Miguel de Arcos

Staff Software Engineer

CONTACT

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Waterloo, Ontario

"Beauty is the ultimate defense against complexity"

EDUCATION

University of Waterloo

Mechatronics Engineering

Waterloo | 2016

SKILLS

Technical Expertise: Software Architecture, Embedded Systems, System Scheduling, Data/Signal Processing, Numerical Optimization, Mathematical Modeling

Leadership & Communication: Technical Leadership, Design Communication, Multidisciplinary Team Collaboration

PROFESSIONAL EXPERIENCE

Exscientia AI

Senior Software Engineer — Python | C++ | Nest.js | Vue.js

2023 — 2024 — Greater Toronto / Oxford, UK

At Exscientia, I was part of a pioneering team dedicated to designing from scratch an automated, collaborative, and cloud-enabled SPR machine, aimed at transforming lab automation and capturing a significant share of the $350M market. Our team was focused on developing a series of scientific instruments tailored for AI-driven automated labs, beginning with this SPR project as our initial foray into the sector.

Fast and Lightweight Metric Evaluation Library: Architected and implemented a scalable service framework in NestJS, leveraging worker threads for efficient execution of data post-processing and metrics calculation at runtime and post-experiment. Integrated a C++ N-API addon library to execute the more complex mathematical operations, notably the Langmuir 1:1 Molecule Kinetics Fitting Algorithm. The service provided data to inform dynamic updates to experimental procedures, and post-experiment analysis.

High-Performance Sensor Data Processing Pipeline: Engineered a high-throughput data processing pipeline that increased data capture rate from 10 Hz to 1 kHz, aimed at enhancing sensor sensitivity while navigating both hardware computational limitations and software constraints imposed by Python's threading capabilities. This system significantly improved maintainability and troubleshooting through meticulous tracking of processor metrics and states.

Collaborative Product Development: Worked closely within a multidisciplinary team to address ongoing product design challenges, ensuring seamless integration of mechanical, electrical, and software components.

Nicoya Lifesciences

Staff Software Engineer — Python | C++ | Nest.js | Angular

2021 — 2023 — Kitchener / Waterloo

At Nicoya, I played a key role in the development of a new, cloud-enabled SPR machine aimed at improving usability and reducing costs in the SPR market. My work focused on system controls and firmware for STM32 peripheral boards,

SKILLS

Programming Languages:
C/C++, Python, Java, TypeScript, Bash, Rust, MATLAB, Groovy, HTML, CSS

Libraries/Frameworks:
Eigen, nlohmann, PLPlot, ROS, SciPy, NumPy, Numba, Vue.js, Nest.js, CMake.js, node-addon-api, Angular, Django

Testing Tools:
GoogleTest, Cypress, Jest, ViTest, Pytest, JUnit, Postman

Development Tools/Tech:
VS Code, Copilot, ChatGPT, Git, Docker Swarm, Kubernetes, ActiveMQ, RabbitMQ, Redis, Fluentd, Jenkins, Artifactory, Eclipse, STM32CubeIDE, GDB, Tmux, Vim

Databases:
NoSQL - MongoDB, Elasticsearch, Cassandra
SQL - PostgreSQL, MySQL

Operating Systems:
Ubuntu, CentOS, MacOS, Windows

utilizing Digital Microfluidics (DMF) technology to efficiently manipulate smaller sample sizes with high precision.

Technical Advisory: Acted as a key technical advisor, providing expert solutions and support on software design and system architecture, which influenced overall system enhancements.

Instrument Runtime Scheduling: Developed the command server in Python, enabling precise execution of coded instructions and effective coordination of physical asynchronous subsystems (including C++ firmware) for experimental execution.

Algorithm Research and Development: Created and refined a molecule kinetics fitting algorithm (Langmuir 1:1 Model), increasing execution speed by nearly 100x and significantly enhancing fit quality which is critical for scientific research. Conducted extensive research and leveraged knowledge of calculus and linear algebra to develop the complex data fitting algorithm.

Firmware Development: Directed the complete overhaul of device firmware, improving motor, thermal, and fan controls, and high-voltage board instruction handling to boost device stability and code maintainability.

Vital Images

Software Engineer — Java | Python | NiFi | Groovy

2018 — 2020 — Kitchener / Waterloo

At Vital Images, I contributed to enhancing a medical informatics system used by hospitals and clinics for managing large medical imaging data, focusing on storage, retrieval, and prefetching processes. I was instrumental in developing a new application that passively analyzed this data, delivering actionable insights to improve patient throughput and increase the profitability of healthcare facilities.

System Architecture and Expertise: Advanced healthcare informatics systems as a mentor and architect, notably through the design and implementation of a FHIR-based data model and RESTful API.

HL7 Integration: Served as a subject matter expert, significantly enhancing data handling capabilities by guiding the integration of HL7 ingestion pipelines.

Sandvine

Software Engineer — C++ | Python | Bash

2016 — 2017 — Kitchener / Waterloo

At Sandvine, I developed firmware and drivers for high-performance network switches, focusing on enabling ISPs to implement highly customizable routing policies while maintaining up to 1TB/s throughput when scaled. Automated testing, code reviews, and software reliability were of paramount importance in ensuring the robustness and efficiency of our development processes.

Sensor Caching Infrastructure: Engineered a robust new system to replace an outdated non-thread-safe infrastructure, significantly boosting system reliability and performance.

Voltage Regulator Driver: Developed crucial drivers for new PMBus compliant voltage regulators, facilitating improved power management and hardware integration.

COOP EXPERIENCE

Evertz - Hardware Engineer: Responsible for designing, analyzing, and updating board schematics based on hardware specifications, including implementing design changes and part replacements.

Hansa Language Centre - Team Lead: Supervised and led the coop software development team, coordinating closely with stakeholders to align on features and progress, and developed comprehensive action plans to achieve both long and short-term goals.

EVault - Software Development Intern: Worked independently in a vSphere environment, managing VMs and enhancing the Virtual Recovery Agent by updating the vSphere SDK, modifying code generation scripts, and adding a SATA drive recovery feature.

Protecode - R&D Developer: Redesigned report generation systems and backend code to support multiple file types, created an abstraction class to streamline future updates, and implemented tools to reduce manual work.