

Education

2020 to 2025 **Ph.D. in Computer Science** at *University of California, Davis*
2018 to 2020 **M.S. in Computer Science** at *University of California, Davis*
2012 to 2016 **B.A. in Mathematics** at *University of California, Santa Cruz*

Summary

2 internships at Lawrence Livermore National Laboratory, 3 first-author publications, 3 cross-institution collaborations, 7 conference talks, and 2 international conference awards: "Best Paper" and "Distinguished Artifact".

Selected Projects

EXCVATE: Testing Exception Handling in Foundational Linear Algebra Libraries

Led a collaboration with the Principal Investigators of the LAPACK and BLAS linear algebra libraries to develop a novel tool combining binary instrumentation and SMT solvers to test floating-point exception handling. Resulted in a first-author publication at the 2025 International Symposium on Computer Arithmetic (ARITH) with an accompanying **"Best Paper" award**.

Prose: Optimizing the Performance of Large-Scale Climate Modeling Software

Collaborated with the Climate & Global Dynamics Laboratory at the National Center for Atmospheric Research to apply automated precision tuning optimizations for weather/climate code. Resulted in a first-author publication at the 2024 International Workshop on Software Correctness for HPC Applications.

FPDiff: Automated Differential Testing for Bug-Finding in Numerical Libraries

Led a team to devise an automated correctness testing methodology to improve the robustness of numerical software. Resulted in a first-author publication at the 2020 International Symposium on Software Testing and Analysis (ISSTA) with an accompanying **"Distinguished Artifact" award**.

Experience

Jan 2019 to July 2025 **Graduate Researcher** with the *UCD-PLSE Research Group*, UC Davis
Focus on designing strategies and developing tools for numerical software with an emphasis on the correctness and performance of floating-point computation in high-performance computing applications.

Summer '21, '22 **Graduate Student Computing Researcher**, Lawrence Livermore National Laboratory
Researching novel sensitivity analysis techniques for numerical software to facilitate the optimization of high-performance computing applications via approximation and ML surrogate models.

Areas of Interest

- Input-Aware Performance Optimization
- Floating-Point Exception Handling
- Mixed-Precision Floating-Point
- Formal Verification of Low-Level Software

Skills

Languages Fortran, C++, x86 Assembly, Python, Bash

Techniques Binary Instrumentation/Analysis, Search-Based Optimization, SMT Solvers, Automated Program Transformation

References

Dr. Cindy Rubio-González *Advisor at UCD // (530) 752-7069 // crubio@ucdavis.edu*
Dr. James Demmel *Collaborator at UCB // (510) 643-5386 // demmel@berkeley.edu*
Dr. Harshita Menon *Advisor at LLNL // (650) 741-4260 // harshitha@llnl.gov*
Dr. Alper Altuntas *Collaborator at NCAR // (919) 649-9980 // altuntas@ucar.edu*

Publications listed on following page

Publications

Awarded
"Best Paper"

Vanover, Jackson, James Demmel, Xiaoye Sherry Li, and Cindy Rubio-González. "EXCVATE: Spoofing Exceptions and Solving Constraints to Test Exception Handling in Numerical Libraries." In *2025 IEEE 32nd Symposium on Computer Arithmetic (ARITH)*, pp. 109-116. IEEE, 2025.

Vanover, Jackson, Alper Altuntas, and Cindy Rubio-González. "Toward Automated Precision Tuning of Weather and Climate Models: A Case Study." In *SC24-W: Workshops of the International Conference for High Performance Computing, Networking, Storage and Analysis*, pp. 148-159. IEEE, 2024.

Menon, Harshitha, James Diffenderfer, Giorgis Georgakoudis, Ignacio Laguna, Michael O. Lam, Daniel Osei-Kuffuor, Konstantinos Parasyris, and **Jackson Vanover**. "Approximate High-Performance Computing: A Fast and Energy-Efficient Computing Paradigm in the Post-Moore Era." *IT Professional* 25, no. 2 (2023): 7-15.

Parasyris, Konstantinos, James Diffenderfer, Harshitha Menon, Ignacio Laguna, **Jackson Vanover**, Ryan Vogt, and Daniel Osei-Kuffuor. "Approximate computing through the lens of uncertainty quantification." In *SC22: International Conference for High Performance Computing, Networking, Storage and Analysis*, pp. 1-14. IEEE, 2022.

Awarded
"Distinguished
Artifact"

Vanover, Jackson, Xuan Deng, and Cindy Rubio-González. "Discovering discrepancies in numerical libraries." In *Proceedings of the 29th ACM SIGSOFT International Symposium on Software Testing and Analysis*, pp. 488-501. 2020.