YOUSSEF IBRAHIM

(HE/HIM) · AI/ML Engineer · Software Engineer · Intelligent Systems
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PROFESSIONAL SUMMARY

AI/ML and software engineer with graduate training in Software Engineering & Intelligent Systems and hands-on experience shipping intelligent product features, backend services, research tooling, and full-stack platforms across industry and academic environments.
Strong blend of applied machine learning and rigorous software engineering: I work comfortably across LLM integration, NLP/classical ML, model evaluation, APIs, data pipelines, debugging, testing, documentation, and production-minded system design.
Recent work includes building GPT-5-powered product capabilities at Radical AI, delivering reliable SaaS/platform systems at Hootsuite, and developing research software/data workflows at the University of Alberta while also mentoring students as a Teaching Assistant and Lab Instructor.
Completed Master of Engineering (MEng) in Electrical and Computer Engineering - Software Engineering & Intelligent Systems, plus a BSc in Computing Science (Mathematics minor). This background supports strong architectural judgment, experiment discipline, technical communication, and end-to-end ownership from prototype to deployment.
Completed the MEng in December 2025 with a 4.0 GPA, reinforcing the portfolio's emphasis on AI systems, backend reliability, research tooling, and product-quality engineering.
AI / ML & software engineering focus areas:

- Applied AI & LLM systems: prompt orchestration, structured outputs, evaluation loops, safety/abuse mitigation, conversational UX
- Machine learning & data: NLP/classification, feature engineering, model evaluation, robustness testing, data pipelines, reproducibility
- Software engineering: Python/Node services, APIs, system design, testing, debugging, observability, maintainable production code

SKILLS

- Applied AI / LLMs: OpenAI (GPT-5), prompt design, structured outputs, guardrails, evaluation loops, conversational product flows
- Machine Learning: NLP, supervised learning, feature engineering, classification, ranking heuristics, model evaluation (precision/recall/F1)
- Deep Learning & Research: TensorFlow, deep learning concepts, adversarial robustness testing, literature review, reproducible experiments
- Software Engineering: object-oriented design, API design, debugging, testing strategy, code reviews, maintainable architecture
- ML / AI Tooling: OpenAI (GPT-5), Botpress, Inworld.ai, TensorFlow, Hugging Face, scikit-learn
- Experimentation & Evaluation: benchmark testing, failure-mode analysis, robustness metrics, prompt iteration, reproducibility
- Data Platforms: Firestore, SQL, data modeling, indexing, privacy-aware dataset handling, research workflows
- Cloud & Integrations: Firebase Auth/Firestore/Cloud Functions/Hosting, third-party APIs, webhooks, environment management
- Product Systems: Stripe subscriptions, payouts, billing lifecycle, entitlement logic, idempotency, logging/error handling
- Quality & Security: input validation, auth/access control, secrets handling, regression prevention, documentation, runbooks

- Backend & Systems: Python, Node.js, REST APIs, Firebase Cloud Functions, serverless workflows, observability mindset
- Languages: Python, JavaScript/TypeScript, Java, Rust, C++, MATLAB, SQL
- Data & Analytics: data cleaning, labeling, validation, dashboards, Power BI, data visualization, pipeline thinking
- Foundations: algorithms, data structures, operating systems, networking, databases
- Collaboration: Git/GitHub, GitHub Codespaces, cross-functional delivery, technical writing, mentoring, stakeholder communication
- Domain Breadth: SaaS products, AI assistants, educational tooling, research software, enterprise/internal platforms

EXPERIENCE

SEPTEMBER 2023 – SEPTEMBER 2024

ARTIFICIAL INTELLIGENCE ENGINEER (APPLIED AI, LLM SYSTEMS & PRODUCT ENGINEERING), RADICAL AI.

- Tech stack: OpenAI (GPT-5), Botpress, Inworld.ai, TensorFlow, Python/JavaScript; LLM evaluation + product integration
- Designed and shipped AI-powered product capabilities from prototype through production integration, combining LLM workflows, backend logic, and user-facing product requirements.
- Integrated GPT-5 into customer workflows using prompt orchestration, structured outputs, fallback handling, and evaluation loops to improve relevance, consistency, and usability.
- Built “ReX” (AI Career Coach) end-to-end: conversation design, personalization logic, action-oriented outputs, and iterative improvement driven by feedback and usage patterns.
- Developed adaptive recommendation logic to tailor next-step guidance and content sequencing based on user actions, progress, and competency signals.
- Implemented anti-fraud / abuse protections and validation layers for AI-assisted flows, reducing risk from prompt misuse and strengthening trust in user-facing systems.
- Collaborated with engineering, product, and design to scope features, define technical trade-offs, and ship reliable releases on an iterative roadmap.
- Created internal tooling, logging, and debugging utilities to inspect model behavior, identify failure modes, and accelerate iteration across deployments.
- Applied ML/NLP concepts beyond prompting-classification, ranking heuristics, and rule-based logic-to improve platform intelligence and decision quality.
- Helped optimize latency and reliability of real-time AI interactions by reducing redundant model calls and tightening request/response handling.
- Wrote technical documentation and runbooks covering prompt guidelines, integration patterns, evaluation criteria, and maintenance handoff.
- Maintained strong engineering discipline through version control, careful data/privacy handling, review participation, and production-minded code quality.
- Framed ReX as a user-facing AI product rather than a demo, emphasizing useful next steps, response trust, and practical career guidance over generic model output.

JANUARY 2023 – JANUARY 2024

RESEARCH ASSISTANT (APPLIED AI, DATA SYSTEMS & RESEARCH TOOLING), UNIVERSITY OF ALBERTA.

- Tech focus: research-grade software tooling, biometric data workflows, reproducible analysis, privacy-aware handling of sensitive data
- Built and maintained research software tooling to support biometric data collection, validation, and downstream analysis in a structured and repeatable way.
- Translated study protocols into software/data requirements; implemented scripts and lightweight interfaces that standardized intake and reduced manual handling.
- Developed data cleaning, labeling, organization, and versioning workflows that improved reproducibility and made iterative experimentation easier to audit.
- Produced internal dashboards and technical summaries for ongoing quality checks, anomaly detection, and research meeting updates.
- Created clear SOPs and documentation so contributors could follow consistent workflows across data preparation, analysis, and reporting.
- Applied privacy-aware engineering practices for sensitive biometric information, including access controls, careful storage habits, and ethics-aligned handling.
- Conducted literature reviews on biometrics measurement and ML-adjacent methods, converting findings into practical improvements to tooling and methodology.
- Contributed figures, technical summaries, and reporting material for research meetings and manuscript/workshop preparation.
- Presented methods and findings to mixed technical/non-technical audiences, strengthening the ability to explain ML and software trade-offs clearly.
- Worked in version-controlled repositories with tracked changes and reviewable workflows to preserve quality, collaboration, and reproducibility.
- Expanded the workflow across intake, cleaning, labeling, versioning, dashboards, and privacy-aware reporting so research operations remained reproducible, inspectable, and easier to hand off.

FEBRUARY 2022 – DECEMBER 2023

SOFTWARE ENGINEER (BACKEND, PLATFORM & INTELLIGENT PRODUCT SYSTEMS), HOOTSUITE, VANCOUVER, BRITISH COLUMBIA.

- Tech stack: Node.js, React, Firebase (Auth/Firestore/Cloud Functions), Stripe, GitHub Codespaces; production SaaS systems
- Delivered production software across front end, backend, and cloud functions, with particular emphasis on backend reliability, API design, and maintainable system behavior.
- Developed and debugged Node.js/Firebase services and serverless functions supporting user workflows, billing logic, and data synchronization.
- Engineered a subscription and payout system using Stripe, handling billing state transitions, webhook processing, retries, error handling, and idempotent operations.
- Implemented product features and reusable UI patterns in React while collaborating closely with backend/service work to keep end-to-end behavior consistent.
- Integrated platform modules and AI-adjacent surfaces through clean interfaces, supporting modular architecture and easier future extension.
- Improved performance and reliability by profiling bottlenecks, optimizing data access patterns, and tracing production issues to root cause.
- Strengthened quality through testing, validation, code review, and incremental releases that reduced regression risk.
- Helped standardize development workflows through GitHub Codespaces, clearer onboarding documentation, and more consistent local environments.
- Worked cross-functionally with engineers, product, and QA to estimate work, break down requirements, and deliver iterative releases.

- Documented API contracts, implementation notes, and engineering decisions to support long-term maintainability and team knowledge sharing.
- Modeled the relationship between billing state, user entitlements, and payout logic so financial workflows stayed centralized, recoverable, and auditable under failure.

FEBRUARY 2022 – SEPTEMBER 2023

TEACHING ASSISTANT & LAB INSTRUCTOR (SOFTWARE ENGINEERING / COMPUTING SCIENCE), UNIVERSITY OF ALBERTA.

- Supported computing science instruction across software engineering, systems, databases, networks, and applied programming; helped students connect theory to implementation.
- Led labs/discussion sections and delivered hands-on demos, teaching debugging, algorithmic thinking, version control, and structured problem solving.
- Provided architecture guidance on project organization, modular design, API usage, state management, and maintainable coding practices.
- Supported database and backend concepts in practice, helping students understand how application behavior maps to data models and system design choices.
- Held regular office hours for 1:1 support; reviewed student code with an engineering mindset focused on correctness, readability, performance, and testing.
- Assisted with assignment/project preparation and grading; delivered clear, constructive feedback that mirrored production-style code review.
- Helped refine lab materials and instructions based on common pain points, improving clarity of expectations and evaluation criteria.
- Coordinated with instructors and other TAs to provide consistent guidance, shared troubleshooting approaches, and aligned grading standards.
- Strengthened mentorship and technical communication by explaining complex concepts clearly to students with diverse experience levels.

JANUARY 2022 – DECEMBER 2022

COMPUTING SCIENCE INTERN (SOFTWARE ENGINEERING & INTERNAL PLATFORMS), PRECISION DRILLING, CALGARY, ALBERTA.

- Helped design, build, test, and deploy internal software used across departments as part of a company-wide digital initiative.
- Collaborated with software engineers and IT managers to translate business requirements into UI workflows, validation rules, backend scripts, and integration behavior.
- Implemented features using JavaScript/HTML/CSS and Python/Java where needed, focusing on maintainable code and practical usability.
- Conducted extensive debugging, QA, and rollout support to improve reliability, compatibility, and adoption across stakeholder groups.
- Assisted with application lifecycle tasks (updates, patches, version control) while following internal SDLC and engineering standards.
- Reviewed bug reports, user feedback, and system logs; proposed and implemented improvements to performance and user experience.
- Helped refine APIs and integration points between internal systems to reduce manual work and improve data flow consistency.
- Produced reporting and analysis using SQL and Power BI to support technical decision-making and process improvement.
- Documented technical workflows and created user guidance to support smoother onboarding and operational handoff.

APRIL 2021 – DECEMBER 2021

SUPPLY CHAIN MANAGEMENT INTERN (DATA QUALITY & OPERATIONAL SYSTEMS), PRECISION DRILLING, CALGARY, ALBERTA.

- Supported the Inventory and Procurement Optimization Project (IPOP) with strong emphasis on master-data quality, reporting, and process standardization.
- Collaborated with purchasers, equipment managers, and administrators to process requests, identify data gaps, and improve operational consistency.
- Built and maintained SAP / Power BI reporting to surface inconsistencies, track progress, and support more informed business decisions.
- Helped roll out vendor pricing updates and supported change management with field procurement teams.
- Reviewed Material Masters and performed data quality checks to ensure alignment with standards and downstream usability.
- Enriched records using additional sources (interactive parts catalogues, OEM lists) to improve accuracy, completeness, and trust in data.
- Supported continuous improvement efforts and documented process changes to reduce friction, manual cleanup, and avoidable errors.

JANUARY 2021 – PRESENT

PEER TUTOR (COMPUTER SCIENCE, ALGORITHMS & SOFTWARE ENGINEERING), UNIVERSITY OF ALBERTA.

- Provided long-term tutoring and mentorship in Computing Science and Mathematics, with frequent focus on programming, algorithms, systems, and software engineering fundamentals.
- Created structured learning plans and technical exercises tailored to each student's goals across Python/Java, data structures, debugging, databases, and project design.
- Explained complex technical concepts clearly and helped students build confidence through step-by-step reasoning, implementation walkthroughs, and code tracing.
- Reviewed assignments and projects with a code-review mindset, giving feedback on correctness, organization, maintainability, and testing.
- Collaborated with instructors and academic advisors to align tutoring goals with course outcomes, deadlines, and academic support plans.
- Strengthened mentorship, patience, and communication by adapting explanations to different learning styles and technical backgrounds.
- Stayed current with evolving software engineering and AI/ML practices so guidance remained relevant, modern, and practical.

EDUCATION

SEPTEMBER 2024 – DECEMBER 2025 (COMPLETED)

MASTER OF ENGINEERING (MENG) IN ELECTRICAL AND COMPUTER ENGINEERING - SOFTWARE ENGINEERING & INTELLIGENT SYSTEMS, UNIVERSITY OF ALBERTA

GPA: 4.00

SEPTEMBER 2019 – APRIL 2024

BACHELOR OF SCIENCE (BSC) IN COMPUTING SCIENCE (MATHEMATICS MINOR), UNIVERSITY OF ALBERTA

GPA: 3.85

HONOURS & AFFILIATIONS

SEPTEMBER 2023

GOLDEN KEY INTERNATIONAL HONOUR SOCIETY MEMBER, UNIVERSITY OF ALBERTA.

Recognized for academic excellence as part of the top 15% of eligible university students; membership is invitation-only and awarded on academic standing.

JANUARY 2022

MEMBER (MTICA), THE INSTITUTE OF COMBINATORICS AND ITS APPLICATIONS.

- International scholarly society affiliation recognizing interest in combinatorics, discrete mathematics, and related areas.
- Selected participation / presentation history:
  - CanaDAM 2023, Winnipeg, Canada - June 2023.
  - Stinson66, Toronto, Canada - 2022.

MEMBER (ICA), THE INTERNATIONAL COMMUNICATION ASSOCIATION (ICA)

Affiliated with the Human-Machine Communication group, focused on scholarship around interaction with AI, digital assistants, robots, and other communicative technologies.

PROJECTS

REX - AI CAREER COACH (LLM PRODUCT)

- Built a user-facing AI assistant inside a web platform, designed to deliver career guidance that felt fast, practical, and trustworthy.
- Integrated GPT-5 with structured prompting, response shaping, and iteration loops to improve output quality and consistency over time.
- Designed conversation flows, personalization signals, and action-oriented outputs so users received useful next steps instead of generic responses.
- Instrumented logging / feedback collection to surface failure modes, compare revisions, and prioritize improvements.
- Implemented privacy-aware handling of user inputs and basic guardrails against misuse patterns in prompt-driven interactions.
- Kept the experience centered on actionable next steps, structured guidance, and feedback loops so the assistant felt practical and trustworthy in real use.
- Tech: OpenAI (GPT-5), Botpress / conversational tooling, JavaScript/Python, product analytics mindset.

ROBUSTNESS TESTING: ADVERSARIAL ATTACKS ON LLMS

- Evaluated robustness of LLMs (including Mistral-7B) under adversarial character-level and word-level perturbations relevant to real deployments.
- Automated generation of perturbed datasets and built reproducible evaluation scripts across benchmark tasks such as AG News, SST-2, and MRPC.
- Measured performance degradation and analyzed failure patterns to understand model brittleness under noisy or malicious inputs.
- Proposed early defense ideas and robustness metrics informed by reliability and trustworthy-AI research.
- Tech: Python, Hugging Face ecosystem, evaluation harnesses, adversarial testing.

MALICIOUS URL DETECTION (ML SECURITY CLASSIFIER)

- Developed a machine-learning classifier for phishing / malicious URL detection, turning raw URLs into model-ready representations through feature engineering.
- Built preprocessing pipelines inspired by NLP techniques and compared model behavior using precision, recall, F1, and confusion-matrix analysis.
- Iterated on hyperparameters and feature choices to improve accuracy and reduce false positives / false negatives.
- Designed the solution so it can be exposed as a service or API for integration into broader web/security systems.
- Tech: Python, scikit-learn, NLP-inspired feature engineering, model evaluation.

SUBSCRIPTION & PAYOUT SYSTEM (PRODUCTION BACKEND)

- Designed and implemented backend workflows for subscriptions and payouts in a SaaS context, covering billing lifecycle, status tracking, and reconciliation logic.
- Integrated Stripe for secure billing and payout flows; handled webhook events, retries, partial failures, and idempotent processing.
- Connected payment state to product entitlements and user access, keeping business rules centralized, testable, and auditable.
- Focused on observability, logging, and defensive error handling for high-trust financial flows.
- Treated billing behavior as a state-machine problem, balancing correctness, recovery paths, entitlements, and operator visibility instead of assuming a simple happy path.
- Tech: Stripe, Node.js, Firebase, webhooks, backend/API design.

STOCK MARKET MONITOR (HIGH-PERFORMANCE DATA TOOLING)

- Built a financial monitoring tool in Rust to ingest price data and compute technical / trend indicators over large datasets efficiently.
- Designed a modular architecture separating ingestion, analytics, and visualization so the system could later be surfaced via API or dashboard.
- Emphasized performance, memory safety, and maintainable code structure while working close to systems-level concepts.
- Strengthened understanding of efficient data processing patterns that transfer directly to backend and analytics engineering.
- Tech: Rust, data processing, visualization libraries.

AID DELIVERY PLATFORM (WEB + MOBILE, REAL-TIME TRACKING)

- Developed a software platform for humanitarian aid logistics with real-time tracking, status updates, and coordination across users/devices.

- Integrated Google Maps routing/visualization and built a Firebase backend for authentication and synchronized operational data.
- Designed user workflows for scheduling, confirmation, and secure information sharing among teams.
- Balanced usability with maintainable architecture, making the system practical for non-technical users in dynamic operating conditions.
- Tech: React, Flutter, Firebase (Auth/Firestore), Google Maps API.

QR CHECK-IN & EVENT ANALYTICS PLATFORM

- Engineered a QR-based system for event registration, attendance tracking, and lightweight analytics with real-time status updates.
- Designed a data model that supported live attendee counts, exportable records, and administrative workflows without manual reconciliation.
- Implemented secure authentication and privacy-aware handling of attendee information.
- Built organizer-friendly flows for monitoring attendance and generating useful post-event data.
- Tech: React, Node.js, Firebase, Java.

SELF-BALANCING BINARY TREES (RUST) - DATA STRUCTURES & PERFORMANCE

- Implemented Red-Black Trees and AVL Trees in Rust, emphasizing correctness, invariants, and safe memory usage.
- Strengthened understanding of performance trade-offs, balancing operations, and modular implementation patterns useful in backend/system design.
- Wrote thorough tests to validate behavior across inserts, deletes, rotations, and edge cases.
- Tech: Rust, unit testing, algorithms/data structures.

OPERATING SYSTEM SIMULATOR (PYTHON) - SYSTEMS FOUNDATIONS

- Designed and implemented an operating system simulator centered on process scheduling and memory-management concepts.
- Implemented strategies such as Round Robin and FCFS, and simulated virtual memory allocation to study performance trade-offs.
- Strengthened systems intuition that transfers directly to building reliable, performance-aware backend services.
- Tech: Python, systems simulation, debugging and testing.

PERSONAL PORTFOLIO & TECHNICAL WEBSITE

- Built and deployed a personal site showcasing projects, technical writing, and engineering experience with responsive, accessible design.
- Used the site as a lightweight software product: iterated on structure, performance, usability, and technical SEO while keeping it maintainable.
- Integrated contact/interaction features through third-party APIs and designed content to communicate technical work clearly to recruiters and engineers.
- Expanded the portfolio into an AI/ML and software engineering product surface with a recruiter-facing AI copilot, source-linked answers, research notes, case studies, and resume/PDF preview layers.
- Designed interactive diagrams and evidence surfaces so projects, architecture, backend systems, and research depth could be evaluated quickly without losing technical detail.
- Tech: HTML, CSS, JavaScript, web performance, technical SEO.