023**
Industrial and Systems Engineering | Graduated with High Honours *Tunis, Tunisia*

Projects

End-to-End Multimodal AI Agent for Autonomous Robotic Control
Master's Thesis

- Designed an LLM-based agent integrated with a Vision-Language-Action policy for end-to-end control of a SO-101 robotic arm, enabling auto-planning, recovery, and real-time error handling from visual observations to physical action execution
- Developed a multimodal voice interface for natural human-robot interaction and hands-free task execution
- Applied parameter-efficient fine-tuning and imitation learning to adapt vision-language models for robotic action generation
- Quantified system performance on real-world tasks, analyzing success rates and latency across VLA architectures
- Orchestrated multi-GPU training workflows on Compute Canada's CCDB cluster via Slurm

CrowdKPI

- Developed a cross-platform audience analytics app using React Native and FastAPI, enabling users to measure crowd engagement and emotional response through YOLOv11 face detection and ViT-based emotion and engagement classification
- Built end-to-end CI/CD workflows using GitHub Actions with automated testing and containerized deployment

Experience

Research Assistant **May 2025 – Aug 2025**
CFRIA, University of Moncton *New Brunswick, Canada*

- Engineered a multimodal agent using LangGraph to control an industrial KUKA robot via natural language (text and speech)
- Integrated persistent conversational memory and a toolset for pick-and-place, Cartesian, and joint space movements, achieving < 2.6s end-to-end latency
- Implemented a robust error recovery system featuring safety checks, rollback, automatic retries, and real-time voice feedback
- Co-authored: "LLM-driven agent for speech-enabled control of industrial robots: A case study in snow-crab quality inspection" published in Results in Engineering 2025

Research Assistant **Jan 2025 – Apr 2025**
LARIHS, University of Moncton *New Brunswick, Canada*

- Migrated 15 years of Acadian student survey data from 7 schools, converting Excel files to a centralized PostgreSQL database
- Built a multi-agent workflow using LangGraph with human-in-the-loop validation for natural language queries
- Developed a Streamlit web application with automated plotting for query results (chatcapitalhumain.ca)

Research Assistant **June 2024 – Dec 2024**
LARIHS, University of Moncton *New Brunswick, Canada*

- Developed a RAG-based conversational agent for querying historical Acadian genealogical records (1700-1900), reducing average archivist search time from ∼15 minutes per query to under 30 seconds (chatacadien.ca)
- Engineered entity-centric chunking and context grounding solutions to disambiguate individuals with identical names in unstructured genealogical text, mitigating a primary cause of model hallucinations
- Evaluated and validated the system for faithfulness and context precision/recall on a dataset of real user interactions
- Built complementary web application for archival image search with VLM-generated descriptions (chatpatrimoineacadien.ca)

Research Assistant **Apr 2023 – June 2024**
LARIHS, University of Moncton *New Brunswick, Canada*

- Benchmarked modern object detection models on industrial surface-defect datasets evaluating the performance-speed tradeoff
- Developed SSL-YOLO, a few-shot learning framework combining contrastive self-supervised pre-training with YOLOv8
- Co-authored and presented conference papers "Real-time defect detection systems for steel and wood inspection", IEEE CECCE 2024 and "Benchmarking few-shot learning techniques for steel surface defect detection", IEEE SWC 2025

Skills

Languages: Python, SQL
Technologies: PyTorch, Transformers, LangChain, Google GenAI, LeRobot, Streamlit, Supabase, Git, Docker, GCP

Languages

Arabic: Native | **French:** Bilingual | **English:** Proficient