Rayen Ghali

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Education

University of Moncton, Faculty of Engineering **Expected Dec 2025**
Master of Applied Science (MASc) | CGPA: 4.15/4.3 *New Brunswick, Canada*

University of Carthage, National Institute of Applied Science and Technology **Sept 2023**
Engineering Diploma in Instrumentation and Industrial Maintenance | Graduated with High Honours *Tunis, Tunisia*

Projects

Master's Thesis

- Explored the use of Vision Language Action models (VLAs) for robotic manipulation tasks with industrial robots KUKA (get model) focusing on enhanced robot ability to understand and execute complex commands through visual and linguistic inputs.
- Fine-tuned Vision language models using Q-LORA, Unsloth.
- Developed simulation environments, reinforcement learning, and evaluation datasets like libero.
- Explored quantization techniques and their impact on model performance.
- Explored tokenizers discrete vs continuous tokenizers for modeling robotic actions.
- Prototyped using the Nvidia Isaac gr00t family of models and the SO-101 mini robots with hf/lerobot library for dataset trajectories collection, motors calibration, fine-tuning and inference.

Experience

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

- Architected a stateful LangGraph agent for natural language robot control (KUKA KR 50 R2100), featuring persistent conversational memory and tools for pick-and-place, Cartesian, and joint space movements.
- Designed and implemented a multimodal pipeline processing continuous audio streams with Voice Activity Detection for speech segmentation and efficient transcription, achieving < 2.6s end-to-end latency.
- Implemented a robust error recovery system with safety checks, rollback to safe state, and automatic retry mechanisms grounded in robot state with 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.
- Tech stack: Python, LangGraph, Google GenAI, KRL

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

- Talk chatcapitalhumain so postgresql, human-in-the-loop, visualizing graphs from llm outputs etc.. focus on design.
- Project website: chatcapitalhumain.ca
- Tech stack: Python, Streamlit, LangGraph, Pandas, SQL, Supabase

Research Assistant **June 2024 – Dec 2024**
Centre d'études acadiennes Anselme-Chiasson (CEAAC) *New Brunswick, Canada*

- Implemented an open-access natural language processing system with agentic retrieval augmented generation for efficient querying of Acadian archives.
- talk rag, hyde, evals RAGAS,
- Developed a ChatGPT-like interface to enhanced accessibility of Acadian heritage for researchers and the public, leveraged large language models and knowledge graphs.
- Designed a knowledge management system to integrate expert archivists' insights into the AI-powered query process.
- Project website: chatacadien.ca, chatpatrimoineacadien.ca
- Tech stack: Python, Streamlit, Langchain, Neo4j, Pinecone, MongoDB, Cloudflare R2

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

- Benchmarked modern object detection models (YOLOv5-v9, RT-DETR) on industrial datasets identifying optimal performance-speed balance.
- 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
- Tech stack: Python, PyTorch, Ultralytics

Skills

Languages: Python, SQL
Technologies: Docker, Git, Streamlit, PyTorch, Langchain

Languages

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