Matthew Brigdan
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Key Skills

- Strong scientific/mathematic/engineering background
- Excellent problem solver, curious and diligent
- Experience in a variety of programming languages (Python, SQL, C#, Java, C) and environments
- Experience working on self-directed projects and leading development in teams crossing the backend/data science boundary
- Experience using LLM/AI tools to accelerate learning, design, and implementation of software

Personal Projects of Interest

- Applying probabilistic programming to Ontario zonal electrical load data (Bayesian neural networks and gaussian processes, risk forecasting applications) - https://github.com/mbrigdan/ontario_load
- Applying multistage stochastic optimization to a model of a refinery (optimal decision making in the face of risk, forecast uncertainty, etc) - https://github.com/mbrigdan/plantopt
- Mathematically provable bounded computation (Using Rocq-prover to create trusted computation) - https://github.com/mbrigdan/rocq_experiments

Experience

Founding Engineer
TeraVolt Trading, Inc.
2025 - Present

- Implemented advanced Bayesian statistical models of Midcontinent Independent System Operator (MISO) nodal DA/RT energy price data for price forecasting and variance/risk estimation.
- Implemented Agentic AI solution to estimate winter storm risk throughout MISO, including government weather service alerts as well as searching the web for news articles and weather forecasts.
- Implemented data pipelines for the retrieval of algorithm input data as well as the submission of bids/offers to the market API.

Technical Lead - Wholesale Markets Optimization and Controls
Stem, Inc.
2022 - 2025 (Senior Software Engineer 2022-2024, Technical Lead 2024-2025)

- Lead the team through the successful deployment of the company's first projects in ERCOT and CAISO
    - Tested, reviewed, and optimized virtual asset performance based on simulation results
    - Designed and implemented connections to ISO & customer systems
    - Lead design and implementation of major refactor to modularize processing for different ISOs and scheduling entities and enable configuration driven actions
- Lead a major project to transform the wholesale market participation system from a minimal viable product state to a modular, sustainable, large scale web service:
    - Designed and lead the implementation of generalization of data sources and data sinks to work across multiple market sources and live data streams
    - Lead the development of monitoring and observability solutions for the product, allowing for the monitoring of data quality and early identifications of issues
    - Based on requirements from product owner and customer representative, worked with optimization scientist to create full-stack (user input, problem formulation, optimization solution, market submission) support for new market requirements
- Drove quality focused best-practices across the team by leading training sessions and pair-programming sessions focused on code review practices, modern python and libraries, and testing philosophies

Software Developer - Control Systems
EnergyToolbase (Pason Systems Corporation)
2018 - 2022

- Took the initiative to learn a constraint modeling framework (pyomo + GLPK) and implemented a system to solve a challenging multi-variable co-optimization problem, central to the business value of an online modeling product
    - Informed external stakeholders about the benefits and costs associated with implementing a constraint-based optimization solution
    - Educated technical team members about fundamental algorithms as well as standard technologies used in constraint-based optimization
- Worked closely with the data science team to guide the transformation of a Jupyter Notebook based solution into a reusable python library
    - Reviewed design of library API and internal structure of code
    - Taught data science team members how to make effective use of inheritance to minimize code duplication
    - Implemented dependency resolution logic for data feature definitions
- Lead project to make the system's economic dispatch strategy more robust against errors in ML forecasting
    - Worked with product stakeholders to define measures of success
    - Organized work division among myself and more junior developers
    - Defined strategies to test and evaluate system performance as changes were made
        - Created evidence to show stakeholders the benefits of the changes
        - Created a reusable system performance analysis testbed

Leak Detection Engineer
TransCanada Pipelines Limited
2015-2016 (Internship), 2016-2017 (Part-time, Contractor), 2017-2018 (Engineer-in-Training)

- Planned and programmed an automated testing tool for pipeline trainer and leak detection systems
    - Significantly decreased manual testing, enabled greater productivity, increased system testing & accuracy
    - Utilized C#, Fortran, SQL, and XML. Used unit testing and integrated testing to ensure quality.
- Analyzed data to investigate performance of the leak detection system and determine areas of improvement
    - Data analysis in Python using the Pandas library, & TensorFlow machine learning framework.
- Developed monitoring application to analyze log files and indicate errors in critical services.
- Worked with senior managers to determine overall system requirements and balanced available resources
- Mentored junior interns and assisted in training and onboarding processes

Engineering Developer / co-founder
Exterra Monitoring (operating regions Alberta & Texas) *www.exterramonitoring.com*
2013-2019

- Plug and play IoT platform for "non-technical" users
- Interacted with field operators & owners to determine needs and identify key design requirements
- Designed, engineered and deployed a turn-key monitoring solution for remote Oil & Gas sites
    - Designed master circuit board from scratch to provide highly accurate sensor readings using low power
    - Utilized embedded C++, and Python
    - Significantly decreased well down-time and increased production to achieve quicker ROI
    - Designed system with off-the-shelf components and a simple wireless interface to reduce cost and complexity

Research Assistant
Microscopy and Imaging Facility, Faculty of Medicine
University of Calgary 2009-2013

- Created 3D models to enable important biological research,
    - credited as an author on an academic paper (Endothelial Ca2+ wavelets and the induction of myoendothelial feedback, doi: 10.1152/ajpcell.00418.2011)
- Planned and completed an independent research project that developed a new protocol in the cutting-edge field of “Correlated Microscopy” which will allow for more efficient processing of imaging data
- Created and managed a highly redundant, automated backup system for critical data
- Wrote and presented detailed research reports to laboratory team and supervisor.

Relevant Academic Work

Biomedical Thesis: Clinical Trial Data Visualization

- Interactive data visualization with Python Bokeh library
- Statistical analysis of resulting data
- Published in AHA Stroke (http://stroke.ahajournals.org/content/49/1/193.full?ijkey=Jdvgk2ngXWb6o5K&keytype=ref)
- Visualization available online: http://escapevisualization.herokuapp.com/novel_vis

Digital Signals Processing (ENCM515)

- In depth work with DSP-specific microcontrollers using C and custom assembly code
- Study of digital signal processing limitations and benefits, theoretical analysis of DSP algorithms

Education

- Bachelor of Science in Electrical Engineering, Specialization in Biomedical Engineering
- Cumulative GPA of 3.9