Harshitha Menon

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Education

2016 **Ph.D., Computer Science**, *University of Illinois at Urbana-Champaign*.
Adaptive Load Balancing for HPC Applications. Advisor: Laxmikant V. Kale

2012 **M.S., Computer Science and Engineering**, *University of Illinois at Urbana-Champaign*.

2006 **B.Tech., Computer Science and Engineering**, *College of Engineering*, Trivandrum, India.

Research and Work Experience

2016-present **Lawrence Livermore National Laboratory**, *Computer Scientist (from 10/18), Postdoctoral Research Staff (till 10/18).*

2012-2016 **Dept of Computer Science, University of Illinois at Urbana-Champaign**, *Research Assistant*.

Summer 2015 **Charmworks**, *Advanced Software Developer Intern*.

Summer 2013 **Lawrence Livermore National Laboratory**, *Research Intern*.

2010-2011 **Dept of Computer Science, University of Illinois at Urbana-Champaign**, *Teaching Assistant*.

Summer 2011 **Google**, *Summer Intern*.

2006-2010 **Google**, *Software Engineer*.

Awards & Honors

2021 Best Reproducibility Award, Supercomputing (SC)'21

2017 Best Poster Award Finalist, Supercomputing (SC) '17

2016 Featured article in IEEE Computer magazine October issue

2016 Invited to Women in Research Lean In event for top PhD female students, Facebook

2014 ACM/IEEE-CS George Michael Memorial HPC Fellowship, SC '14

2014 Google Anita Borg Memorial Scholarship

2014 Best Paper Award, IEEE Cluster '14

2014 Feng Chen Memorial Best Paper Award, University of Illinois at Urbana Champaign

2013 Best Student Paper Award Finalist, Supercomputing (SC) '13

2013 Best Poster Award, Student Poster Symposium, LLNL

2012 Siebel Scholarship

2012 Member of finalist team for HPC Challenge Class II Award, Supercomputing (SC) '12

2011 Teachers Ranked as Excellent, University of Illinois at Urbana Champaign, Fall 2011

2010 Google Fellowship for Employees

2007 Google Founders Award for contributions to Gmail

Research and Other Funding

2023-present **Co-I**, *dFEM: Differentiating Large-Scale Finite Element Applications*, 400K/year.
PI: Tzanio Kolev, LLNL. DOE Advanced Scientific Computing Research (ASCR)

2020-2023 **Co-I and Thrust Lead**, *BUILD: Binary Understanding and Integration Logic for Dependencies*, $2.1M/year.
PI: Todd Gamblin, LLNL. DOE LDRD Strategic Initiative.

2019-present **PI**, *Approximate High Performance Computing : A Fast and Energy Efficient Computing Paradigm in the Post-Moore Era*, LLNL. DOE LDRD Exploratory Research, $700K/year.

2019-2021 **Co-PI**, *Validating Extreme-scale Resilience with Veracity*, LLNL. DOE Advanced Scientific Computing Research (ASCR), $90K.

2018 **PI**, *Multi-scale Fault Injector with DisCVar and FSEFI*, Linking Exploratory Application Research to Next-gen development (LEARN) program, $112K.

Mentoring/Co-advising

Postdocs: Konstantinos Parasyris (LLNL), James Diffenderfer (LLNL)

Graduate Students: Daniel Nichols (Univ. Maryland), Caetano Melone (Stanford Univ.), Manisha Mukherjee (CMU), Zhimin Li (Univ. Utah), Jackson Vanover (UC Davis), Diego Jimenez Vargas (CENAT), Nathan Pinnow (WWU)

Undergraduate Students: Alec Scott (Univ. Arizona), Garima Singh, Baidyanath Kundu, Logan Moody (JMU), Garrett Folks (JMU)

Professional Service

Workshop Chair: IEEE Cluster, Heidelberg, Germany, 2022

Organizer: Workshop (ESwML) at EuroSys 2024, Mini-symposium (ML4SW) at PASC'2024, Workshop (HIPS) at IPDPS'23, Mini-symposium at SIAM CSE'21, HIPS 2023

Committees

Board Member: Institutional Postdoc Program Board, LLNL

Technical Review Board: IEEE Transactions on Parallel and Distributed Systems, 2020-2021

Technical Program Committees: SC'24, PPoPP'24, PPoPP'23, HPDC'23, HiPC'23, HPDC'22, HIPC'22, IPDPS'22, ICPP'21, HiPC'21, Cluster'20, ICPP'20, CARLA'19, PASC'19, Euro-Par'19 PPoPP '19, ICPP '18, Euro MPI '18

Other Committees: LDRD ER Review Committee'23, SC'21 Workshop Committee, SC'20 Research Posters Committee

Other Reviewing: TPDS, TACO, IJHPCA, Concurrency and Computation: Practice and Experience, PMBS, FGCS

Selected Invited Talks & Panels

Feb, 2024 **Workshop on Differentiable Parallel Programming, PPoPP'24**,
Automatic Differentiation for Correctness and Correctness of Automatic Differentiation.

Mar, 2024 **Minisymposium on Reproducibility, SIAM-PP'24**,
Ensuring Reproducibility Amidst Approximate Computing.

Jun, 2023 **DOE/NSF Workshop on Correctness in Scientific Computing 2023**,
Ensuring Correctness in Programs Generated by LLM: Challenges and Solutions.

Nov, 2022 **Panelist, SC'22**,
Approximate Computing.

Nov, 2022 **Panelist, SC'22**,
Careers at HPC.

Aug, 2022 **Panelist, UC Santa Cruz Open Source Symposium 2022**,
Reproducibility in HPC.

Dec 13, 2021 **Differentiable Programming Workshop, NeurIPS'21**,
Approximate High Performance Computing Guided by Automatic Differentiation, Virtual.

Aug 11, 2020 **23rd European Workshop on Automatic Differentiation**,
Error Analysis Using Automatic Differentiation in HPC Applications, Virtual.

May 8, 2020 **ICERM workshop on Variable Precision in Mathematical and Scientific Computing**,
Automatic Mixed Precision Analysis and Transformation Tool, Virtual.

Publications

Peer Reviewed Conference & Journal Papers

[1] **Harshitha Menon**, Daniel Nichols, Abhinav Bhatele, and Todd Gamblin. Learning to predict and improve build successes in package ecosystems. 2024.

[2] Daniel Nichols, Aniruddha Marathe, **Harshitha Menon**, Todd Gamblin, and Abhinav Bhatele. Modeling parallel programs using large language models. *ISC*, 2024.

[3] Zane Fink, Konstantinos Parasyris, Giorgis Georgakoudis, and **Harshitha Menon**. Hpac-offload: Accelerating hpc applications with portable approximate computing on the gpu. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, pages 1–14, 2023.

[4] Jan Hueckelheim, **Harshitha Menon**, William S Moses, Bruce Christianson, Paul Hovland, and Laurent Hascoet. A short review of automatic differentiation pitfalls in scientific computing. In *ICML 2023 Workshop on Differentiable Almost Everything: Differentiable Relaxations, Algorithms, Operators, and Simulators*, 2023.

[5] **Harshitha Menon**, 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(02):7–15, 2023.

[6] Garima Singh, Baidyanath Kundu, **Harshitha Menon**, Alexander Penev, David J Lange, and Vassil Vassilev. Fast and automatic floating point error analysis with chef-fp. In *2023 IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, pages 1018–1028. IEEE, 2023.

[7] Zhimin Li, **Harshitha Menon**, Kathryn Mohror, Shusen Liu, Luanzheng Guo, Peer-Timo Bremer, and Valerio Pascucci. A visual comparison of silent error propagation. *IEEE Transactions on Visualization and Computer Graphics*, 2022.

[8] Harshitha Menon*, Konstantinos Parasyris*, Tom Scogland, and Todd Gamblin. Reliabuild: Searching for high-fidelity builds using active learning. *Mining Software Repositories*, 2022.

[9] Konstantinos Parasyris, 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*, pages 1–14. IEEE, 2022.

[10] James Diffenderfer, Daniel Osei-Kuffuor, and **Harshitha Menon**. Qdot: Quantized dot product kernel for approximate high-performance computing. *SIAM Journal on Scientific Computing (SISC)*, 2021.

[11] Zhimin Li, **Harshitha Menon**, Kathryn Mohror, Peer-Timo Bremer, Yarden Livant, and Valerio Pascucci. Understanding a program's resiliency through error propagation. In *Proceedings of the 26th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pages 362–373, 2021.

[12] Konstantinos Parasyris, Giorgis Georgakoudis, **Harshitha Menon**, James Diffenderfer, Ignacio Laguna, Daniel Osei-Kuffuor, and Markus Schordan. Hpac: Evaluating approximate computing techniques on hpc openmp applications. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, SC '21. IEEE, 2021. **Best Reproducibility Award**.

[13] Zhimin Li, **Harshitha Menon**, Dan Maljovec, Yarden Livnat, Shusen Liu, Kathryn Mohror, Peer-Timo Bremer, and Valerio Pascucci. Spotsdc: Revealing the silent data corruption propagation in high-performance computing systems. *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, 27(10):3938–3952, 2020.

[14] **Harshitha Menon**, Abhinav Bhatele, and Todd Gamblin. Auto-tuning parameter choices in hpc applications using bayesian optimization. In *2020 IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, pages 831–840. IEEE, 2020.

[15] Konstantinos Parasyris, Ignacio Laguna, **Harshitha Menon**, Markus Schordan, Daniel Osei-Kuffuor, Giorgis Georgakoudis, Michael O Lam, and Tristan Vanderbruggen. Hpc-mixpbench: An hpc benchmark suite for mixed-precision analysis. In *2020 IEEE International Symposium on Workload Characterization (IISWC)*, pages 25–36. IEEE, 2020.

[16] **Harshitha Menon**, Michael O. Lam, Daniel Osei-Kuffuor, Markus Schordan, Scott Lloyd, Kathryn Mohror, and Jeffrey Hittinger. Adapt: Algorithmic differentiation applied to floating-point precision tuning. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage, and Analysis*, SC '18. IEEE Press, 2018.

[17] **Harshitha Menon** and Kathryn Mohror. Discvar: Discovering critical variables using algorithmic differentiation for transient faults. In *Proceedings of the 23rd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pages 195–206. ACM, 2018.

[18] S. Bak, H. Menon, S. White, M. Diener, and L. Kale. Multi-level load balancing with an integrated runtime approach. In *2018 18th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGRID)*, pages 31–40, May 2018.

[19] Bilge Acun, Akhil Langer, Esteban Meneses, **Harshitha Menon**, Osman Sarood, Ehsan Totoni, and Laxmikant V. Kalé. Power, reliability, and performance: One system to rule them all. *IEEE Computer, Energy Efficient Computing Special Issue*, 49(10):30–37, Oct 2016.

[20] A Bastidas Fry, F Governato, A Pontzen, T Quinn, M Tremmel, L Anderson, H Menon, AM Brooks, and J Wadsley. All about baryons: revisiting sidm predictions at small halo masses. *Monthly Notices of the Royal Astronomical Society*, 452(2):1468–1479, 2015.

[21] **Harshitha Menon**, Lukasz Wesolowski, Gengbin Zheng, Pritish Jetley, Laxmikant Kale, Thomas Quinn, and Fabio Governato. Adaptive techniques for clustered n-body cosmological simulations. *Computational Astrophysics and Cosmology*, 2(1):1, 2015.

[22] Bilge Acun, Abhishek Gupta, Nikhil Jain, Akhil Langer, **Harshitha Menon**, Eric Mikida, Xiang Ni, Michael Robson, Yanhua Sun, Ehsan Totoni, et al. Parallel programming with migratable objects: Charm++ in practice. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, pages 647–658. IEEE Press, 2014.

Best Paper [23] Jonathan Lifflander, Esteban Meneses, **Harshitha Menon**, Phil Miller, Sriram Krishnamoorthy, and Laxmikant V Kalé. Scalable replay with partial-order dependencies for message-logging fault tolerance. In *2014 IEEE International Conference On Cluster Computing (CLUSTER)*, pages 19–28. IEEE, 2014. **Best Paper Award**.

[24] **Harshitha Menon**, Bilge Acun, Simon Garcia De Gonzalo, Osman Sarood, and Laxmikant Kalé. Thermal aware automated load balancing for hpc applications. In *Cluster Computing (CLUSTER), 2013 IEEE International Conference on*, pages 1–8. IEEE, 2013.

BP Finalist [25] **Harshitha Menon** and Laxmikant Kalé. A distributed dynamic load balancer for iterative applications. In *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC)*, page 15. ACM, 2013. **Best Student Paper Award Finalist**.

[26] **Harshitha Menon**, Nikhil Jain, Gengbin Zheng, and Laxmikant Kale. Automated load balancing invocation based on application characteristics. In *Cluster Computing (CLUSTER), 2012 IEEE International Conference on*, pages 373–381. IEEE, 2012.

Workshop Papers & Technical Reports

[27] Todd Gamblin, **Harshitha Menon**, Tom Scogland, and Mathew Legendre. Build: Binary understanding and integration logic for dependencies final report. Technical report, Lawrence Livermore National Laboratory (LLNL), Livermore, CA (United States), 2023.

[28] JA Hittinger, PG Lindstrom, H Bhatia, PT Bremer, DM Copeland, KK Chand, AL Fox, GS Lloyd, H Menon, GD Morrison, et al. Variable precision computing. Technical report, Lawrence Livermore National Lab.(LLNL), Livermore, CA (United States), 2019.

[29] Michael O Lam, Tristan Vanderbruggen, **Harshitha Menon**, and Markus Schordan. Tool integration for source-level mixed precision. In *2019 IEEE/ACM 3rd International Workshop on Software Correctness for HPC Applications (Correctness)*, pages 27–35. IEEE, 2019.

[30] **Harshitha Menon**, Chun-Kai Chang, Kathryn Mohror, and Mattan Erez. Identifying critical variables using algorithmic differentiation for a realistic fault model. In *Silicon Errors in Logic System Effects (SELSE)*, 2018.

[31] Seonmyeong Bak, **Harshitha Menon**, Sam White, Matthias Diener, and Laxmikant Kale. Integrating openmp into the charm++ programming model. In *Proceedings of the Third International Workshop on Extreme Scale Programming Models and Middleware at SC*, page 4. ACM, 2017.

[32] Markus Schordan, Jan Hückelheim, Pei-Hung Lin, and **Harshitha Menon**. Verifying the floating-point computation equivalence of manually and automatically differentiated code. In *Proceedings of the First International Workshop on Software Correctness for HPC Applications at SC*, pages 34–41. ACM, 2017.

[33] **Harshitha Menon**, Abhinav Bhatele, Sebastien Fourestier, Laxmikant Kale, and Francois Pellegrini. Applying graph partitioning methods in measurement-based dynamic load balancing. Technical report, 2015.

Ph.D. Dissertation

[34] **Harshitha Menon**. *Adaptive load balancing for HPC applications*. PhD thesis, University of Illinois at Urbana-Champaign, Urbana, Illinois, October 2016.