Dowling Wong

Dowling's Website | Dowling's Github | Linkedin Profile | dowlingwong@gmail.com

Education

Karlsruhe Institute of Technology Oct 2024 – Present
PhD Candidate, Institut für Experimentelle Teilchenphysik *Karlsruhe, BW, DE*

- Designed low-latency signal processing algorithms (optimal filter, FIR, Fourier) for cryogenic detector readout
- Developed advanced deep learning methods for detector data analysis, including transformer-based spatial reconstruction, Stable Diffusion for synthetic rare-event data generation, and ML-inspired filtering (denoising, recurrent–transformer, and state-space models) for robust real-time feature extraction from low-SNR, high-throughput signals.

Brandeis University Aug 2021 - May 2024
Bachelor of Science in Physics with high honors *Waltham, MA, USA | GPA: 3.69/4.00*

- Completion of Master's with focus: Data Science in High Energy Physics, Theoretical and Mathematical Physics

Franklin W. Olin College of Engineering Aug 2022 - May 2024
Certificate in Electrical & Computer Engineering *Needham, MA, USA | GPA: 3.92/4.00*

- Digital Signal Processing, Full-Stack Development, Robotics (Path Planning & Behavior Trees), PCB Design

Skills

Languages: Python, C/C++, Java, MATLAB, SQL, ReactJS, JavaScript, HTML/CSS, LaTeX, Bash
ML/DS: Keras, AutoKeras, PyTorch, Bayesian ML(predictive modeling), TensorFlow, Scikit-learn
Computation: Optimum/Kalman/FIR filters, Docker, HTCondor, Singularity, CUDA accelerated FFT/DFT
Engineering: ROS and nav algorithms, Databases, Full-stack dev, FPGA (Xilinx), Nvidia Jetson, Raspberry Pi

Research & Experience

PhD Student | *Karlsruhe Institute of Technology & CERN CMS* Oct 2024 – Present

- Developing GPU-accelerated optimal filtering and Fourier-based signal processing for cryogenic detector data
- Constructed database and automated scalable data workflows for CERN's CMS upgrade at KIT

Visiting Student | *Massachusetts Institute of Technology* Jun 2023 – Jun 2024

- R&D for CMS DeepSuperCluster application on EMCAL for particle classifier
- Built online neural network classifiers for particle identification using FermiLab fix-target beam dump datasets

Research Assistant | *Brandeis Univ. & FermiLab* May 2022 – Jun 2024

- Optimized Kalman filters for track/vertex reconstruction and implemented multiclass particle classifiers

Selected Coursework

Data Science in Physics (MIT), Advanced Mathematical Physics (BU), Graduate Quantum Mechanics II, Statistical Physics, Particle Phenomenology, General Relativity, Differential Geometry, Digital Signal Processing, Robotics, Full-Stack Development

Selected Projects

HPC Lab | *C, Python, Assembly Language* Sep 2023 - present

- Jupyter Notes for ML/DS
- Hardware architecture-based accelerated computation in python and C++
- Built small-scale virtualization environment for HPC performance testing

Auto-navigation Robot Rover | *ROS Jazzy, YOLO, MATLAB Simulink* May 2023 - present

- Built autonomous navigation with AprilTag, accelerometer, GPS, and depth camera (VSLAM)
- Integrated YOLO and TensorFlow algorithms into edge computation
- Kalman filtering for processing point cloud data