Matt Bowring

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Website | Github | LinkedIn

Education

Purdue University (3.7 GPA) — 2024 - Present
M.S. Mechanical Engineering — Remote

- Designed and manufactured a novel mixed-signal PCB for solving combinatorial optimization problems using phase dynamics of coupled oscillators; Developed schematics and layouts in Altium Designer; Simulated phase dynamics with LTspice and MATLAB; Verified circuit behavior with waveform capture and analysis in MATLAB; Wrote C++ firmware using SPI for problem encoding and solution readout.

The University of New Hampshire (3.8 GPA) — 2017 - 2021
B.S. Mechanical Engineering — Durham, NH

- Awarded over $100,000 in scholarships for personal quadcopter project.
- QuadSAT Swarm Engineering Lead; Makerspace mentor; STEMbassadors member

Experience

The MathWorks — 2022 - Present
Software Engineer (Math/PDE) — Natick, MA
MATLAB, C++, Python, CMake, Git, Perforce, Jira, Confluence

- Lead development of the MATLAB Support Package for Quantum Computing; Implement core features for building, simulating, and running programs on remote quantum hardware hosted by AWS and IBM; Design compiler and assembly code generation, web server interfaces, and numeric algorithms to compute expectation values and matrix decompositions; Develop functional/performance tests, direct quality engineering efforts, and coordinate integration with industry partners; Experiment with third-party quantum computing frameworks.
- Consult industry customers and develop models for their quantum computing applications in combinatorial optimization and machine learning; Implement quantum algorithms for internal use, documentation examples, and conferences.

The MathWorks — 2021 - 2022
Application Engineer — Natick, MA
MATLAB, Python, Simulink, Git, Jira, Confluence

- Developed functionality to construct the Hamiltonian for arbitrary amino acids folding on a lattice using multi-variable reduction and binary encoding methods; Developed an interface to remote quantum annealing hardware and benchmarked problems to analyze trade-offs in encoding methods; Simulated energy spectra of single qubit dynamics in various coupling schemes of electromagnetic fields.
- Trained a recurrent graph network on the QM7-X dataset to predict low-energy molecular configurations with high accuracy. Developed an OpenBabel interface for easy processing of atomic properties into feature matrix embeddings.

Projects

Website — 2024 - Present
- Blog about personal engineering interests using Hugo and Tailwind CSS; Own and manage domain through Cloudflare Pages.

Compute Server — 2024 - Present
- Build Linux/Windows machines and configure them on personal network for remote access using Tailscale; Experiment with Pytorch, CUDA, and JAX (diffrax, thermox); Explore NixOS.

Machine Learning — 2020 - 2021
- Trained a recurrent network to predict dash-camera misalignment using OpenCV and Pytorch; Developed a Bayesian network to predict trends in popular mobile game using NetworkX and Pytorch.

Jet-X Engineering — 2020 - 2021
- Lead student team to design an air intake for mock jet turbine; Modelled and integrated parts using SolidWorks; Ran CFD simulations in Ansys to improve driveshaft power; 3D-printed airfoils and made silicon mold in vaccum chamber to experiment with casting.

Quadcopter — 2019 - 2021
- Integrated the PX4 flight control software with Raspberry Pi to enable waypoint tracking for quadcopters. Implemented ROS/MAVROS communication, telemetry, and interfaced the Gazebo physics environment for software-in-the-loop simulation with Python. Tuned flight controller and analyzed DC motor response using MATLAB; 3D-printed frame, soldered electrical components, and conducted field tests.