

Jackson Vanover

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".

Experience

- Jan 2019 to **Graduate Researcher** with the UCD-PLSE Research Group, UC Davis
July 2025 Researched and developed practical tools and techniques for numerical software with an emphasis on the correctness and performance of floating-point computation in high-performance computing applications, resulting in 3 first-author publications, 7 conference talks, and 2 awards. *See selected projects below.*
Summer '21-'22 **Graduate Student Computing Researcher**, Lawrence Livermore National Laboratory
Two research focuses: **(1)** the use of local and global sensitivity analysis (Feature Importance of Random Forests, Sobol Indices, Variograms, Automatic Differentiation/Morris Method) to identify kernels of high-performance computing applications to optimize via approximation (low-precision, loop perforation) or to replace with ML surrogates; **(2)** the use of random forests to interpolate the sensitivities of outputs from performance-critical kernels in high-performance computing applications (calculated via automatic differentiation for a set of sampled inputs) to yield a model predicting effective approximation parameters for unseen inputs.

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.

References

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

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.

Talks

- Oct 2025 **Workshop on the Development of Modern Methods for Linear Algebra**, (DMML70)
- Sep 2025 **The BLIS Retreat**
- May 2025 **Symposium on Computer Arithmetic**, (ARITH25)
- Nov 2024 **Workshop on Software Correctness for HPC Applications at SC24**, (Correctness '24)
- Apr 2023 **Improving Scientific Software Conference**, (ISS23)
- Jul 2020 **Symposium on Software Testing and Analysis**, (ISSTA20)
- Jun 2020 **FPTalks 2020**