Dowling Wong

Machine Learning Research Engineer · Distributed Computation · Robotics & Digital Signal Processing

🌐 Dowling's Website Dowling's Github in Linkedin Profile ✉ dowlingwong@gmail.com

Machine Learning Engineer with experience building and administering distributed ML training and inference infrastructure for large-scale time-series analysis framework, integrating PyTorch/JAX models with C++/CUDA acceleration and containerized HPC systems.

EDUCATION

Karlsruhe Institute of Technology
Oct 2024 – Present

PhD Candidate, Institut für Experimentelle Teilchenphysik — *Karlsruhe, BW, Germany*

- Developed attention-based, low-latency reconstruction pipelines for high-throughput detector time series, integrating LSTM/Transformer models with Optimal Filtering and normalizing flows for joint energy and interaction-location reconstruction and triggering.
- Enabled unsupervised anomaly detection in high-throughput detector data, using PCA and autoencoders to flag rare and nonphysical signal morphologies, improving data quality and downstream reconstruction robustness.
- Administered and supported a containerized distributed cluster (JupyterHub + HTCondor), serving as a technical point of contact for ML training workflows, user access control (OAuth2), and system monitoring (Grafana).

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

College 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 (advanced), C/C++ (advanced), Java (proficient), SQL/Bash (proficient), JS/React (familiar)

Machine Learning: PyTorch(Advanced), JAX, TensorFlow, Keras, Bayesian ML (posterior inference), simulation-based inference (normalizing flows)

Scientific Computing & DSP: Kalman/Optimal/FIR filtering, CUDA-accelerated FFT, Docker/Singularity, HTCondor cluster workflows

Robotics & Embedded Systems: ROS (navigation & perception), FPGA for low-latency triggering (Xilinx), database-backed full-stack applications, Nvidia Jetson and Raspberry Pi prototyping.

RESEARCH & EXPERIENCE

PhD Researcher in AI for Physics | *Karlsruhe Institute of Technology & CERN CMS* Oct 2024 – Present

- Research in cryogenic detector signal processing and machine learning for next-generation dark matter and neutrino experiments. Developing GPU-accelerated optimal filtering and Fourier-based signal processing.
- 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 & Embedded Systems (navigation, VSLAM, Kalman filtering), Full-Stack Development