Massimo Caruso

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Hiring manager
COMPANY
STREETNUMBER STREETNAME, CITY, PROVINCE POSTALCODE

January 6, 2026

Dear Hiring manager,

I am thrilled to apply for the POSITION role at COMPANY. As a fourth year Software Engineering student at Concordia University, I bring a robust foundation in software development, coupled with hands-on experience from academic and professional projects.

During my internship at PayFacto, I worked on the deployment and implementation of MEVWeb, a province-wide cloud-based SaaS platform mandated by Revenu Québec. I supported the acquisition, cleaning, and preprocessing of merchant data to ensure accurate system onboarding and compliance. I also participated in end-to-end software deployments, both remotely and on-site, including planning, testing, and installation, and contributed to validating software builds by testing deployment packages and reporting bugs prior to production rollout. This experience strengthened my understanding of real-world SaaS deployment, cross-functional collaboration, and the operational considerations required when delivering compliant, production-ready software.

As a challenge designer with the Hexploit Alliance at AtHackCTF, I designed a security challenge simulating an access control system using MIFARE Classic cards, focusing on vulnerabilities like weak key management and privilege escalation. Participants reverse-engineered RFID memory sectors and forged admin access, gaining hands-on experience with embedded systems security.

As part of the AtHackCTF 2025 organizing team, I prepared over 600 MIFARE Classic cards by writing custom data, ensuring proper formatting and labeling, and supporting event logistics. I also coordinated the distribution of RFID card readers and facilitated a lockpicking activity, contributing to a hands-on learning environment focused on practical security concepts.

In addition, my academic projects strengthened my applied software and systems engineering skills. I designed and implemented a secure wireless access control system using ESP32 microcontrollers with BLE and LoRa communication, incorporating multi-factor authentication, encrypted alert messaging, tamper detection, and actuator-based lock control. This project emphasized embedded firmware development, state-machine design, and secure communication between distributed nodes. I also developed an online Food Database System, where I worked with APIs and relational databases to manage data ingestion, querying, and user interactions, reinforcing my experience with Python, JavaScript, SQL, and end-to-end application development.

What excites me most about COMPANY is COMPANYDETAILS. I am particularly drawn to the opportunity to POSITIONDETAILS.

I am confident that my technical skills, academic achievements, and passion for software engineering make me a strong candidate for the POSITION role. I would welcome the opportunity to discuss how my experiences align with the needs of your team. Please feel free to reach out to me at (514) 944-5977 or massimo02caruso@gmail.com.

Thank you for considering my application. I look forward to the possibility of contributing to COMPANY's success.

Sincerely,
Massimo Caruso

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Education

Montreal, Canada **Concordia University** **Jan 2023 – Present**

- **Major:** Software Engineering, BEng
- **Relevant Courses:** Data Structures and Algorithms, Operating Systems, Databases, Embedded Systems, Machine Learning, and Deep Learning

Experience

PayFacto - Payment Technology Solutions **May 2025 – August 2025**
Software Implementation, Intern

- Spearheaded data acquisition, cleaning, and preprocessing of raw merchant data sets for the deployment of MEVWeb, a province-wide cloud-based SaaS platform mandated by Revenu Québec.
- Participated in end-to-end deployment of MEVWeb software remotely and on-site, including planning, testing, and installation.
- Supported hardware transitions by uninstalling legacy MEV devices and installing MEVWeb-compatible components such as printers and routers.
- Collaborated with project delivery, field services, and sales teams to ensure seamless coordination of deployments and merchant onboarding.
- Tested MEVWeb software builds and deployment packages, reporting bugs and verifying stability before production rollout.

AtHackCTF **Nov 2024 – March 2025**
Challenge Designer and Developer, Permanent Part-time

- Designed a complex RFID-based Capture the Flag (CTF) challenge using a real ATM machine and MIFARE Classic cards, which communicated with the machine's reader to simulate a security environment.
- Developed three flags requiring participants to:
  - Extract the card's PIN from memory by reverse-engineering the RFID data.
  - Manipulate the card's balance data, allowing the participant to alter the funds stored on the card.
  - Modify the card's UID to impersonate an admin and escalate privileges within the system.
- Implemented an interactive ATM interface, including buttons for navigation and a printer to issue flags upon successful completion of challenges.
- Facilitated the learning of hardware security, from memory manipulation to privilege escalation, within a real-world context.
- Prepared over 600 MIFARE Classic cards by writing custom data to each card and ensuring proper labeling and formatting for participant use.

Projects

Market Predictability (Deep Learning Project)

- Designed and implemented a PyTorch LSTM-based trading model to learn daily market leverage allocations on the Hull Tactical Market Prediction dataset, achieving an adjusted Sharpe score of **1.94**, indicating strong risk-adjusted performance with nearly twice as much return per unit of risk.
- Led systematic hyperparameter optimization across sequence length, hidden dimensions, learning rate, and regularization, identifying an optimal configuration that produced a cumulative strategy return of **122.4%** versus **116.7%** for a market benchmark.
- Developed evaluation and visualization pipelines to analyze equity curves, drawdowns, and rolling risk metrics, observing an average rolling Sharpe of approximately **1.14** with a maximum drawdown of -**25.2%**.

Embedded Wireless Access Control System

- Designed a two-node embedded access control system using ESP32 with BLE and LoRa, implementing servo-based lock actuation, tamper detection via analog sensing, and a deterministic finite state machine (armed, alarm, 2FA, disarmed) in C++ using PlatformIO.
- Implemented application-layer AES-128 encrypted alert messaging over LoRa and a BLE-based two-factor challenge–response protocol for local disarm, alongside an authenticated admin console with lockout policy and simulated biometric verification.
- Integrated multi-sensor inputs (potentiometer door position, IR motion, touch-based biometric) with encrypted wireless alerts, real-time console monitoring, and modular firmware architecture supporting offline simulation and incremental security hardening.

Food Database System

- Developed an online nutritional database integrating APIs (FatSecret, TheMealDB) to provide detailed nutritional data, recipes, and dietary metadata.
- Cleaned and validated JSON data, storing in hybrid databases (PostgreSQL + MongoDB) with optimized queries, indexing, and aggregates.
- Automated data migration between SQL and NoSQL, improving retrieval efficiency with custom recipe-name generator for FatSecret API.

Linear Regression Model

- Built a multiple regression model to analyze life expectancy factors (WHO dataset, 193 countries, 2000–2015).
- Applied backward elimination to reduce predictors from 20 to 6, achieving adjusted $R^2 = 0.77$ and predicting Canada's 2013 life expectancy within 0.5 years of reported value.
- Used Python (Pandas, NumPy, Scikit-learn) for preprocessing, modeling, and visualization.

Skills

Languages: (Proficient): C, Java, LaTeX, HTML/CSS, Javascript, Python, SQL; (Familiar): C++, Clojure, Erlang
Frameworks: React, Node.js, Express.js, Flask, psycopg, Arduino, TensorFlow
Libraries: Pandas, NumPy, Matplotlib, Scikit-learn, PyTorch
Developer Tools: Git, Docker, Makefile, MongoDB, PostgreSQL, Neo4j, VS Code, Eclipse, Jupyter NB, PlatformIO
Methodologies: Agile development, Scrum, Waterfall