Matt Bowring

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Experience

Software Engineer   06/2022 - Present
The MathWorks (Math/PDE Team)   Natick, MA

- Lead design and development for the [MATLAB Support Package for Quantum Computing](#); Write object-oriented MATLAB and C++ to enable building, simulating, and running quantum circuits on remote hardware hosted by AWS and IBM; Develop hardware-specific OpenQASM assembly code generation, and numeric algorithms to compute expectation values and matrix decompositions for quantum gates; Develop source code on Windows/Unix with CMake and MATLAB MEX build tools using Perforce source control; Maintain test infrastructure and direct quality engineering efforts; Manage tasks in Jira and Confluence.

- Consult industry customers and provide MATLAB scripts for their quantum computing applications in combinatorial optimization and classification; Contribute MATLAB examples of quantum algorithms (VQE, QAOA, RBM, etc.) for internal use, documentation, and conferences; Meet with industry partners/customers to discuss technical software integration and present my designs for UI/UX feedback; Manage customer code and other external projects using Git source control; Participate in books clubs for numerical methods and quantum computing.

Application Engineer   05/2021 - 6/2022
The MathWorks (Control, Design, and Automation Team)   Natick, MA

- Supported 100s of customers with control engineering applications using MATLAB and Simulink; Collaborated with development teams to resolve issues and refactor models for performance; Participated in UI/UX review of internal functionality, mentored interns, and occasionally interviewed applicants.

- Developed internal deep learning and quantum computing examples to prototype functionality in MATLAB. Managed projects using Git, Jira, and Confluence.
    - Constructed binary optimization problems for folding structures on a lattice using various encoding techniques; Evaluated problems on quantum annealing hardware to analyze solution quality; Simulated energy spectra of single qubit dynamics in various coupling schemes of electromagnetic fields.
    - Built and trained a recurrent graph network for the QM7-X molecular dataset to predict minimum energy configurations; Collaborated with the MATLAB Deep Learning Toolbox development team.
    - Wrote and benchmarked algorithms to decompose controlled quantum gates with various resource requirements.

Education

M.S. Mechanical Engineering   2024 - Present
Purdue University   Remote

- Research and develop prototype hardware to solve combinatorial problems using coupled electronic LC oscillators; Write MATLAB to interface with my test instruments (waveform generator, oscilloscope, etc.), program digital potentiometers using an Arduino, and simulate stochastic differential equations of the oscillator model; Design circuit schematics using Multisim; Manage software using Git.

B.S. Mechanical Engineering   2017 - 2021
The University of New Hampshire (3.47 GPA)   Durham, NH

- Developed projects on Windows/Unix using Git in addition to regular coursework while involved in volunteer, mentor, and athletic positions.
    - Integrated the PX4 software with Raspberry Pi hardware to enable waypoint tracking for quadcopters. Wrote Python to manage ROS/MAVROS communication, radio telemetry, send waypoints, and interface with the (Unix-based) Gazebo environment for software-in-the-loop simulation. Wrote MATLAB to facilitate gain tuning of the flight controller and analyze DC motor under disturbance; Ran field tests to analyze real-time performance of the controller; Soldered electronic hardware components and integrated the Betaflight firmware.
    - Lead student team in designing air intake for a mock jet engine using Ansys and SolidWorks in collaboration with [Jet-X Engineering](#); Ran CFD airflow simulations to optimize driveshaft power of the turbine; Printed airfoils to be cast in aluminum using silicone mold created in vacuum chamber.
    - Wrote Python scripts using OpenCV, Pytorch, and NetworkX libraries for camera calibration and graph clustering.