Amin Pakzad

amin.pakzad.work@gmail.com • in amin-pakzad-8a05b0127 • amnp95
Applied Scientist (ML) | Large-Scale Systems & Model Development

Profile

Applied Scientist with a focus on massively parallel systems and distributed software architecture. Expert in scaling Python/C++ applications across thousands of cores and designing end-to-end pipelines for large-scale modeling. Interested in the intersection of high-performance engineering and applied machine learning

Professional Experience

SimCenter & DesignSafe (NSF) **Berkeley, CA**
Research Engineer / Applied Scientist *Jul 2023 – Present*

- Designed and implemented end-to-end computational frameworks combining Python and C++ to execute large-scale workloads on distributed infrastructure (TACC clusters).
- Developed scalable data ingestion, preprocessing, and post-processing workflows to support high-throughput experimentation across thousands of parallel jobs.
- Optimized performance-critical components using MPI, enabling experiments to scale efficiently across thousands of CPU cores.
- Built robust execution pipelines with standardized configuration and result aggregation to support comparative model and simulation evaluation.
- Authored developer-facing documentation and Jupyter-based analysis notebooks to enable rapid experimentation by external users.

University of Washington **Seattle, WA**
Graduate Research Assistant / Core Developer *Jan 2022 – Present*

- Architected **Femora**, a Python framework for automated model generation and experimentation, used as part of downstream ML and simulation pipelines.
- Implemented algorithms for large-scale geometry and data processing, reducing preprocessing time from weeks to minutes.
- Extended performance-critical C++ components to support adaptive control logic and improved numerical stability in long-running experiments.
- Designed binary I/O pipelines (HDF5, VTK) to efficiently store and analyze large experimental outputs.
- Built validation pipelines comparing simulated outputs against experimental datasets, enabling quantitative evaluation of model accuracy and generalization.

Technical Skills

Machine Learning: PyTorch, Scikit-learn, PINNs, model training & evaluation, experiment design.
Systems & Performance: MPI, OpenMP, CUDA, Linux, Docker, distributed computing, profiling.
Languages: Python (expert), C++ (advanced), MATLAB, SQL.
Data & Tools: NumPy, Pandas, HDF5, Jupyter, Git, CI workflows.

Education

University of Washington **GPA: 3.85**
PhD Civil Engineering (Computational) *Exp. 2026*
Thesis: High-Fidelity Dynamic Analysis utilizing Massively Parallel Computing (HPC).

Georgia Tech **GPA: 4.0**
M.S. Computer Science (Machine Learning) *Exp. 2027*

University of Washington **GPA: 4.0**
M.S. Applied Mathematics *2024*

Selected Software & Publications

2024: McKenna, F., ... **Pakzad, A.**, et al. NHERI-SimCenter/EE-UQ v4.1.0 (Zenodo).
2024: **Pakzad, A.**, Arduino, P. Workflow for high-fidelity dynamic analysis (Pan-American Conference).
2024: **Pakzad, A.**, Arduino, P. Assessment of constitutive models (Soil Dynamics & Earthquake Engineering).