

# Faycal Kilali

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## Education

Mount Allison University – B.Sc. (Hons) Computer Science and Mathematics – Sackville, NB	2022 – 2026
• Certifications: <i>Machine Learning with Python</i> (IBM), <i>Object Oriented Design</i> (UAlberta), <i>Microsoft Learn AI Skills</i> (Microsoft Corporation)	2024
• Founder and President of the AI & Robotics Society – Sackville, NB	2023-2026
• Co-Founder and Vice President of the Mature Students Club – Sackville, NB	2023-2025

## Experience

Fullstack Software Developer, AI Object Detection Framework and Educational Tool – Sackville, NB	May 2024 – Sep 2024
• Secured \$4,000 TD Ignite Grant and led development of AI-based object detection educational tool, implementing YOLOv10 model across Flask backend, Streamlit web interface, and Tkinter GUI with support for 243 languages	
• Architected full-stack educational game integrating real-time computer vision, REST API design, and multi-platform deployment, achieving comprehensive documentation with API specifications and workflow diagrams	

Mathematics and Computer Science Peer Tutor, Mount Allison University – Sackville, NB	Mar 2023 – Sep 2024
• Tutored 50+ students across various mathematical subjects effectively, resulting in positive feedback from students	

Technical Lead, Greater Dorchester Moving Forward – Dorchester, NB	Jan 2023 – August 2023
• Spearheaded technology operations for a nonprofit organization by leading data collection, mapping, and software development–enhancing impact and advancing the mission	
• Collaborated with other departments within the organization to integrate technical solutions relevant to the seated board	

## Selected Projects

Content-Aware Enterprise Document Search & Management System   Java, PostgreSQL (SQL), JDBC, PDFBox, Bash, MVC, Agile, Scrum, DevOps, Figma   GitHub	2025
• Architected a decoupled MVC system using Dependency Injection to orchestrate state management between the front-end and the application's backend, significantly reducing component coupling and enhancing system modularity	
• Designed a hybrid search algorithm combining PostgreSQL's tsvector for optimized metadata retrieval ( $O(\log n)$ ) with a custom Java-based regex engine for deep content analysis of binary PDF blobs, enabling granular pattern matching	
• Orchestrated the team's Agile/Scrum workflow, serving as Technical Lead to mentor peers on Git best practices, resolve merge conflicts, and manage technical debt to ensure on-time delivery of prototypes	
• Established comprehensive DevOps and documentation standards, authoring UML architectural diagrams and configuring CI/CD pipelines (Gradle) to standardize the build and release lifecycle for the team	

Room Scanner & Voice Guidance System   Python, YOLOv10, Raspberry Pi, Bash, Computer Vision, Soldering, Embedded Engineering   GitHub	2025
• Engineered embedded room scanning system integrating computer vision with custom hardware circuits (GPIO, LED indicators, push-button controls), implementing both hardware and software debouncing techniques	
• Developed real-time voice feedback system for object detection with respect to the physical location of the system, providing information/guidance for blind individuals throughout the observable area	
• Created comprehensive documentation of the hardware schematics and the software components with automated installation scripts, thereby emphasizing reproducible deployment	

Multi-Paradigm Wordle Puzzle Solver AI Agent   Python, Streamlit, Information Theory, AI   GitHub	2025
• Implemented four AI paradigms (Information-Theoretic, Model-Based, Goal-Based, Utility-Based), utilizing entropy calculations and information gain maximization to achieve optimal 3-5 guess performance	
• Architected Streamlit visualization dashboard displaying real-time AI decision-making with time complexity of $O(W^2L)$ , demonstrating advanced algorithm optimization and probabilistic reasoning	

Multivariate Regression Framework   Python, PyTorch, NumPy, Machine Learning, AI   GitHub	2024
• Developed machine learning framework from mathematical foundations, implementing gradient descent optimization, L2 regularization (Ridge), and closed-form solutions using PyTorch and NumPy	
• Conducted systematic experimental analysis across 5 dimensions (noise sensitivity, training set impact, parameter complexity, regularization effects) with comprehensive visualizations demonstrating theoretical ML concepts in practice	

Variable Elimination for Bayesian Networks   Python, Probability and Statistics   GitHub	2024
• Implemented Variable Elimination Algorithm for Bayesian Networks to compute probability distributions with evidence	

- Optimized sum-product computation for efficient inference in complex probabilistic networks

**Dreamy Pastures (Multiplayer Board Game Engine)** | Java, UML, OOP, Multiplayer | GitHub

2024

- Collaboratively developed local multiplayer board game supporting up to 4 concurrent players with real-time state synchronization and turn-based game logic, demonstrating OOP Design Patterns, and extensive UML Documentation

**Design Patterns Library** | Java, UML | GitHub

2024

- Created detailed library of OOP design patterns with UML diagrams and implementations, aligning with best practices.

**RSA Encryption & Decryption System** | Python, RSA, Security | GitHub

2021

- Implemented RSA cryptographic algorithm from mathematical foundations, including key generation using prime number factorization, modular exponentiation, and Euler's totient function with configurable prime digit lengths for customizable security levels
- Developed modular encryption system supporting both file and string encryption/decryption with Unicode numeral representation, integrating multiple in-house implementations of the algorithms (prime generation, modular arithmetic, extended GCD) into a cohesive cryptographic framework

**Centralized Master Server** | Python, PHP, Online | GitHub

2019

- Architected first-of-its-kind centralized master server for the game, enabling real-time notifications to players without requiring client-side code updates

**Open Source Video Games** | MBScript, Python, PHP | Floris Evolved | Tainted Paths | Medieval Conquests

2015-2019

- Founded and led development of three major game modifications with **314,000+ active subscribers** and **1.3+ million unique visitors** across platforms, achieving **90-95% positive ratings**
- Architected & developed approximately 100,000 lines of MBScript & Python code for game logic and modular systems
- Managed distributed teams of volunteers across multiple years, implementing complex features including custom gameplay mechanics and enhanced AI systems

## Skills

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**Programming Languages:** Python, Java, C, C++, BASH/Shell Scripting, MBScript, Assembly (MIPS, RISC-V), LaTeX, SQL

**Frameworks & Libraries:** PyTorch, TensorFlow, NumPy, Flask, Streamlit, YOLOv10, REST API, JDBC, PDFBox

**Tools & Platforms:** Git, PostgreSQL, Figma, Unity, Linux/Unix, Windows, AWS, Azure, Raspberry Pi, Arduino

**Artificial Intelligence:** Machine Learning, Deep Learning, Computer Vision (Neural Networks), Bayesian Networks, AI Agents (Information-Theoretic, Model-Based, Goal-Based, Utility-Based, Logic-based), Information Theory

**Embedded Systems & Hardware:** Hardware Design, Hardware Schematics, Debouncing, Automation

**Software Engineering:** Object-Oriented Programming (OOP), MVC Architecture, System Design, Parallel Processing, Procedural Programming, Logic Programming, Database Programming

**Algorithmic Paradigms:** Divide and Conquer, Greedy Algorithms, Dynamic Programming, Decrease and Conquer

**Methodologies:** Agile, Scrum, DevOps

**Domain Expertise:** Low-level programming, Game Engines, Security/Cryptography, Server Infrastructure, GIS, Digital Signal Processing, Computer Graphics, Haptics, Computer Networks, VR/AR, GPU, CPU

**Languages:** English (Native), Standard Arabic (Professional), Saudi Arabic (Professional), Darija (Native), French (Beginner) – MIFI Francisation (2025)

## Relevant Coursework

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**Mathematical:** Vector Calculus, Multivariable Calculus, Calculus 2, Applied Calculus, Advanced Linear Algebra, Linear Algebra, Mathematical Modeling, Probability and Statistics, Discrete Structures, Real Analysis, Mathematical Optimization, Modern Algebra, Differential Equations

**Computer Science:** Software Design, Operating Systems, Advanced Data Structures & Algorithms, Database Systems, Computer Networks, Graph Theory, Data Structures & Algorithms, Algorithm Analysis, Systems Programming, Digital Electronics and Digital Signal Processing, Artificial Intelligence, Simulation and Modeling, Computer Organization & Architecture, Object-Oriented Design, Introduction to Data Science, General Physics I, General Physics II.

## Awards & Accomplishments

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- 3rd Place Winner, The Pitch Competition (\$1,000)** – Mount Allison University  
Secured recognition for presenting a scalable solution bridging AI and healthcare, showcasing hardware-software integration and algorithm design for medical assistance devices
- Global eSports Excellence:** Top 100 Global Ranking Achievement in League of Legends (EUW) in Season 3
  - Exceptional Global Ranking:** Achieved top 100 position among over 70 million active monthly players globally, placing in the 0.000001% of competitive players
  - Strategic Mastery:** Exhibited exceptional split-second decision-making and strategic acumen in high-pressure competitive environments
  - Competitive Success:** Dominated multiple tournaments, securing numerous 1st place victories and consistently achieving top 3 placements