

## EXPERIENCE

### Oak Ridge National Laboratory (ORNL) Research Intern

Knoxville, TN  
May–Aug 2018, Jun–Dec 2017

- Created a *new formulation* for tool path planning to optimize 3D print quality and to reduce printing time and cost. Implemented in **Python** and **C++**.
- Created a *novel geometric subdivision approach*, Euler transformation (ET). It transforms any mesh into a new one that guarantees a continuous tool path. Reduced print time up to 50% and improved print quality on test example.
- Tested and integrated hexagonal mesh library, and developed ET module in **C++** for ORNL slicing software.

### Washington State University Graduate Researcher

Pullman, WA  
May 2016–present

- Developed efficient and practical algorithms for continuous tool paths with no crossover using ET. Implemented system in **Python**.
- Created a *novel and scalable domain partitioning approach* to solve large instances of *optimal tool path planning* in 3D printing. Implement framework in **Python** using **Cplex** for optimization. Sample sizes: Buddha 799,716 nodes/169 layers, Bunny 812,733 nodes/360 layers. Improved mechanical strength of test sample up to 37%.
- First author on three manuscripts (see **PUBLICATIONS** below).
- Created a *novel topological data analysis (TDA) filtration approach* for high-dimensional data visualization and summarization to understand complex features. Implemented framework in **Python** using **SciPy**. Identified significant thin features in point cloud not observable in standard TDA.
- Taught 3 freshman/sophomore level mathematics classes to non-math majors.

### Washington State University Graduate Researcher

Richland, WA  
Jan 2015–May 2016

Developed a **C++** module in lammps from scratch for nanoscale fluids using discretized Navier Stokes Equation, works for both shared and distributed memory systems.

### NEi Software Finite Element Analysis intern

Westminster, CA  
May 2013–Aug 2013

Integrated nonlinear optimization solver **IPOPT** on NEi Nastran that gave better performance in specific cases.

## EDUCATION

### Washington State University

Ph.D. in Applied Mathematics Jan 2015–present  
Relevant Coursework: Advanced Matrix Computations, Structured Prediction, Artificial Neural Networks, Machine learning, Deep Learning, Bayesian Analysis, Distributed Systems Concepts and Programming, Parallel Computing

### University of Colorado at Boulder

MS in Simulation based Mechanical Engineering Science Aug 2012–Dec 2014  
Relevant Coursework: Numerical Methods, Applied Mathematics I & II, Markov processes, Queues, and Monte Carlo Simulations.

## TECHNICAL SKILLS

NumPy, SciPy, Pandas, AMPL, Cplex, TensorFlow.

## PUBLICATIONS

1. Prashant Gupta, Bala Krishnamoorthy, Euler Transformation of Polyhedral Complexes, 2018, Accepted in International Journal of Computational Geometry and Applications (IJCGA), 2021, [arXiv: 1812.02412](https://arxiv.org/abs/1812.02412).
2. Prashant Gupta, Bala Krishnamoorthy, and Gregory Dreifus. Continuous toolpath planning in a graphical framework for sparse infill additive manufacturing. Computer-Aided Design, 127:102880, 2020, SPM 2020, [arXiv: 1908.07452](https://arxiv.org/abs/1908.07452).
3. Prashant Gupta, Yiran Guo, Bala Krishnamoorthy, Narasimha Boddeti, SFCDecomp: A Space-Filling Curve Based Domain Decomposition Method for Multicriteria Optimized Toolpath Planning in 3D Printing, 2021, submitted.