Jeremy Welsh

Computational Scientist, Scientific Software Developer

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Technical Skills

- **Programming Languages**: Python, Fortran, C, C++, Bash, R, SQL, Julia, Mathematica
- **Frameworks**: NumPy, Pandas, SciPy, Scikit-Learn, TensorFlow, OpenCV, PyMC, MDTraj, Matplotlib, Numba
- **Software & Tools**: Git, Docker, General Particle Tracer (GPT), GROMACS, LAMMPS, PyMol, ImageJ, Slurm

Work Experience

- **Senior Intern - Computational Modeling Research Scientist** Jun 2022 – Jun 2023
  Thermo Fisher Scientific Remote
  - ◇ Developed Python code to automate milling and imaging workflows on dual-beam (FIB-SEM) microscope systems.
  - ◇ Designed experiments and computer vision image analysis to detect ∼100nm machining tolerances in Focused Ion Beam column.
  - ◇ Developed Python code to measure optical aberrations in ion beam using computer vision tools from OpenCV and Skimage.
  - ◇ Designed simulation components in C for ion column simulations in the General Particle Tracer software package.
  - ◇ Developed a scientific software package in Python for parallelizing optics simulations and performing data analysis in a Linux HPC environment.
  - ◇ Developed machine learning algorithms to optimize ion column designs, resulting in up to 350% improvement in ion beam performance.
  - ◇ Created data visualizations and presentations of algorithm design, experimental design, and results to a team of scientists in order to direct critical decisions about focused ion beam R&D.

- **Graduate Research Assistant - Computational Biophysics** Sep 2020 – Jun 2022
  University of Oregon Eugene, OR
  - ◇ Developed coarse-grained models of DNA and proteins, and validated models using molecular dynamics simulations (GROMACS and LAMMPS) and Monte Carlo simulations.
  - ◇ Wrote scripts in Python and Bash for performing molecular dynamics simulations using GROMACS and LAMMPS molecular dynamics software on HPC clusters at San Diego Supercomputer Center.
  - ◇ Characterized performance and degree of parallelism of simulation software to determine computational resource requirement on 128 Core/node HPC system.
  - ◇ Developed data analysis tools in Python, Fortran, and C++ for data analysis of ∼10TB of molecular dynamics simulation data.
  - ◇ Used clustering algorithms, such as DBSCAN, to determine coordinate regions for Markov Chain Monte Carlo simulation.
  - ◇ Validated coarse-grained molecular models against statistical models such as principal component analysis (PCA) and time-lagged independent component analysis (t-ICA).
  - ◇ Mentored undergraduate and graduate research assistants on code development, simulation data analysis, and theoretical molecular biophysics.

- **Graduate Teaching Assistant** Mar 2022 - Jun 2022
  University of Oregon Eugene, OR
  - ◇ Instructed tutorials and labs in undergraduate physics courses covering electricity and magnetism, circuitry, and Newtonian mechanics.

- **Library Student Assistant** Sep 2017 - Jun 2022
  University of Oregon Eugene, OR
  - ◇ Provided tutoring for math and science subjects including: algebra, probability and statistics, calculus, differential equations, linear algebra, and computer science.
  - ◇ Assisted library patrons with use of library services and systems.

Education

- **M.S., Physics** Sep 2020 - Jun 2022
  University of Oregon, GPA: 3.92 Eugene, OR
- **B.S., Mathematics and Physics** Sep 2016 - June 2020
  University of Oregon, GPA: 3.83 Eugene, OR