# Matt Bowring

mbowring@purdue.edu | Cambridge, MA
Website | Github | LinkedIn

## Experience

**The MathWorks** May 2022 - Present
Software Engineer (Math/PDE) Natick, MA (on-site)
MATLAB, C++, Python, CMake, OpenMP, Git

- Lead development of the MATLAB Quantum Computing Library from an unreleased prototype to 9,100+ users
  - Design object-oriented MATLAB framework that enables quantum programming on Windows, Linux, and Mac
  - Develop templated C++ state-vector simulator for CPU/GPU with multi-threading using OpenMP
  - Implement graph compiler/transpiler using C++ to generate optimized assembly code of quantum circuits
  - Build client-side REST infrastructure using AWS and IBM cloud services to manage async jobs on quantum hardware
  - Develop sparse algorithms to compute expectation values of observables and decompose quantum gates
  - Manage CI/CD, write all unit/functional/performance tests, and benchmark against other quantum libraries
- Consult industry users on machine learning and quantum computing applications
  - Implemented quantum neural networks for image classification (SPIE publication) and reinforcement learning
  - Researched constraint-aware encoding techniques for quantum heuristics using penalty dephasing and quadratization
  - Developed presentations and examples for industry conferences (ACS 25, AWS re: Invent 25, IBM QDC 22-25)

**The MathWorks** May 2021 - May 2022
Software Engineer Natick, MA (on-site)
MATLAB, C++, Python, Git

- Trained recurrent graph network on QM7-X molecular dataset to predict equilibrium energy and classify optimal configurations; Developed format-agnostic data pipeline to encode atomic properties using OpenBabel
- Developed REST interface to cloud-based quantum annealing hardware; Benchmarked minor-embedding heuristics on constrained combinatorial problems; Wrote parallel simulations to compute qubit transition probabilities for truncated Hamiltonian based on graph-theoretic formalism across coupling strength and energy separation parameters

## Education

**Purdue University (3.8 GPA)** Jan. 2025 - Present
M.S. Mechanical Engineering West Lafayette, IN (remote)

- Fabricated mixed-signal PCB to solve combinatorial problems using phase dynamics of LC oscillators (arXiv preprint); Accepted for research mentorship under Stephen Wolfram
  - Developed simulations of coupled oscillators in LTspice and modeled noisy phase dynamics with MATLAB
  - Designed schematics and layouts for two multi-layer boards in Altium Designer and soldered components
  - Developed real-time embedded C++ firmware using SPI and FreeRTOS to measure phases at 1MHz
  - Automated test instrument control to inject perturbations and analyze Fourier spectrum using MATLAB

**The University of New Hampshire (3.9 GPA)** Aug. 2017 - May 2021
B.S. Mechanical Engineering Durham, NH (on-site)

- Awarded over $100,000 in scholarships for developing an autonomous quadcopter
- Led the Quadcopter Engineering Team; Served as Makerspace Administrator, Academic Tutor and Mentor

## Projects

**Computer Systems** 2024 - Present

- Built custom multi-GPU Linux machine for PyTorch/CUDA research experiments; Configured Beelink home server using NixOS and Tailscale

**Machine Learning** 2020 - Present

- Wrote packet parser to process and analyze financial data using Python and Wireshark; Trained recurrent convolutional network to predict dash-camera misalignment using OpenCV and PyTorch; Built data pipeline and Bayesian network to predict trends for online video game using NetworkX and PyTorch

**Robotics** 2019 - 2021

- Integrated PX4 flight-stack with Raspberry Pi to enable waypoint tracking for quadcopters; Implemented ROS/MAVROS communication, telemetry, and interfaced Gazebo for SITL simulation with Python; Tuned flight controller and analyzed motor responses using MATLAB; 3D-printed frame, soldered electrical components, and conducted field tests to evaluate controller performance