

## SKILL SET

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### Software Engineering

- **Python** · Pandas, NumPy, SciPy, Plotly/Dash, Kedro, SQLAlchemy, Pydantic, pytest
- **Optimization** · Pyomo, Cbc, GLPK
- Go
- Git
- Linux
- Docker
- CI/CD
- Relational databases (PostgreSQL) and ORMs
- Grafana
- Machine learning
- MLflow
- Basic Rust
- Basic Java
- MATLAB/Simulink and Optimization Toolbox

### Control Systems

- Modern optimal and digital control
- Modeling and simulation

### Electrical Systems

- Power and signal electronics analysis
- Digital design
- Microcontrollers and single-board computers
- Real-time systems

## WHERE I EXCEL

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- Showing initiative in end-to-end problem solving, from conception to deployment
- Creating reusable, well-tested, and fast software
- Considering all aspects of a problem, from technical to green energy implications

## EXPERIENCE

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### Optimization Engineer

2022 – Present

Ottawa, ON

- Developed, deployed, and maintained an optimization service to reduce strain on the electrical grid by controlling grid-scale batteries and hundreds of EVs, for an ongoing EV Everywhere program with Hydro Ottawa
  - Created an algorithm that controls EVs' charging to consume power when the energy mix is green
- Developed and deployed software to optimally control a solar-powered hydrogen production and storage system, extending its component lifespan while generating electricity from green hydrogen at high-demand times
- Collaboratively developed and deployed a cloud service that sends timely and helpful charging station recommendations to EV taxi drivers based on location
  - Helped progress the pilot project with the taxi company to the next stage by creating a real-time simulator of EV taxi fleet operations, showcased at [COP28](#)
- Developed and deployed prototype optimizers of electric bus charging operations for multiple transit agencies in simulation
  - Created optimization models for peak-shaving and energy cost minimization in a model predictive control scheme, used in a simulation study for many Ontario school bus depots
- Created a library used by multiple projects for testing smart grid control software in a variety of simulated environments
- Created, evaluated, and deployed novel load predictors for Mumbai and Prince Edward Island (which outperformed LGBM by 17%)
- Completed a 10-MW grid-scale battery study for reducing strain on the city of St. John's grid
- Co-inventor on [five patents](#), including for the real-time, data-driven minimization of cost and greenhouse gas emissions with EV charging stations

### Systems Engineering Co-op

Jastram Engineering

Sep – Dec 2020

Vancouver, BC

- For steering systems on naval frigates:

- Streamlined the tracking of engineering requirements, helping to raise customer value by ~\$20K
- Developed documentation for security, safety, risk management, and failure analysis
- Verified conformance of electrical systems to NATO standards
- Successfully performed vibration analysis for hydraulic power units in Python

## EDUCATION

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### BASc Mechatronic Systems Engineering

*Simon Fraser University*

2016 – 2021

Vancouver, BC

- 3.67 CGPA; President's Honour Roll, three-time Dean's Honour Roll
- 4.33 GPA in statistics and engineering optimization courses

## PERSONAL PROJECTS

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### Simulation of Mid-Air Refueling of a Hydrogen-Powered Airliner

2023 – Present

- Design and feasibility study determining how to refuel a sustainably-powered commercial airliner
- Developed a 3D computer simulation of mid-air refueling by AT200 cargo UAVs
- Created a flight controller UI mockup

### **Author of Multiple Python Libraries**

2024 – Present

- Applications span signal resampling, Pandas/dataclasses interoperability, and ease of writing explainable, traceable, and auditable Python programs

### Series About Energy, Renewables, and Climate Change

2022 – Present

- A series of web postings of interesting, significant, and actionable facts and pieces of information about energy, renewables, and fighting climate change

### Cluedo Game Simulator and AI Assistant

2023

- Wrote software guaranteed to beat human players at Cluedo by solving the game as a Boolean satisfiability problem
- Made an interactive player dashboard to visualize game and simulation results

### IoT Integration of a Hydroponic Farm

2022 – 2023

- Created an IoT dashboard and Python-based interface for remote monitoring & control
- Developed a farm process model for minimizing consumption of energy and resources
- Completed the first phase on-time to successfully control the farm across Canada

### **Energy Yield Model of a Gas Turbine**

2021

- Performed statistical analysis and trained machine learning models on sensor data
- Verified, visualized, and reported model performances

### **Model of Fuel Cell EV Air Supply System for Optimization**

2020

- Identified the potential for optimization among car manufacturers
- Defined an empirical relationship between fuel cell humidity and performance
- Numerically modeled turbo compressor to feed fuel cell oxygen

### **Optimization of a Telescopic Handler Mechanism**

2020

- Applications in structural engineering and robotics
- Verified and visualized solution to 1000-variable optimization problem obtained using tuned gradient-based and genetic algorithms