

# 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.

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## 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*.

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## 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

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## 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)

## 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 **Workshop on Reproducibility, SIAM-PP'24**,  
*Reproducibility in the Midst of Approximate Computing.*
- Nov, 2022 **Panelist, SC'22**,  
*Approximate Computing.*
- Nov, 2022 **Panelist, SC'22**,  
*Careers at 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: Accelerat-

- ing 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 Livnat, 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*, New York, NY, USA, 2021. Association for Computing Machinery.
  - [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 Toton, 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] **Harshitha Menon**, Konstantinos Parasyris, Tom Scogland, and Todd Gamblin. Reliabuild: Searching for high-fidelity builds using active learning, 2022.
- [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.