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## LIST OF PUBLICATIONS, PRESENTATIONS and STUDENT SUPERVISION

Raghavan specializes in computational data science and high performance computing, a.k.a supercomputing. She has led the development of “sparse algorithms” that derive from and operate on compact yet accurate representation of high-dimensional data, complex models, and computed results. She has developed parallel sparse solvers that limit the growth of computational costs and utilize the more than million-way concurrent computing capability of advanced hardware to enable the solution of large-scale modeling and simulation problems that are otherwise beyond reach. She has also developed algorithms and software for predictive computational modeling of materials and mechanical systems, and advanced sparse matrix and graph methods to increase the efficiency and quality of solutions produced by data mining schemes. Raghavan was among the first to propose the design of energy-efficient supercomputing systems by combining results from sparse scientific computing with hardware features for embedded mobile processors. Raghavan’s recent research focuses on resilient algorithms in the face of transient hardware errors and scheduling schemes for the efficient processing of data-intensive workflows when resource requirements are unpredictable.

**Total publications: 108 refereed publications, 6 edited volumes/book chapters/position papers.**

### Edited Volumes/Book Chapters/Position Papers

1. Realizing the Potential of Data Science. F. Berman, R. Rutenbar, B. Hailpern, H. Christensen, S. Davidson, D. Estrin, M. J. Franklin, M. Martonosi, P. Raghavan, V. Stodden and A. S. Szalay, Communications of the ACM Vol. 61, #4, pp.67—72, 2018.
2. Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis. SC 2017, Denver, CO, USA, Nov. 12 - 17, 2017, Editors B. Mohr and P. Raghavan, ACM, 2017.
3. Improving Classification through Graph Embeddings. A. Chatterjee\*, S. Bhowmick\* and P. Raghavan, *Graph Embedding for Pattern Analysis*, Editors, Y. Fu, Y. Ma, Springer, New York, pp. 119 – 138, 2013.
4. Special Issue: Selected Papers from Super Computing 2012. J. S. Vetter, P. Raghavan, Scientific Programming, 21 (3-4): 63-64, 2013
5. Parallel Processing for Scientific Computing. M. H. Heroux, P. Raghavan and H. D. Simon, SIAM book series on Software, Tools, and Environments including introductory and concluding chapters, Parallel Processing for Scientific Computing: An Overview, and Opportunities and Challenges for Parallel Computing in Science and Engineering, November 2006. A reviewer in InsideHPC on 06/23/2010 says “*Parallel is organized around the themes and problems presented at the Eleventh SIAM Conference on Parallel Processing for Scientific Computing, held in San Francisco in 2004... even though 2004 seems like a long time ago, the editors and contributors took care in the creation*

of this book, and it remains timely today.” (see <http://insidehpc.com/2010/06/review-parallel-processing-for-scientific-computing/>)

6. Symbolic Preprocessing Techniques for Information Retrieval Using Vector Space Models. M. W. Berry, P. Raghavan and X. Zhang\*, Computational Information Retrieval, SIAM Proceedings in Applied Mathematics, Editor M. W. Berry, SIAM, Philadelphia, pp. 75–86, 2001.

## Refereed Publications (\* indicates student/postdoctoral supervision by P. Raghavan)

### Computational Data Science:

Parallel matrix and graph algorithms, computational modeling and data analytics

7. A Scalability and Sensitivity Study of Parallel Geometric Algorithms for Graph Partitioning. S. Kirmani\*, H.\* Sun, and P. Raghavan. In Proceedings of the 9th Workshop on Applications for Multi-Core Architectures (WAMCA), Lyon, France, 2018.
8. An Embedded Sectioning Scheme for Multiprocessor Topology-Aware Mapping of Irregular Applications. P. Raghavan, S. Kirmani\* and J. Park\*, The International Journal of High Performance Computing Applications (IJHPCA), Vol 31, #1, pp. 91—103, 2017.
9. Locality-Aware Laplacian Mesh Smoothing, G. Aupy\*, J.H. Park\* and P. Raghavan, Proceedings of the 45th International Conference on Parallel Processing, ICPP 2016, Philadelphia, PA, USA, August 16-19, 2016, pp. 588—597, 2016.
10. STS-k: A Multilevel Sparse Triangular Solution Scheme for NUMA Multicores. H. Kabir\*, J. Booth\*, G. Aupy, A. Benoit, Y. Robert and P. Raghavan, Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, SC15, pp 55:1-11, Austin, TX, November 2015.
11. A Multilevel Compressed Sparse Row Format for Efficient Sparse Computations on Multicore Processors, H. Kabir\*, J. Booth\*, P. Raghavan, Proceedings of the 21<sup>st</sup> IEEE International Conference on High Performance Computing, HiPC 2014, Goa, India, pp 1-10, December 2014.
12. Hybrid Sparse Linear Solutions with Substituted Factorization. J. Booth\* and P. Raghavan, Proceedings of the International Meeting High Performance Computing for Computational Science, VECPAR 2014, Lecture Notes in Computer Science Volume 8969, 2015, pp 145-155, Eugene, OR, June 2014.
13. Scalable parallel graph partitioning. S. Kirmani\*, P. Raghavan, Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, SC'13, pp51:1-10, Denver, CO, November 2013. **Finalist for Best Student Paper award.**
14. NUMA-aware graph mining techniques for performance and energy efficiency. M.R. Frasca\*, K. Madduri, P. Raghavan, Proceedings of the SC Conference on High Performance Computing Networking, Storage and Analysis, SC '12, Salt Lake City, UT, November 2012.
15. Adapting Sparse Triangular Solution to GPUs. B. Suchoski\*, C. Severn\*, M. Shantharam\*, P. Raghavan, Proceedings of the 41st International Conference on Parallel Processing Workshops, Pittsburgh, PA, pp. 140–148, September 2012.
16. Fault tolerant preconditioned conjugate gradient for sparse linear system solution. M. Shantharam\*, S. Srinivasmurthy\*, P. Raghavan, Proceedings of the International Conference on Supercomputing, ICS'12, Venice, Italy, pp. 69–78 June 2012.
17. Similarity Graph Neighborhoods for Enhanced Supervised Classification. A. Chatterjee\*, P. Raghavan, Procedia Computer Science, 9: 577-586, 2012.
18. Feature subspace transformations for enhancing k-means clustering. A. Chatterjee\*, S. Bhowmick, P. Raghavan, Proceedings of the 19th ACM Conference on Information and Knowledge Management, CIKM 2010, pp. 1801-1804, October 2010.
19. Characterizing sparse preconditioner performance for the support vector machine kernel. A.

- Chatterjee\*, K. Fermoye\*, P. Raghavan, *Procedia Computer Science* 1(1): 367-375, 2010.
20. Characterizing the Impact of Soft Errors on Iterative Methods in Scientific Computing. M. Shantharam\*, S. Srinivasmurthy\*, P. Raghavan, *ACM International Conference on Supercomputing 2011*, 152-161, 2011, **short version awarded Best Poster at Supercomputing 2010**.
  21. Exploiting dense substructures for fast sparse matrix vector multiplication. M. Shantharam\*, A. Chatterjee\*, P. Raghavan, *International Journal of High Performance Computing Applications*, 25(3):328-341, 2011.
  22. A Multilevel Cholesky Conjugate Gradients Hybrid Solver for Linear Systems with Multiple Right-hand Sides. J. Booth\*, A. Chatterjee\*, P. Raghavan, M. Frasca\*, *Procedia Computer Science*, 4:2307-2316, 2011.
  23. Parallel Hybrid Preconditioning: Incomplete Factorization with Selective Sparse Approximate Inversion, P. Raghavan and K. Teranishi\*, *SIAM J. Scientific Computing* 32(3):1323-1345, 2010.
  24. PFFTC: An improved fast Fourier transform for the IBM cell broadband engine. A. Shaffer\*, B. Einfalt, P. Raghavan, *Procedia Computer Science*, 1(1):1045-1054, 2010.
  25. A Hybrid Parallel Preconditioner Using Incomplete Cholesky Factorization and Sparse Approximate Inversion, K. Teranishi\* and P. Raghavan, *Lecture Notes in Computational Science and Engineering, Domain Decomposition Methods in Science and Engineering XVI*, Vol. 55, pp. 757-764, 2007.
  26. Towards Low-Cost, High-Accuracy Classifiers for Linear Solver Selection, S. Bhowmick\*, B. Toth\* and P. Raghavan, *Proceedings of International Conference on Computational Science 2009*, pp. 463-472. *Lecture Notes in Computer Science*, Vol. 5544, Springer, 2009.
  27. An Evaluation of Limited Memory Sparse Linear Solvers for Thermo-Mechanical Applications, K. Teranishi\*, P. Raghavan, J. Sun\* and P. Michaleris, *International Journal of Numerical Methods for Engineering*, Wiley InterScience, ([www.interscience.wiley.com](http://www.interscience.wiley.com)) DOI: 10.1002/nme.2239, pp. 1690-1715, November 2007.
  28. Readily Regenerable Reduced Microstructure Representations, K. Teranishi\*, P. Raghavan, J. Zhang, T. Wang, L. Q. Chen and Z. K. Liu, *Computational Materials Science*, DOI: [//dx.doi.org/10.1016/j.commatsci.2007.07.015](https://doi.org/10.1016/j.commatsci.2007.07.015), 18 pages, March 2008.
  29. Analysis of the IPv4 Address Space Delegation Structure, A. Sriraman\*, K. Butler, P. McDaniel and P. Raghavan, pp. 501-508, *IEEE Symposium on Computers and Communications (ISCC'07)*, DOI: 10.1109/ISCC.2007.4381538, July 2007.
  30. Si Nanotrees: Structure and Electronic Properties, M. Menon, E. Richter, I. Lee\* and P. Raghavan, *J. of Computational and Theoretical Nanoscience*, Vol. 4, pp. 250-256, 2007.
  31. Applications of the FETI-DP-RBS-LNA algorithm on Coupled Linear-Nonlinear Large Scale Problems with Localized Nonlinearities, J. Sun\*, P. Michaleris, A. Gupta and P. Raghavan, *Lecture Notes in Computational Science and Engineering, Domain Decomposition Methods in Science and Engineering XVI*, Vol. 55, pp. 431-438, 2007.
  32. Effective Preconditioning through Ordering Interleaved with Incomplete Factorization, I. Lee\*, P. Raghavan and E. G. Ng, *SIAM Journal on Matrix Analysis and Applications*, 27(4):1069-1088, 2006.
  33. Parallel Hybrid Sparse Solvers Through Flexible Incomplete Cholesky Preconditioning, K. Teranishi\* and P. Raghavan, *Lecture Notes in Computer Science*, No. 3732, *Applied Parallel Computing*, pp. 637-643, 2006.
  34. Advanced Algorithms and Software Components for Scientific Computing, P. Raghavan, *Lecture Notes in Computer Science*, No. 3732, *Applied Parallel Computing*, pp. 590-592, 2006.
  35. A Fast Implementation of the FETI-DP Method: FETI-DP-RBS-LNA and Applications on Large Scale Problems with Localized Nonlinearities, J. Sun\*, P. Michaleris, A. Gupta and P. Raghavan *International Journal for Numerical Methods in Engineering*, 60(4):833-858, 2005.
  36. Large Scale Simulations of Branched Si-nanowires, M. Menon, E. Richter, I. Lee\*, K. Teranishi\* and P. Raghavan, *Proceedings of the IEEE/ACM International Workshop on High Performance Computing for Nano-science and Technology (HPCNano05)*, November 2005.
  37. Parallel Adaptive Solvers in Compressible PETSc-FUN3D Simulations, S. Bhowmick\*, D. Kaushik, L. McInnes, B. Norris and P. Raghavan. Argonne National Laboratory preprint ANL/MCS-P1279-

- 0805, Proceedings of the 17th International Conference on Parallel Computational Fluid Dynamics, August 2005.
38. An Integrated Framework for Multi-Scale Materials Simulation and Design, Z. K. Liu, L. Q. Chen, P. Raghavan, Q. Du, J. O. Sofo, S. Langer and C. Wolverton, *Journal of Computer-Aided Materials Design*, Volume 11, No. 2-3, pp. 183-199, 2004.
  39. Towards A Grid Enabled System for Multicomponent Materials Design, K. Teranishi\*, P. Raghavan and Z. K. Liu, Proceedings of CCGrid04: IEEE International Symposium on Cluster Computing and the Grid, Chicago, Illinois, IEEE Computer Society Press, 6 pages, April 2004.
  40. A Quality of Service Approach for High-Performance Numerical Components, P. Hovland, K. Keahey, L. C. McInnes, B. Norris, L. F. Diachin and P. Raghavan. Proceedings of the Workshop on Quality-of-Service in Component-Based Software Engineering, Software Technologies Conference, Toulouse, France, pp. 89-98, June 2003.
  41. Multi-Pass Mapping Schemes for Parallel Sparse Matrix Computations, K. Malkowski and P. Raghavan, *Lecture Notes in Computer Science, Computational Science-ICCS 2005*, Number 3514, pp. 245-255, May 2005.
  42. Faster PDE-Based Simulations Using Robust Composite Linear Solvers, S. Bhowmick\*, P. Raghavan, L. C. McInnes and B. Norris, *Future Generation Computer Systems*, Vol. 20, pp. 373-387, 2004.
  43. Robust Algorithms and Software for Parallel PDE-Based Simulations, S. Bhowmick\*, L. McInnes, B. Norris and P. Raghavan, Proceedings of HPC 2004, The Twelfth Special Symposium on High Performance Computing at the 2004 Advanced Simulation Technologies Conference, Arlington, VA, pp. 37-42, April 2004.
  44. A Latency Tolerant Hybrid Sparse Solver Using Incomplete Cholesky Factorization, P. Raghavan, K. Teranishi\* and E. G. Ng, *Numerical Linear Algebra*, Volume 10, pp. 541-560, 2003.
  45. Time-Memory Trade-offs Using Sparse Matrix Methods For Large-Scale Eigenvalue Problems, K. Teranishi\*, P. Raghavan and C. Yang, *Lecture notes in Computer Science 2677*, pp. 840-847, May 2003.
  46. Dimension Reduction in Spectral Element Methods, I. Lee\*, P. Raghavan, S. Schofield and P. Fischer, *Computational Fluid and Solid Mechanics 2003*, Proceedings of the Second MIT Conference on Computational Fluid and Solid Mechanics, Editor K. J. Bathe, Volume 2, pp. 2039-2042, June 2003.
  47. Adaptive Sparse Linear Solvers for Implicit CFD Using Newton-Krylov Algorithms, B. Norris, L. McInnes, S. Bhowmick\* and P. Raghavan, Proceedings of the Second MIT Conference on Computational Fluid and Solid Mechanics, Editor K. J. Bathe, Volume 2, pp. 1024-1028, June 2003.
  48. The Role of Multi-Method Linear Solvers in PDE-Based Simulations, S. Bhowmick\*, L. McInnes, B. Norris and P. Raghavan, *Lecture notes in Computer Science 2677*, pp. 828-839, May 2003.
  49. Scalable Sparse Matrix Techniques for Modeling Crack Growth, P. Raghavan, M. A. James, J. C. Newman and B. R. Seshadri, *Lecture Notes in Computer Science, Applied Parallel Computing*, pp. 588-602, June 2002.
  50. Experiences with FETI-DP in a Production Level Finite Element Code, K. Pierson, G. Reese and P. Raghavan, Proceedings of the 14th International Conference on Domain Decomposition Methods, also available in the electronic archive at <http://www.ddm.org/DD14/>, pp. 233-240, January 2002.
  51. Large-scale Normal Coordinate Analysis on Distributed Memory Parallel Systems, C. Yang, P. Raghavan, L. Arrowood\*, D. W. Noid, B. G. Sumpter and R. E. Tuzun, *Int. Journal of HighPerformance Computing Applications*, Vol. 1, pp. 409-424, 2002.
  52. A New Data-Mapping Scheme for Latency-Tolerant Distributed Sparse Triangular Solution, K. Teranishi\*, P. Raghavan and E. Ng, Proceedings of the IEEE/ACM Supercomputing 2002, IEEE Computer Society, paper 27, November 2002.
  53. A Combinatorial Scheme for Developing Efficient Composite Solvers, S. Bhowmick\*, P. Raghavan and K. Teranishi, *Lecture Notes in Computer Science, Computational Science-ICCS 2002*, Number 2330, Springer Verlag, pp. 325-334, May 2002.
  54. Towards Scalable Preconditioning Using Incomplete Factorization, P. Raghavan, K. Teranishi\* and

- E. Ng, Proceedings of the International Conference on Preconditioning Techniques, pp. 63-65, November 2001.
55. Level Search Techniques for Scalable Information Filtering and Retrieval, M. W. Berry, P. Raghavan and X. Zhang\*, Information Processing and Management, Vol. 37, pp. 313-334, 2001.
  56. A Grid Computing Environment for Enabling Large Scale Quantum Mechanical Simulations, J. J. Dongarra and P. Raghavan, Proceedings of GRID'2000: IEEE/ACM International Workshop on Grid Computing, Lecture Notes in Computer Science, No. 1971, Editors R. Buyya and M. Baker, pp. 102-110, December 2000.
  57. Towards A Scalable Hybrid Sparse Solver, E. G. Ng and P. Raghavan, Concurrency: Practice and Experience, Vol. 12, pp. 1-16, 2000.
  58. A Blocked Incomplete Cholesky Preconditioner for Hierarchical-Memory Computers, E. G. Ng, B. W. Peyton and P. Raghavan, IMACS Series in Computational and Applied Mathematics: Iterative Methods in Scientific Computation IV, pp. 211-222, October 1999.
  59. The Performance of Greedy Ordering Heuristics for Sparse Cholesky Factorization, E. G. Ng and P. Raghavan, SIAM Journal of Matrix Analysis and Applications, 20(4):902-914, 1999.
  60. Tools for Mapping Applications to CCMs, M. T. Jones, M. A. Langston and P. Raghavan, Proceedings of SPIE, Configurable Computing: Technology and Applications, Editor John Schewel, pp. 72-81, November 1998.
  61. Efficient Parallel Triangular Solution Using Selective Inversion, P. Raghavan, Parallel Processing Letters, Vol. 8, No. 1, pp. 29-40, 1998.
  62. The Performance of Parallel Sparse Triangular Solution, M. T. Heath and P. Raghavan, IMA Volumes in Mathematics and its Applications: Algorithms for Parallel Processing, Vol. 105, pp. 289-306, 1998.
  63. Parallel Ordering Using Edge Contraction, P. Raghavan, Parallel Computing, 23(8):1045-1067, 1997.
  64. Performance of a Fully Parallel Sparse Solver, M. T. Heath and P. Raghavan, International Journal of Supercomputing Applications, 11(1):49-64, 1997.
  65. A Comparison of Computational Complexities of HFEM and ABC Finite Element Methods, M. A. Nasir, P. Raghavan, W. C. Chew and M. T. Heath, Journal of Electromagnetic Waves and Applications, Vol. 11, pp. 1601-1617, 1997.
  66. Sparse Matrix Reordering Schemes for Browsing Hypertext, M. W. Berry, B. Hendrickson and P. Raghavan, Lectures in Applied Mathematics, Vol. 32: The Mathematics of Numerical Analysis, pp. 99-123, 1996.
  67. Distributed Sparse Gaussian Elimination and Orthogonal Factorization, P. Raghavan, SIAM Journal of Scientific Computing, Vol. 16, pp. 1462-1477, 1995.
  68. A Cartesian Parallel Nested Dissection Algorithm, M. T. Heath and P. Raghavan, SIAM Journal of Matrix Analysis and Applications, Vol. 16, pp. 235-253, 1995.
  69. Performance of a Fully Parallel Sparse Solver, M. T. Heath and P. Raghavan, Proceedings of the 1994 Scalable High Performance Computing Conference, IEEE Computer Society Press, pp. 334-341, May 1994.
  70. A Comparison of Computational Complexities of HFEM and ABC Based Finite Element Methods, M. A. Nasir, P. Raghavan, W. C. Chew and M. T. Heath, Proceedings of IEEE APS International Symposium, pp. 447-450, June 1994.
  71. Distributed Sparse Gaussian Elimination and Orthogonal Factorization, P. Raghavan, Proceedings of the 1994 Scalable High Performance Computing Conference, IEEE Computer Society Press, pp. 607-614, May 1994.
  72. Distributed Solution of Sparse Symmetric Positive Definite Systems, M. T. Heath and P. Raghavan, Proceedings of the 1993 Scalable Parallel Libraries Conference, IEEE Computer Society Press, October 1993.
  73. Distributed Orthogonal Factorization: Givens and Householder Algorithms, A. Pothen and P. Raghavan, SIAM Journal of Scientific Computing, Vol. 10, No. 6, pp. 1113-1134, 1989.

74. Distributed Orthogonal Factorization, A. Pothen and P. Raghavan, Proceedings of the Third ACM Conference on Hypercube Concurrent Computers and Applications, pp. 1610-1620, June 1988.

#### External Funding:

- National Science Foundation, Division of Computer and Communications Foundations, *SHF: Small: Embedded Graph Software-Hardware Models and Maps for Scalable Sparse Computations*, P. Raghavan, \$424,999, 2013-2018, **completed, PI**.
- National Science Foundation, CNS Data-Intensive Computing, DC: Small: *Adaptive Sparse Data Mining on Multicores*, P. Raghavan and M. Kandemir, \$449,998, 2010-2014, **completed, PI**.
- National Science Foundation, Division of Computer and Communication Foundations, *Toward a Linear Time Sparse Solver with Locality-Enhanced Scalable Parallelism*, P. Raghavan, \$200,000, 2008-2013, **completed, PI**.
- U.S. Army Corps of Engineers, Engineer Research and Development Center, *A Smart Solver Selection Toolkit for Faster PDE-Based Simulations*, P. Raghavan, \$105,849, 2009-2011, **completed, PI**.
- National Science Foundation, *Center for Computational Materials Design (IIP-0541674)*, Z. K. Liu, L.Q. Chen, J. Kubucki, P. Raghavan and J. Sofo, approximately \$400,000, October 2005 - October 2011, **completed, Co-PI**.
- National Science Foundation, Major Research Instrumentation Program, *MRI Acquisition of a Scalable Instrument for Discovery through Computing*, P. Raghavan, L. Q. Chen, P. J. Hudson, M. T. Kandemir and B. K. Smith, \$1,855,501, 2008-2012, **completed, PI**.
- IBM, SUR grant, *Toward a Parallel Preconditioned Conjugate Gradients Sparse Solver for the Cell Processor*, P. Raghavan, V. Agarwala, and J. Nucciarone, \$100,000, October 2007-October 2008, **completed, PI**.
- National Science Foundation, Information Technology Research ‘medium’ award, *ITR: Computational Tools for Multicomponent Materials Design (DMR-0205232)*, Z. K. Liu, L.Q. Chen, P. Raghavan and Q. Du, \$2,900,000, 2002-2008, **completed, Co-PI**.
- National Science Foundation, *(I<sup>3</sup>C): An Infrastructure for Innovation in Information Computing (CNS-0102007)*, C. Das, R. Acharya, L. Giles, M. J. Irwin, and P. Raghavan, \$1,795,729, 2002-2008, **completed, Co-PI**.
- National Science Foundation, Information Technology Research ‘small’ award, *ITR: Large Scale Quantum Mechanical Simulations of Nanomechanics (EIA-0221916)*, M. Menon and P. Raghavan, \$394,843, 2002-2006, **completed, Co-PI**.
- Department of Energy, *SciDac Terascale Optimal PDE Simulation: An Enabling Technology Center*, multi-site project lead by D. Keyes, subcontract from the Lawrence Berkeley National Laboratory, P. Raghavan, \$108,000, 2002-2005, **completed, PI**.
- Argonne National Laboratory (Department of Energy) and the University of Chicago, *The Maria Goeppert-Mayer Distinguished Scholar Award*, P. Raghavan, \$171,349, 2002-2003, **completed, PI**.
- National Science Foundation, *Robust Limited Memory Hybrid Sparse Solvers (0102537)*, P. Raghavan, \$315,473, 2001-2005, **completed, PI**.
- National Science Foundation, *Grant to Support Activities at the Eleventh SIAM Conference on Parallel Processing for Scientific Computing (CCF-0340869)*, San Francisco, CA, February 2004, P. Raghavan (conference Co-Chair), \$17,000, August 2003-March 2004, **completed, PI**.
- National Science Foundation, *Fabrication of Fullerene Based Novel Molecular Electronic Devices Using Quantum Mechanical Simulations*, M. Menon and P. Raghavan, \$87,078, 2001-2002, **completed, PI**.
- National Aeronautics and Space Administration (NASA), *An Efficient Scheme for Updating Sparse Cholesky Factors*, P. Raghavan, \$20,000, 2001-2002, **completed, PI**.

- National Science Foundation, *SInRG: A Scalable Intracampus Research Grid*, J. J. Dongarra, M. D. Beck, M. W. Berry, J. Gregor, and M. A. Langston, \$1,751,088, 2000-2005, **completed, senior-personnel**.
- National Science Foundation, *Enabling Technology for High-Performance Heterogeneous Clusters*, J. J. Dongarra, P. Raghavan and J. S. Plank, support only for instrumentation, \$150,000, 1999-2002, **completed, Co-PI**.
- National Science Foundation, *Scalable Sparse Solvers*, P. Raghavan, \$182,000, 1998-2002, **completed, PI**.
- National Science Foundation, *High-Performance ATM Network*, M. W. Berry, J. Gregor, M. T. Jones, J. S. Plank and P. Raghavan, \$100,000, 1996-1997, **completed, PI**.
- Defense Advanced Research Projects Agency (DARPA), *Portable Parallel Preconditioning*, J. G. Gilbert, E. G. Ng, B. W. Peyton and P. Raghavan, \$600,000, 1996-1999, **completed, Co-PI**.
- Defense Advanced Research Projects Agency (DARPA), *Scalable Libraries, multi-site project* lead by J. J. Dongarra, subcontract to P. Raghavan, from the Sparse Direct Solvers component directed by M. T. Heath, \$130,000, 1996-1999, **completed, PI**.
- National Science Foundation, *Parallel Sparse Matrix Computations*, P. Raghavan, **CAREER award**, \$131,651, 1995-2000, **completed, PI**.

### **High Performance Computing (supercomputing):**

Energy-efficient, scalable and resilient design and implementation

75. Scheduling Parallel Tasks under Multiple Resources: List Scheduling vs. Pack Scheduling. H. Sun\*, R. Elghazi, A. Gainaru\*, G. Aupy\* and P. Raghavan, 2018 IEEE International Parallel and Distributed Processing Symposium, IPDPS 2018, Vancouver, BC, Canada, May 21-25, pp. 194—203, 2018.
76. Coping with silent and fail-stop errors at scale by combining replication and checkpointing. A. Benoit, A. Cavelan\*, F. Cappello, P. Raghavan, Y. Robert, H. Sun\*. *Journal of Parallel and Distributed Computing*, 122: 209-225, 2018.
77. Co-scheduling Amdahl applications on cache-partitioned systems. G. Aupy\*, A. Benoit, S. Dai, L. Pottier, P. Raghavan, Y. Robert and M. Shantharam\*, *The International Journal of High Performance Computing Applications (IJHPCA)*, Vol 32, #1, pp. 123—138, 2018.
78. Co-Scheduling Algorithms for Cache-Partitioned Systems. G. Aupy\*, A. Benoit, L. Pottier, P. Raghavan, Y. Robert and M. Shantharam\*, 2017 IEEE International Parallel and Distributed Processing Symposium Workshops, IPDPS Workshops 2017, Orlando / Buena Vista, FL, USA, pp. 874—883, 2017.
79. Co-scheduling algorithms for cache-partitioned systems. G. Aupy\*, A. Benoit, L. Pottier., P. Raghavan, Y. Robert and M. Shantharam\*, 2017 IEEE International Parallel and Distributed Processing Symposium Workshops, IPDPS Workshops 2017, Orlando / Buena Vista, FL, USA, pp. 874—883, 2017.
80. Co-scheduling algorithms for high-throughput workload execution. G. Aupy\*, M. Shantharam\*, A. Benoit, Y. Robert and P. Raghavan, *Journal of Scheduling*. Vol 19, #6, pp. 627—640, 2016.
81. Phase Detection with Hidden Markov Models for DVFS on Many-Core Processors. J. Booth\*, P. Raghavan, *Proceedings of the 35<sup>th</sup> IEEE International Conference on Distributed Computing Systems (ICDCS 2015)*, pp 185-195, Columbus, OH June 2015.
82. Speedup-Aware Co-Schedules for Efficient Workload Management. M. Shantharam\*, Y. Youn\*, P. Raghavan, *Parallel Processing Letters*, 23 (2), 2013.
83. Interference Resolver in Shared Storage Systems to Provide Fairness to I/O Intensive Applications. R. Prabhakar, M. T. Kandemir, P. Raghavan, M. Jung, *Proceedings of the 2013 IEEE International Symposium on Parallel & Distributed Processing, Workshops and PhD Forum*, Cambridge, MA, pp. 1971-1980, May 2013.

84. Phase Partitioning Methods for I/O Cache Optimization. M. R. Frasca\*, P. Raghavan, Proceedings of the 41st International Conference on Parallel Processing, ICPP 2012, Pittsburgh, PA, pp. 360–368, September 2012.
85. Virtual I/O Caching: Dynamic Storage Cache Management for Concurrent Workloads. M. Frasca\*, R. Prabhakar, P. Raghavan, M. T. Kandemir, Supercomputing 2011:38.
86. Can models of scientific software-hardware interactions be predictive? M. Frasca\*, A. Chatterjee\*, P. Raghavan, Procedia Computer Science, 4:322-331, 2011.
87. Intra-Application Cache Partitioning, S. P. Muralidhara, M. Kandemir and P. Raghavan, Proceedings of the 24nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2010, 1-12.
88. Analyzing the Soft-Error Resilience of Linear Solvers on Multicore Multiprocessors, K. Malkowski\*, P. Raghavan and M. Kandemir, Proceedings of the 24nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2010, 1-12.
89. T-NUCA -A Novel Approach to Non-Uniform Access Latency Cache Architectures for 3D CMPs, K. Malkowski\*, P. Raghavan, M. Kandemir and M. J. Irwin, Proceedings of the 6th Workshop on High Performance, Power-Aware Computing (HPPAC), in conjunction with 24nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS Workshops-2010, 1-8.
90. Intra-Application Shared Cache Partitioning For Multithreaded Applications, S. P. Muralidhara\*, M. Kandemir and P. Raghavan, Proceedings of 15th ACM SIGPLAN Annual Symposium on Principles and Practices of Parallel Programming (PPoPP 2010), January 2010.
91. Dynamic Core Partitioning for Energy Efficiency. Y. Ding\*, M. Kandemir, M. J. Irwin and P. Raghavan, Proceedings of the 6th Workshop on High Performance, Power-Aware Computing (HPPAC), in conjunction with 24nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2010, IPDPS Workshops 2010: 1-8.
92. Markov Model Based Disk Power Management for Data Intensive Workloads. R. Garg\*, S. Woo Son, M. T. Kandemir, P. Raghavan, R. Prabhakar, 9th IEEE/ACM International Symposium on Cluster Computing and the Grid, CCGRID 2009: 76-83.
93. Adapting Application Execution in CMPs Using Helper Threads, Y. Ding\*, M. Kandemir, P. Raghavan and M. J. Irwin. Journal of Parallel and Distributed Computing, **Invited Paper**, 69(9):790-806, 2009.
94. Adapting Application Mapping to Systematic Within-die Process Variations on Chip Multiprocessors. Y. Ding\*, M. Kandemir, M.J. Irwin and P. Raghavan, Proceedings of International Conference on High Performance Embedded Architectures & Compilers, pp. 231-247, 2009.
95. Ring Data Location Prediction Scheme for Non-Uniform Cache Architectures, S. Akikoa\*, F. Li, K. Malkowski\*, P. Raghavan, M. Kandemir and M. J. Irwin, Proceedings of XXVI IEEE International Conference on Computer Design, ICCD'08, pp. 693-698, 2009.
96. Hybrid Techniques for Fast Multicore Simulation, M. Shantharam\*, P. Raghavan and M. Kandemir, Euro-Par 09: Proceedings of the 15th International Euro-Par Conference on Parallel Processing, pp. 122-134, Springer Verlag, 2009.
97. Performance and Power Impacts of Memory Latency Hiding for Sparse Matrix Vector Multiplication on Multi-Core Architectures, M. Shantharam\*, K. Malkowski\* and P. Raghavan, Post conference Proceedings of the 9th International Workshop on State-of-the-Art in Scientific and Parallel Computing (PARA 2008), May 2008.
98. A Helper Thread Based EDP Reduction Scheme for Adapting Application Execution in CMPs, Y. Ding\*, M. Kandemir, P. Raghavan and M. J. Irwin. 22nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2008, pp. 1-14, DOI: 10.1109/IPDPS. 2008.4536297. **Best Paper, Software Track; 4 Best Papers, one per track out of 410 submitted papers.**
99. Evaluating the Role of Scratchpad Memories in Chip Multiprocessors for Sparse Matrix Computations, A. Yanamandra, B. Cover\*, P. Raghavan. M. J. Irwin and M. Kandemir, 22nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2008, pp. 1-10,



- DOI:0.1109/IPDPS.2008.453631, April 2008.
100. Managing Power, Performance and Reliability Trade-offs, P. Raghavan, M. Kandemir, M. J. Irwin and K. Malkowski\*, Next Generation Software Workshop, Proceedings of 22nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2008, pp. 1-6, April 2008.
  101. Towards Energy Efficient Scaling of Scientific Codes Y. Ding\*, K. Malkowski\*, P. Raghavan and M. Kandemir, High Performance, Power-Aware Computing Workshop. Proceedings of 22nd IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2008, pp. 1-8, April 2008.
  102. Adapting Application Execution to Reduced CPU Availability, Y. Ding\*, M. Kandemir, P. Raghavan and M. J. Irwin, INTERACT at IEEE 13th International Symposium on High Performance Computer Architecture, HPCA-INTERACT'07, pp. 24-31, February 2007.
  103. Scientific Algorithms: Performance, Power, Thermal Properties on Modern Computing Architectures, I. Lee\*, P. Raghavan, Workshop on Unique Chips and Systems, pp. 1-8, April 2007.
  104. Load Miss Prediction for Energy-Aware High Performance Computing, K. Malkowski\*, G. Link\*, P. Raghavan and M. J. Irwin, 21st IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2007, High Performance, Power-Aware Computing Workshop, pp. 1-8, DOI:10.1109/IPDPS.2007.370536, March 2007.
  105. Memory Optimizations for Fast Power-Aware Sparse Computations, K. Malkowski\*, P. Raghavan and M.J. Irwin, Proceedings of the 21st IEEE/ACM International Parallel and Distributed Symposium, IPDPS-2007, Next Generation Software Workshop, pp. 1-8, DOI:10.1109/IPDPS.2007.370501, March 2007.
  106. Reducing energy consumption of parallel sparse matrix applications through integrated link/CPU voltage scaling, S. W. Son\*, K. Malkowski\*, G. Chen, M. T. Kandemir, P. Raghavan, The Journal of Supercomputing, DOI: 10.1007/s11227-007-0113-9, 41(3):179-213, September 2007.
  107. Phase-Aware Adaptive Hardware Selection for Power-Efficient Scientific Computing, K. Malkowski\*, P. Raghavan, M. Kandemir and M. J. Irwin, ISLPED, pp. 403-406, DOI:10.1145/1283780.1283869, August 2007.
  108. Modeling of Link Shutdown Opportunities During Collective Communication Primitives in 3-D Torus Nets, S. Conner, S. Akioka\*, G. M. Link, M. J. Irwin and P. Raghavan, 21st IEEE International Parallel and Distributed Symposium, IPDPS-2007, High Performance, Power-Aware Computing Workshop, pp. 1-8, March 2007.
  109. On Improving Performance and Energy Profiles of Sparse Scientific Applications, K. Malkowski\*, I. Lee\*, P. Raghavan and M. Irwin, Proceedings of the 20th IEEE/ACM International Parallel and Distributed Symposium, IPDPS'06, Next Generation Software Workshop, pp. 1-8, DOI:10.1109/IPDPS.2006.1639589, April 2006.
  110. Conjugate Gradient Sparse Iterative Solvers: Performance-Power Characteristics, K. Malkowski\*, I. Lee\*, P. Raghavan and M. Irwin, Proceedings of the 20th IEEE/ACM International Parallel and Distributed Symposium, Second High Performance, Power-Aware Computing Workshop, pp. 1-8, DOI: 10.1109/IPDPS.2006.1639595, April 2006.
  111. Integrated Link/CPU Voltage Scaling for Reducing Energy Consumption of Parallel Sparse Matrix Applications, S. W. Son, K. Malkowski\*, G. Chen, M. T. Kandemir and P. Raghavan, Proceedings of the 20th IEEE/ACM International Parallel and Distributed Symposium, IPDPS'06, Second High-Performance, Power-Aware Computing Workshop, pp. 1-8, DOI:10.1109/IPDPS.2006.1639596, April 2006.
  112. Characterizing the Performance and Energy Attributes of Scientific Simulations, S. Akioka\*, K. Malkowski\*, P. Raghavan, M. J. Irwin, L. C. McInnes and B. Norris, Lecture Notes in Computer Science, Volume 399/2006, pp. 242-249, January 2006.
  113. Adaptive Software for Scientific Computing: Co-Managing Quality-Performance-Power Tradeoffs, P. Raghavan, M. J. Irwin L. C. McInnes and B. Norris Proceedings of the Next Generation Software Workshop at the 19th IEEE/ACM International Parallel and Distributed Symposium, IPDPS-05 Vol. 11, No. 11, p. 220b, 19th, 2005.
  114. Reducing Power with Performance Constraints for Parallel Sparse Applications, G. Chen, Reducing

Power with Performance Constraints for Parallel Sparse Applications, G. Chen, K. Malkowski\*, M. Kandemir and P. Raghavan, Proceedings of the High Performance, Power-Aware Computing Workshop at the 19th IEEE/ACM International Parallel and Distributed Symposium, IPDPS-05 Vol. 12, No. 12, p. 231a, 19th, 2005.

### External Funding:

- National Institutes of Health, NCATS, The Vanderbilt Institute for Clinical Translational Research (VICTR), subcontract Vanderbilt University Medical Center, \$972,840, 2017-2022, **in progress, PI.**
- National Science Foundation, XPS: FULL: DSD: End-to-end Acceleration of Genomic Workflows on Emerging Heterogeneous Supercomputers, K. Madduri, M. Kandemir, P. Medvedev, P. Raghavan, \$849,984, 2014-2017, **completed, Co-PI.**
- National Science Foundation, CISE Computer Systems Research, SHF: Medium: *Automatic Control Driven Resource Management in Chip Multiprocessors*, M. Kandemir, P. Raghavan and Q. Wang, \$1,200,000, 2010-2014, **completed, Co-PI.**
- National Science Foundation, CISE HECURA program, *Collaborative Research: Achieving End-to-End QoS in the I/O Stack on Petascale Multiprocessors*, M. Kandemir, P. Raghavan, J. Dennis and Q. Wang, \$708,551, 2009-2014, **completed, Co-PI.**
- National Science Foundation, OCI, US and China Workshop Series to Build a Collaborative Framework for Developing Shared Software Infrastructure, \$443,233, multi-university. PSU sub-award, \$18,967, 2008-2012, **completed, Raghavan was PSU lead.**
- National Science Foundation, CISE-Computer Systems Research, *Toward Model-Driven Multilevel Analysis and Optimization of Multicomponent Computer Systems*, P. Raghavan, M. J. Irwin, M. Kandemir, J. Li, and S. Shontz, \$855,729, 2007-2010, **completed, PI.**
- Maryland Procurement Office (NSA), *CMP Optimizations- Parts I & II*, P. Raghavan, \$184,571, 2007-2009, **completed, PI.**
- National Science Foundation, *Adaptive Software for Extreme-Scale Scientific Computing: Co-Managing Quality-Performance-Power Tradeoffs* (CCF-0444345), P. Raghavan, M. J. Irwin (Co-PI), L. C. McInnes and B. Norris (collaborators) \$950,000, 2004-2009, **completed, PI.**
  - *Research Experience for Undergraduates Supplement*, \$6,000, May 2005-December 2005, **completed, PI.**
  - National Science Foundation, *A Set of Multi-Tiered Interventions at Critical Pipeline Stages: Broadening Participation in Computing Supplement*, \$149,900, 2006-2007, **completed, PI.**
- National Science Foundation, *A Study of an Automated Development Environment for Parallel Computing with Reconfigurable Processing Elements*, M. A. Langston, P. Raghavan and D. W. Bouldin, \$315,473, 2000-2003, **completed, Co-PI.**
- The University of Tennessee (SARIF Equipment and Infrastructure Fund), *A Linux-Based Parallel Computing Cluster for Computational Chemistry Algorithm Design*, R. J. Hinde and P. Raghavan, instrumentation, \$12,000, 1999-2000, **completed, Co-PI.**

### RESEARCH SOFTWARE

Software developed by Raghavan embodies novel algorithms for computational science and engineering and mathematical principles.

1. **DSCPACK:** A Domain-Separator Cholesky Package for the multifrontal solution of sparse linear systems, P. Raghavan. The software is suitable for multiprocessors with message passing (MPI) and includes mechanisms for latency tolerant, fast repeated solves (by inquiry).

2. **MATCASE:** A Web-Based Laboratory for Multicomponent Materials Design, P. Raghavan and K. Teranishi, Raghavan is the principal developer of the services based software architecture to combine knowledge bases with on-demand multi-scale simulations on computational grids (wide-area high performance computing systems). The system enables scientists to interactively explore the design of the technologically important Al-Cu-Mg-Si alloys. It enables the prediction of macro-structural properties such as stress fields, by automating the generation of simulated micro-structures, their subsequent analyses using finite-element methods, and design-space exploration using reduced-order representations. Limited-use release to industry partners through the NSF funded IUCRC “Center for Computational Materials Design.”

#### **SELECTED INVITED PRESENTATIONS (2005 – PRESENT)**

- 4/18 Purdue University, West Lafayette, IN, *Rethinking Performance and Resiliency for Massively Parallel Processing of Large Sparse Data Sets.*
- 7/18 Workshop on Clusters, Clouds and Data for Scientific Computing, Chemin de Chanze, France, *Rethinking the Computational Complexity and Efficiency in the Age of ‘Big Data.’*
- 11/18 IEEE/ACM Supercomputing, SC’18, Dallas, TX, *Superscaling Performance through Energy-Efficient Supercomputing.*
- 9/16 The 28th International Workshop on Languages and Compilers for Parallel Computing, Raleigh, NC, USA, Keynote, *Toward programming models for parallel processing of sparse data sets.*
- 7/15 Algorithms and Scheduling Techniques to Manage Resilience and Power Consumption in Distributed Systems, Schloss Dagstuhl, Germany, *Scheduling for parallel sparse matrix computations.*
- 3/15 SIAM Conference on Computational Science and Engineering (SIAM CSE15), Salt Lake City, UT, Panel Speaker, *The Future of CSE as a Discipline.*
- 9/14 Clusters and Computational Data for Scientific Computing Workshop, Lyon, France, *Sparse computations and soft errors*
- 7/14 9<sup>th</sup> Scheduling for Large Scale Systems Workshop, Lyon, France, *Energy-aware high throughput co-schedules*
- 11/13 EarthCube End-User Domain Workshop for Rock Deformation and Mineral Physics Research 2013, Alexandria, VA, *Cyberscience: driving innovations through computational and data-enabled research*
- 8/13 National Science Foundation Division of Advanced Cyberinfrastructure Directorate for Computer and Information Science and Engineering, Washington, D.C., *Science in the Digital Age: Experiences & Perspectives*
- 9/12 Clusters, Clouds & Data for Scientific Computing CCDSC 2012, Dareizé, France, *Strong Scaling for Sparse Codes: Myth or Reality?*

- 6/12 7th International Workshop on Parallel Matrix Algorithms and Applications (PMAA'12), Birkbeck University of London, UK, *Achieving energy-aware high performance for parallel sparse matrix and graph computations*
- 9/11 China-USA Computer Software Workshop, sponsored by the National Natural Science Foundation of China (NSFC) and the US National Science Foundation (NSF), Peking University, Beijing, China, *Extreme-Scale Software*
- 5/11 Advanced Computing and Computational Sciences Division, Army Research Laboratory, Aberdeen, MD, *New Dimensions to Parallel Computing: Co-managing Performance, Reliability, Energy Trade-offs*
- 4/10 Computer Science, Cornell University, Ithaca, NY, *Energy-Aware Scalability of Parallel Sparse Scientific Computing*
- 5/09 Scheduling for large-scale systems, Knoxville, TN, *Energy-Aware Scheduling for Scalable Matrix Computations*
- 2/09 Indiana University School of Informatics, Bloomington, IN, *Sparsity, Structure, Parallelism and Power*
- 11/08 International Conference for High Performance Computing, Networking, Storage and Analysis (Supercomputing 2008), Austin, TX, *Energy-Aware Algorithms at the Exascale*
- 3/08 Thirteenth SIAM Conference on Parallel Processing for Scientific Computing (SIAM-PP08), Atlanta, GA, *When Sparse Applications Meet Architectures*
- 12/07 Third Asian-Pacific Congress on Computational Mechanics, with the Eleventh International Conference on Enhancement and Promotion of Computational Methods in Engineering and Science, Kyoto International Conference Center, Kyoto, Japan, *Scalable Parallel Preconditioning through Selective Sparse Approximate Inversion*
- 8/07 1007 ASM/TMS Annual Symposium, Computational Materials Design, GE Global Research, Niskayuna, NY, *Readily Regenerable Reduced Microstructure Representations*
- 7/07 International Conference on Preconditioning Techniques for Large Sparse Matrix Problems, Toulouse, France, *Parallel Hybrid Preconditioners*
- 7/07 Department of Defense, Conference on Multicore Processing, Washington, D.C., *Challenges in Co-Managing Performance and Power Profiles of Advanced Systems*
- 12/06 Computer Science and Engineering, The Ohio State University, *Sparse Computations and Computer Architecture: Improving Performance and Energy Profiles*
- 10/06 International Symposium for Integrated Predictive Simulation System for Earthquake and Tsunami Disaster, University of Tokyo, Japan, *Power-Aware High Performance Scientific Computing*
- 10/06 International Workshop on Numerical Methods and Large-Scale Scientific Computation, University of Tokyo, *SuperSolvers: Hybrid, Adaptive and Composite Solvers*

- 8/06 Workshop on Cyberinfrastructure for Materials Science, National Science Foundation, Division of Materials Research, Washington DC, *Cyberinfrastructure Challenges for Materials Design Optimization*
- 7/06 SIAM Annual Meeting, Boston, *Parallel Hybrid Solvers*
- 2/06 Architectures and Algorithms for Petascale Computing, Dagstuhl Seminar, Schloss Dagstuhl, International Conference and Research Center for Computer Science Universität des Saarlandes, Germany, *Energy Aware Optimization for Sparse Scientific Computing*
- 9/05 Information Technology Division, Air Force Rome Laboratory, Rome, NY, *Parallel Scientific Computing and Its Applications*

### **SELECTED CONTRIBUTED CONFERENCE PRESENTATIONS (2005 – PRESENT)**

The presenter is listed first, students supervised by Raghavan are indicated by an ‘\*’.

- 12/14 21<sup>st</sup> IEEE International Conference on High Performance Computing (HiPC 2014), Goa, India, *A Multilevel Compressed Sparse Row Format for Efficient Sparse Computations on Multicore Processors*, H. Kabir\*, J. Booth\*, P. Raghavan
- 6/14 International Meeting High Performance Computing for Computational Science (VECPAR 2014), Eugene, OR, *Hybrid Sparse Linear Solutions with Substituted Factorization*, J. Booth\*, P. Raghavan
- 11/13 International Conference for High Performance Computing, Networking, Storage and Analysis (SC’13), Denver, CO, *Scalable parallel graph partitioning*, S. Kirmani\*, P. Raghavan
- 2/13 SIAM Conference on Computational Science & Engineering. Boston, MA, *Algorithms for Soft-error Resilience in Sparse Linear Solvers*, R. Saksena\*, P. Raghavan
- 2/13 SIAM Conference on Computational Science and Engineering (CSE 2013). Boston, MA, *Locality Aware Scheduling of Sparse Computations for Energy and Performance Efficiencies*, P. Raghavan, M. Frasca
- 2/12 Conference on Parallel Processing for Scientific Computing, Savannah GA, *Speedup-aware Co-schedules for Energy Efficient Workload Management*, M. Shantharam and P. Raghavan
- 11/11 Supercomputing, Seattle, WA, *Virtual I/O Caching: Dynamic Storage Cache Management for Concurrent Workloads*, M. Frasca\*, R. Prabhakar, P. Raghavan, M. T. Kandemir
- 6/11 International Conference on Computational Science, Singapore, *A Multilevel Cholesky Conjugate Gradients Hybrid Solver for Linear Systems with Multiple Right-hand Sides*, P. Raghavan, J. Booth\*, A. Chatterjee\*, M. Frasca\*
- 6/11 International Conference on Computational Science, Singapore, *Can models of scientific software-hardware interactions be predictive?* P. Raghavan, M. Frasca\*, A. Chatterjee\*
- 5/11 International Conference on Supercomputing 2011, Phoenix AZ, *Characterizing the Impact of Soft Errors on Iterative Methods in Scientific Computing*, M. Shantharam\*, S. Srinivasmurthy\*, P. Raghavan

- 4/08 SIAM Text Mining in conjunction with the 8<sup>th</sup> SIAM International Conference on Data Mining, Atlanta, GA, *FAST: Force-directed Approximate Subspace Transformation Improve Unsupervised Classification*, A. Chatterjee\*, S. Bhowmick and P. Raghavan
- 2/08 Gene Golub Symposium, University of Illinois, Urbana-Champaign, IL, *Preconditioning with Selective Sparse Approximate Inversion*, P. Raghavan and K. Teranishi\*
- 2/08 Center for Computational Materials Design Annual Meeting 2008, Atlanta, GA, *Software Engineering of Phase-field Codes*, A. Chatterjee\*, J. Zhang, P. Raghavan and L. Q. Chen
- 10/07 Center for Advanced Studies Conference 2007 (CASCON 2007), Toronto, Canada, *Challenges in Parallelizing Irregular Computations*, K. Malkowski\* and P. Raghavan
- 8/07 International Symposium on Low Power Electronics and Design 2007 (ISLPED 2007), Portland, OR, *Phase-Aware Hardware Adaptivity for Energy-Aware High Performance Computing*, K. Malkowski\*, P. Raghavan, M. Kandemir and M. J. Irwin
- 7/07 IEEE Symposium on Computers and Communications (ISCC'07), Aveiro, Portugal, *Analysis of the IPv4 Address Space Delegation Structure*, A. Sriraman\*, K. Butler, P. McDaniel and P. Raghavan
- 4/07 Workshop on Unique Chips and Systems (UCAS-3), San Jose, CA, *Scientific Algorithms: Performance, Power, Thermal Properties on Modern Computing Architectures*, I. Lee\*, P. Raghavan
- 2/07 SIAM Computational Science, Costa Mesa, CA, *On-Line Microstructure Repository for Predictive Analyses*, K. Teranishi\*, P. Raghavan, Z. K. Liu and L. Q. Chen
- 2/07 INTERACT at IEEE 13th International Symposium on High Performance Computer Architecture, HPCA-INTERACT'07, Phoenix, AZ, *Adapting Application Execution to Reduced CPU Availability*, Y. Ding\*, M. Kandemir, P. Raghavan and M. J. Irwin
- 2/06 SIAM Conference on Parallel Processing for Scientific Computing. San Francisco, CA, *Improving Performance and Power for Sparse Scientific Computing*, P. Raghavan, K. Malkowski and M. J. Irwin
- 2/06 SIAM Conference on Parallel Processing for Scientific Computing. San Francisco, CA, *Parallel Incomplete Cholesky Preconditioner with Selective Sparse Approximate Inversion*, K. Teranishi\* and P. Raghavan
- 11/05 The IEEE/ACM International Workshop on High Performance Computing for Nano-science and Technology (HPCNano05), Seattle, WA, *Large scale simulations of branched Si-nanowires*, I. Lee\*, E. Richter, M. Menon and P. Raghavan
- 11/05 Poster session, IEEE/ACM Supercomputing (SC05), 2005. Seattle, WA, *Co-Managing Performance and Power for High-Performance Scientific Computing*, S. Akioka\*, M. J. Irwin, S. Kennedy, K. Malkowski\*, L. C. McInnes, B. Norris and P. Raghavan
- 2/05 SIAM Conference on Computational Science and Engineering (CSE05), Orlando, FL, *A Grid Enabled Multicomponent Materials Design System*, K. Teranishi\*, P. Raghavan and Z. K. Liu

1/05 The 16th International Conference on Domain Decomposition Methods, New York City, NY, A  
*Hybrid Parallel Preconditioner Using Incomplete Cholesky Factorization and Sparse  
Approximate Inversion*, K. Teranishi\* and P. Raghavan

## RESEARCH SUPERVISION

### At Penn State unless otherwise indicated.

S. Bhowmick, PhD 2004; J. Booth, PhD 2014; M. Carter, B.S. Honors 2005; A. Chatterjee, M.S. 2009, PhD 2011; B. Cover, M.S. 2007; X. Ding, M.S. 2004 (U Tenn); A. Dongarra, M.S. 1999 (U Tenn); K. Fermoye, M.S. 2010; W. Figurelle, MS 2013; M. Frasca, PhD 2012; A. Gokhale, M.S. 2013; T. Harrold, M.S. 1997 (U Tenn); K. Hart, M.S. 1996 (U Tenn); B. Heidorn, PhD current; M. Iturriaga, M.S. 2000 (U Tenn); J. Johnson, M.S. 2009; H. Kabir, PhD current; R. Kaulakis, B.S. Honors 2007; S. Kirmani, PhD 2015; J. Koehler, M.S. 2000 (U Tenn); I. Lee, PhD 2007; Y. Li, M.S. 1999 (U Tenn); T. Liang, B.S. Honors 2006; K. Malkowski, PhD 2008; J. Park, PhD 2015; P. Philip, M.Eng (2016) S. Poku, M.Eng. 2006; P. Renaud-Goud, PhD 2012 (ENS Lyon); A. Ruslander, B.S. Honors 2007; A. Shaffer, M.S. 2009; M. Shantharam, PhD 2012; S. Srinivasamurthy, M.S. 2011; A. Sriraman, M.S. 2007; W. Stevenson, M.Eng. 2004; T. Stitt, B.S. 2015; B. Suchoski, M.S. 2012; J. Sun, M.S. 2005; K. Teranishi, M.S. 2000 (U Tenn), PhD 2007; B. Toth, M.S. 2009; A. Viswanath, M.S. 2008; C. Walker, M.S. 2007; X. Zhang, M.S. 1999 (U Tenn)

**Total Theses Supervised: 47 (3 current).**

**Post-doctoral Research Supervision:** Hongyang Zha (2017-), G. Aupy (2015-2017), S. Akioka (2006-2008), K. Malkowski (2010), K. Teranishi, (2005-2007), R. Saxena (2012-2013).

## STUDENT EVALUATION OF TEACHING

### Student Ratings of Teaching Effectiveness (SRTE)

Student ratings of Teaching Effectiveness have been consistently high with scores for the “overall quality of the course” in the range of 5.2 – 6.5 and “overall quality of instruction” in the range of 5.0 – 6.5 on a scale of 0 to 7 (*most recent 5 years*).

**Faculty Teaching Award, Department of Computer Science and Engineering, The Pennsylvania State University, 2006.**

## BROADENING PARTICIPATION IN COMPUTING

(Computer Research Association's Committee on the Status of Women in Computing Research CRA-W)

- Department Chair, Lab Director, Dean, What Next? Career Success after Tenure and Promotion, CRA-W Panel at Grace Hopper, August 2017.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, San Francisco, April 10-11, 2015.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, Santa Clara, April 11-12, 2014.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, Boston, April 5-6, 2013.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, Bellevue, April 13-14, 2012.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, Boston, April 1-2, 2011.

- Professional Development Workshop, CRA-W Distinguished Professor for NSF-sponsored Cohort of Associate Professors Project, Providence, RI, June 25-26, 2010.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, Bellevue, April 23-24, 2010.
- Graduate Cohort Workshop, P. Raghavan, CRA-W Graduate Cohort Workshop, San Mateo, March 27-28, 2009.
- Workshop on Computational Education for Scientists, Microsoft Research, Redmond, WA, September 27-28, 2007.
- Graduate Cohort Workshop, P. Raghavan, Fourth CRA-W Graduate Cohort Workshop, San Francisco, March 23, 2007.
- Presentation at the Computer Research Association, CAPP-Research Professional Development Workshop, P. Raghavan, CRAW- Distinguished Professor, Fort Myers, FL, October 20, 2006.
- Presentation at the Penn State College of Engineering Graduate Cohort Program, P. Raghavan, September 23, 2006.
- Presentation at the Computer Research Association Graduate Program Professional Development Workshop, P. Raghavan, CRA-W Graduate Cohort Program, San Francisco, March 31, 2006.
- Organized Professional Development Workshop for Faculty at Penn State, March 21, 2005.
- Commission for Women at Penn State, Co-Chair Faculty Issues and Development Committee, and member Executive Committee, 2004-2005.

#### **Support for Broadening Participation in Computing and Student Recruitment and Retention**

- National Science Foundation, Research Experience for Undergraduates Supplement, \$6,000, May 2005 - December 2005, (completed, PI, 60%).
- National Science Foundation, A Set of Multi-Tiered Interventions at Critical Pipeline Stages: BPC Supplement, \$149,900, May 2006 - October 2007, (completed, PI, 25%), Joint with Argonne National Laboratory and the Department of Energy.
- National Science Foundation, Grant to Support Activities at the Eleventh SIAM Conference on Parallel Processing for Scientific Computing (CCF-0340869), San Francisco, CA, February 2004, P. Raghavan (conference Co-Chair), \$17,000, August 2003 - March 2004, (completed, PI)