

# Brian M. Howell

numerical optimization | numerical methods | numerical simulation  
portfolio: <https://bmhowell.github.io> email: [bhowell@berkeley.edu](mailto:bhowell@berkeley.edu) ∈ Bay Area, CA

## Summary

I am an engineer interested in high-performance numerical simulation/optimization/linear algebra and its applications in scientific computing, machine learning, finance, and manufacturing. I am battle-hardened in building in-house solvers for PDEs and optimization methods in C/C++/CUDA/Python.

## Professional Experience

Apple, Cupertino, CA.

Feb - Aug 2024

Computational Engineering PhD Intern:

- **Platform Architecture** - parallel/distributed + high performance computing
- **Software**: Full stack distributed computing via MPI and GPU, with C++ back end and Python front end.

Google X, the moonshot factory, Mountain View, CA.

Jan 2022 - Dec 2022

AI Resident:

- **My project** aimed at bringing modern computing tools for materials optimization to a very large industry. My colleague and I cracked the problem with geometric/thermodynamic + convex modeling/optimization.
- **Machine Learning/Optimization**: Gaussian processes + Bayesian optimization, deep learning, convex optimization
- **Physics Simulation/Modeling**: Discrete element method, convex geometry
- **Hardware**: Sensor development and data processing, high-throughput experimentation, feedback control systems for complex fluid flow
- **Publicly Available Output**: Three granted patents (one as lead inventor)

Lawrence Livermore National Lab., Livermore, CA.

June 2017 - Jan 2022

Staff Scientist:

- **My work** at LLNL was primarily focused on materials development & optimization for 3D printing
- **Software/Simulation**: Controllers, sensors, toolpath generation and optimization, digital twins for additive manufacturing
- **Hardware/Chemical**: Hardware integration, CAD modeling & design, chemical formulation
- **Testing**: Rheology & UV kinetics, mechanical (Instron), Scanning Electron Microscope (SEM)
- **Publicly Available Output**: Two patents (one as lead inventor), one publication, work featured in [Advanced Science News](#)

UC Berkeley, Berkeley, CA.

Jan 2021 - Jan 2022

Graduate Student Instructor:

- **My position** focused on computational modeling that brought applied mathematical techniques in numerical methods, optimization and machine learning to raw, custom code.
- **Head GSI**: Modeling and Simulation of Advanced Manufacturing Processes - Professor Tarek Zohdi
- **Head GSI**: Modeling and Simulation Tools for Industrial Research Applications - Professor Tarek Zohdi
- **Received** 2021 Outstanding GSI Award by the university

## Skills

**Programming Tools**: C/C++, Python, CUDA, OpenMP, MPI, PyTorch, JAX,  $\text{\LaTeX}$ , Git, Linux

**Computational Methods**: Numerical Methods/Optimization/Linear Algebra, Machine Learning, Parallel Computing, Distributed Computing

## Education

UC Berkeley

PhD/MS in Computational/Mechanical Engineering

2019-2024

**Dissertation**: *Materials Discovery & Optimization for Advanced Manufacturing*

**Advisor**: Prof. Tarek Zohdi

Brigham Young University

BS in Chemical Engineering

2013-2017