

Jackson Vanover

Leveraging static and dynamic analyses to maximize the performance and correctness of numerical code in the field of HPC

Education

Target 2025 **PhD Candidate in Computer Science** at University of California, Davis
2018 to 2020 **MS in Computer Science** at University of California, Davis, GPA: 4.0
2012 to 2016 **BA in Mathematics** at University of California, Santa Cruz, Major GPA: 3.92

Experience

Jan 2019 to Present **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 techniques for the analysis of numerical software to facilitate the optimization of high-performance computing applications via approximation.

Selected Projects

EXCVATE: Testing Exception Handling in Foundational Linear Algebra Libraries

Collaboration with the Principal Investigators of the LAPACK and BLAS linear algebra libraries to devise a tool combining binary instrumentation and SMT solvers to test library exception handling. Culminated in a first-author publication at the 2025 International Symposium on Computer Arithmetic.

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

Collaboration with the Climate & Global Dynamics Laboratory at the National Center for Atmospheric Research to research automated precision tuning optimizations for weather/climate code. Culminated 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 focused on improving the robustness of numerical software that resulted in the FPDiff tool. Culminated in a first-author publication at the 2020 International Symposium on Software Testing and Analysis with an accompanying "Distinguished Artifact" award.

Publications

Vanover, Jackson, James Demmel, Xiaoye Sherry Li, and Cindy Rubio-González. "EXCVATE: Spoofing Exceptions and Solving Constraints to Test Exception Handling in Numerical Libraries." *Proceedings of the 32nd IEEE International Symposium on Computer Arithmetic*. Accepted, expected May 2025.

Vanover, Jackson, Alper Altuntas, and Cindy Rubio-González. "Toward Automated Precision Tuning of Weather and Climate Models: A Case Study." *2024 IEEE/ACM 8th International Workshop on Software Correctness for HPC Applications (Correctness)*. IEEE, 2024.

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*. 2022.

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

References

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Dr. Harshitha Menon Advisor at LLNL // (650) 741-4260 // harshitha@llnl.gov
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