

CURRICULUM VITAE

MIKKO H. LIPASTI

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RESEARCH INTERESTS

Design, modeling, measurement, and analysis of conventional and biologically-inspired high-performance computer architectures and their interaction with state-of-the-art optimizing compilation systems, modern operating systems, and scientific, commercial, and intelligent applications.

EDUCATION

Ph.D. in Electrical and Computer Engineering, Carnegie Mellon University, May 1997
Advisor: John Paul Shen Thesis: Value Locality and Speculative Execution

M.S. in Electrical and Computer Engineering, Carnegie Mellon University, Dec. 1992
Advisor: John Paul Shen Thesis: Compilation Techniques for Superscalar Processors

B.S. in Computer Engineering, Valparaiso University, May 1991
Graduated summa cum laude

EMPLOYMENT HISTORY

- 2009-present Professor. Department of ECE, University of Wisconsin, Madison, WI
Supervised three additional Ph.D. theses to completion (total of eleven to date). Currently supervising nine graduate and undergraduate researchers, with focus areas in on-chip interconnection networks, CMOS reliability, and cortical/neural information processing.
- 2005-present Associate Professor. Department of ECE, University of Wisconsin, Madison, WI
Supervised five additional Ph.D. theses to completion (total of eight). Led restructuring of introductory computer engineering curriculum, introduced a new freshman course which is attracting many new students to the field, and developed new course in mobile systems programming. Post-tenure research directions include CMOS chip power and reliability, electrical and optical on-chip interconnection networks, dynamic code optimization, and cortical/neural information processing.
- 2004-2006 Microarchitectural Consultant. Intel Corporation, Austin, TX
Participated in research and development of future microprocessor microarchitecture and system architecture.
- 1999-2005 Assistant Professor. Department of ECE, University of Wisconsin, Madison, WI
Created a substantial and very successful research program at University of Wisconsin, which is (informally) the top-ranked computer architecture research university in the world, raising over \$4M in funding and equipment over 6-year probationary period. Supervised 3 Ph.D. theses and 14 M.S. projects to completion.
- 1997-1999 Advisory Engineer/Scientist. IBM Corporation, Rochester, MN
I participated in microarchitectural definition and predictive performance analysis of future AS/400 and RS/6000 processors and systems. This encompassed processor core and memory subsystem timer model implementation, design trade-off analysis, and creative problem-solving requiring original invention resulting in several patent applications.
- 1998-1999 Adjunct Faculty. University of Minnesota, Minneapolis, MN
I taught an advanced graduate-level class on computer architecture offered through the

Department of Electrical and Computer Engineering (ECE) to a combined enrollment of 40 students. Class research projects resulted in two conference paper submissions.

- 1995-1997 Research Assistant. Carnegie Mellon University, Pittsburgh, PA
I conducted original research in memory subsystems, value prediction, and superspeculative processor microarchitecture; performed a detailed evaluation of the PowerPC 620; implemented accurate microarchitectural timing models; and implemented trace-driven and emulation-based tools for modeling and characterizing processor performance.
- 1993-1995 Performance Analyst/Programmer. IBM Corporation, Rochester, MN
I was involved in predictive performance analysis of future AS/400 processors, operating systems, and compilers; modeling and visualization of memory subsystem behavior; and implementation of operating system kernel functions, while initiating or making significant contributions to the filing of four U.S. patent applications.
- 1991-1993 Research/Teaching Assistant. Carnegie Mellon University, Pittsburgh, PA
I conducted original research in instruction scheduling, register allocation, and computer architecture; designed and implemented a binary-to-binary recompilation system for the IBM RS/6000 that performs global, trace-based scheduling and register renaming; and assisted in teaching senior- and sophomore-level computer engineering courses.
- 1990 Co-op Engineer. Process Automation, Inland Steel Co., East Chicago, IN
I maintained and enhanced real-time process control and data collection software.

HONORS AND ACHIEVEMENTS

IEEE Fellow, 2013

Awarded Philip Dunham Reed Endowed Chair, 2008-present

IISWC 2012 Best Paper Nominee

IPDPS 2011 Best Paper in Track

MICRO Hall of Fame, 2009 (<http://newsletter.sigmicro.org/micro-hof.txt/view>)

ISCA Hall of Fame, 2008 (<http://www.cs.wisc.edu/arch/www/iscabibhall>)

Outstanding Young Alumnus Award, Valparaiso University, 2007

Gerald Holdridge Teaching Excellence Award, 2006

IEEE MICRO "Top Picks" papers: 2004, 2006

ISPASS 2004 Best Paper Award

Eta Kappa Nu Outstanding Young Electrical Engineer, 2002

Peter Schneider Computer Engineering Junior Faculty Fellowship, 2002

Hilldale Undergraduate/Faculty Research Fellowship, 2002, advisee: Erika Gunadi

NSF CAREER Award, 2001

Eta Kappa Nu Outstanding Young Electrical Engineer Honorable Mention, 1999

IBM Server Group Patent Issuance Award, 1997

Best Paper Award, MICRO-29, Paris, December 1996.

IBM First Plateau Invention Achievement Award, March 1996

IBM Technical Recognition Award, July 1995

Tau Beta Pi National Engineering Honor Society

Completed undergraduate curriculum in six semesters

BOOKS AND BOOK CHAPTERS

1. John Paul Shen and Mikko H. Lipasti, “*Modern Processor Design: Fundamentals of Superscalar Processors*,” Beta Edition, McGraw-Hill Companies, 2003.
2. John Paul Shen and Mikko H. Lipasti, “*Modern Processor Design: Fundamentals of Superscalar Processors*,” First Edition, McGraw-Hill Companies, 2005. Adopted by 29+ universities.
3. Craig Saldanha and Mikko H. Lipasti, “Power Efficient Cache Coherence,” in *High-Performance Memory Systems*, edited by H. Hadimiouglu, D. Kaeli, J. Kuskin, A. Nanda, and J. Torrellas, Springer-Verlag, 2003.
4. Jason Cantin, Mikko H. Lipasti, and James E. Smith, “Dynamic Verification of Cache Coherence Protocols,” in *High-Performance Memory Systems*, edited by H. Hadimiouglu, D. Kaeli, J. Kuskin, A. Nanda, and J. Torrellas, Springer-Verlag, 2003.

JOURNAL PUBLICATIONS

5. Andrew Nere, Sean Franey, Atif Hashmi, and Mikko Lipasti, “Simulating Cortical Networks on Heterogeneous Multi-GPU Systems,” *Journal of Parallel and Distributed Computing*, <http://dx.doi.org/10.1016/j.jpdc.2012.02.006>, 2012.
6. Atif Hashmi and Mikko Lipasti, “A Cortically Inspired Learning Model,” *Studies in Computational Intelligence*, Vol. 399, 2012.
7. Natalie Enright Jerger and Mikko Lipasti, “Systems for Very Large-Scale Computing,” *IEEE MICRO Special Issue* (guest editors’ introduction), Vol. 31, No. 3, pp. 4-7, 2011.
8. Natalie Enright Jerger, Mikko Lipasti, and Li-Shiuan Peh, “Circuit-switched Coherence,” *IEEE Computer Architecture Letters*, Vol. 6, No. 1, Jan-Jun, 2007.
9. Erika Gunadi and Mikko H. Lipasti, “Narrow Width Dynamic Scheduling,” *Journal of Instruction-level Parallelism*, Vol. 9, No. 1, April 2007.
10. Eric F. Weglarz, Kewal K. Saluja, and Mikko H. Lipasti, “Energy Estimation of the Memory Subsystem in Multiprocessor Systems,” *Journal of Low-Power Electronics*, Vol. 2, No. 3, December 2006, pp. 325-332.
11. Jason Cantin, Mikko H. Lipasti, James E. Smith, Andreas Moshovos, and Babak Falsafi, “Coarse-Grain Coherence Tracking: RegionScout and Region Coherence Arrays,” *IEEE MICRO Special Issue on Top Picks in Computer Architecture*, Vol. 26, No. 1, pp. 70-79, 2006.
12. Jason Cantin, Mikko H. Lipasti, and James E. Smith, “The Complexity of Verifying Memory Coherence and Consistency,” *IEEE Transactions on Parallel and Distributed Systems*, Vol. 16, No. 7, July 2005.
13. Harold Cain and Mikko H. Lipasti, “Memory Ordering: A Value-based Approach,” *IEEE MICRO Special Issue on Top Picks in Computer Architecture*, vol. 24, no. 6, pp. 110-117, 2004.
14. Harold W. Cain, Mikko H. Lipasti, and Ravi Nair “Constraint Graph Analysis of Multi-threaded Programs,” *Journal of Instruction-level Processing (JILP)*, Vol. 6, 2004.
15. Kevin Lepak, Gordon Bell, and Mikko Lipasti, “Silent Stores and Store Value Locality,” *IEEE Transactions on Computers*, pp. 1174-1190, Vol. 50, No. 11, November 2001.
16. S.R. Kunkel, R.J. Eickemeyer, M.H. Lipasti, T.J. Mullins, B. O’Krafka, H. Rosenberg, S.P. VanderWiel, P.L. Vitale, and L.D. Whitley, “A Performance Methodology for Commercial Servers,” *IBM Journal of Research and Development*, Vol. 44, No. 6, 2000.
17. Mikko H. Lipasti and John Paul Shen, “Exploiting Value Locality to Exceed the Dataflow Limit,” *International Journal of Parallel Processing*, Vol. 26, No. 4, pp. 505-538, 1998.

18. Mikko H. Lipasti and John Paul Shen, "A Superspeculative Microarchitecture for A.D. 2000 and Beyond," *IEEE Computer Special Issue: Future Microprocessors--How to use a Billion Transistors*, September 1997.

REFEREED CONFERENCE PUBLICATIONS

19. Sean Franey and Mikko Lipasti, "Accelerating Atomic Operations on the GPU for Broader Applicability," to appear in *Proceedings of the 7th International Symposium on Networks-on-Chip (NOCS 2013)*, Tempe, AZ, April 2013.
20. Andrew Nere, Atif Hashmi, Mikko Lipasti, and Giulio Tononi, "Bridging the Semantic Gap: Emulating Biological Neuronal Behaviors with Simple Digital Neurons," to appear in *Proceedings of the 19th IEEE International Symposium on High-Performance Computer Architecture (HPCA-19)*, Shenzhen, China, February 2013.
21. Tianshi Chen, Yunji Chen, Marc Duranton, Qi Guo, Atif Hashmi, Mikko Lipasti, Andrew Nere, Shi Qiu, Michele Sebag, and Olivier Temam, BenchNN: On the Broad Potential Application Scope of Hardware Neural Network Accelerators," in *Proceedings of the 2012 IEEE International Symposium on Workload Characterization (IISWC 2012)*, San Diego, CA, Nov. 2012 (**nominated for best paper award**).
22. David Palframan, Nam Sung Kim, and Mikko H. Lipasti, "Mitigating Random Variation with Spare RIBs: Redundant Intermediate Bitslices," in *Proceedings of the 42nd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2012)*, Boston, MA, June 2012.
23. Mitch Hayenga and Mikko H. Lipasti, "The NoX Router," in *Proceedings of the 44th Int'l Symposium on Microarchitecture (MICRO-44)*, Porto Alegre, Brazil, December 2011.
24. Vignyan Kothinti Naresh, David Palframan, and Mikko H. Lipasti, "CRAM: Coded Registers for Amplified Multiporting," in *Proceedings of the 44th Int'l Symposium on Microarchitecture (MICRO-44)*, Porto Alegre, Brazil, December 2011.
25. Atif Hashmi, Hugues Berry, Olivier Temam, and Mikko H. Lipasti, "Automatic Abstraction and Fault Tolerance in Cortical Microarchitectures," in *Proceedings of the 38th International Symposium on Computer Architecture (ISCA-38)*, San Jose, CA, June 2011.
26. Erika Gunadi and Mikko H. Lipasti, "CRIB: Combined Rename, Issue, and Bypass," in *Proceedings of the 38th International Symposium on Computer Architecture (ISCA-38)*, San Jose, CA, June 2011.
27. Andrew Nere, Atif Hashmi, and Mikko H. Lipasti, "Profiling Heterogeneous Multi-GPU Systems to Accelerate Cortically Inspired Learning Algorithms," in *Proceedings of the 25th IEEE International Parallel and Distributed Processing Symposium (IPDPS 2011)*, Anchorage, Alaska, May 2011.
28. Guangyu Shi, Min Li, and Mikko H. Lipasti, "Accelerating Search and Recognition Workloads with SSE 4.2 String and Text Processing Instructions," in *Proceedings of the 2011 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS-2011)*, Austin, TX, April 2011.
29. David J. Palframan, Nam Sung Kim, and Mikko H. Lipasti, "Time Redundant Parity for Low-Cost Transient Error Detection," in *Proceedings of Design, Automation, and Test in Europe (DATE 2011)*, Grenoble, France, March 2011.
30. Atif Hashmi, Andrew Nere, James Thomas, and Mikko Lipasti, "A Case for Neuromorphic Instruction Set Architectures," in *Proceedings of the 16th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2011)*, Newport Beach, CA, March 2011.
31. Dana Vantrease, Nate Binkert, and Mikko H. Lipasti, "Atomic Coherence: Leveraging Nanophotonics to Build Race-Free Cache Coherence Protocols," in *Proceedings of the*

17th IEEE International Symposium on High-Performance Computer Architecture (HPCA-17), San Antonio, TX, February 2010.

32. Erika Gunadi, Abhisek A. Sinkar, Nam Sung Kim, and Mikko Lipasti, "Combating Aging with the Colt Duty Cycle Equalizer," in *Proceedings of the 43rd Int'l Symposium on Microarchitecture (MICRO-43)*, Atlanta, GA, December 2010.
33. Atif Hashmi and Mikko Lipasti, "Discovering Cortical Algorithms," in *Proceedings of the International Conference on Neural Computation (ICNC)*, Valencia, Spain, October 2010.
34. Mitchell Hayenga, Natalie D. Enright Jerger, and Mikko H. Lipasti, "SCARAB: A Single Cycle Adaptive Routing and Bufferless Network," in *Proceedings of the 42nd Int'l Symposium on Microarchitecture (MICRO-42)*, New York, NY, December 2009.
35. Dana Vantrease, Nate Binkert, Robert Schreiber, and Mikko H. Lipasti, "Light speed arbitration and flow control for nanophotonic interconnects," in *Proceedings of the 42nd Int'l Symposium on Microarchitecture (MICRO-42)*, New York, NY, December 2009.
36. Dennis Abts, Natalie D. Enright Jerger, John Kim, Dan Gibson, and Mikko Lipasti, "Achieving Predictable Performance Through Better Memory Controller Placement in Many-Core CMPs," in *Proceedings of the International Symposium on Computer Architecture (ISCA-36)*, Austin, TX, June 2009.
37. Atif Hashmi and Mikko H. Lipasti, "Cortical Columns: Building Blocks for Intelligent Systems," in *Proceedings of IEEE Symposium on Computational Intelligence for Multimedia Signal and Vision Processing (CIMSVP)*, Nashville, TN, March 2009.
38. Natalie Enright-Jerger, Li-Shiuan Peh and Mikko H. Lipasti, "Virtual Tree Coherence: Leveraging Regions In-Network Multicast Trees for Scalable Cache Coherence," in *Proceedings of the 41st International Symposium on Microarchitecture (MICRO-41)*, Italy, November 2008.
39. Gordon B. Bell and Mikko H. Lipasti, "Skewed Redundancy," in *Proceedings of the 17th International ACM/IEEE Conference on Parallel Architectures and Compilation Techniques (PACT-2008)*, Toronto, Canada, October 2008.
40. Atif Hashmi and Mikko H. Lipasti, "Accelerating Search and Recognition with a TCAM Functional Unit," in *Proceedings of the 26th IEEE International Conference on Computer Design (ICCD-26)*, Lake Tahoe, CA, October 2008.
41. Eric L. Hill, Mikko H. Lipasti, and Kewal Saluja, "An Accurate Flip-flop Selection Technique for Reducing Logic SER," in *Proceedings of The 38th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN-2008)*, Anchorage, Alaska, June 2008.
42. Natalie Enright-Jerger, Li-Shiuan Peh and Mikko H. Lipasti, "Virtual Circuit Tree Multicasting: A Case for On-Chip Hardware Multicast Support," in *Proceedings of the 35th International Symposium on Computer Architecture (ISCA)*, Beijing, China, June 2008.
43. Natalie Enright Jerger, Li-Shiuan Peh, and Mikko H. Lipasti, "Circuit-switched Coherence," in *Proceedings of the IEEE Network on Chip Symposium (NOCS)*, Newcastle-Upon-Tyne, UK, April 2008.
44. Nidhi Aggarwal, Jason Cantin, Mikko H. Lipasti, and James E. Smith, "Power-Efficient DRAM Speculation," in *Proceedings of 14th International Symposium on High-Performance Computer Architecture (HPCA-14)*, Salt Lake City, UT, February 2008.
45. Erika Gunadi and Mikko H. Lipasti, "A Position-Insensitive Finished Store Buffer," in *Proceedings of the 25th IEEE International Conference on Computer Design (ICCD-25)*, Lake Tahoe, CA, October 2007.
46. Eric Hill and Mikko H. Lipasti, "Transparent Mode Flip-Flops for Collapsible Pipelines," in *Proceedings of the 25th IEEE International Conference on Computer Design (ICCD-25)*, Lake Tahoe, CA, October 2007 (short paper).

47. Natalie Enright Jerger, Dana Vantrease, and Mikko H. Lipasti, ““An Evaluation of Server Consolidation Workloads for Multi-core Designs,”” in *Proceedings of the IEEE International Symposium on Workload Characterization (IISWC)*, Boston, MA, September 2007.
48. Erika Gunadi and Mikko H. Lipasti, “Power-Aware Operand Delivery,” In *Proceedings of the IEEE/ACM International Symposium on Low Power Electronics and Design (ISLPED)* , Portland, OR, August 2007 (short paper with poster presentation).
49. Lixin Su and Mikko H. Lipasti, “Speculative Optimization Using Hardware-Monitored Guarded Regions for Java Virtual Machines,” In *Proceedings of of the 3rd International ACM Conference on Virtual Execution Environments (VEE-3)*, San Diego, CA, June 2007.
50. Jason F. Cantin, Mikko H. Lipasti, and James E. Smith, “Stealth Prefetching,” in *Proceedings of the 12th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-XII)*, October, 2006.
51. Eric L. Hill and Mikko H. Lipasti, Stall Cycle Redistribution in a Transparent Fetch Pipeline,” in *Proceedings of the IEEE/ACM International Symposium on Low-Power Electronics and Design (ISLPED) 2006*, October, 2006.
52. Lixin Su and Mikko H. Lipasti, “Dynamic Class Hierarchy Mutation,” in *Proceedings of of the 4th IEEE/ACM International Symposium on Code Generation and Optimization (CGO-4)*, New York, NY, March 2006.
53. Natalie Enright Jerger, Eric L Hill, and Mikko H. Lipasti, “Friendly Fire: Understanding the Effects of Multiprocessor Prefetching,” in *Proceedings of the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS-2006)*, Austin, TX, March 2006.
54. Shiliang Hu, Ilhyun Kim, Mikko H. Lipasti, and James E. Smith, “An Approach for Implementing Efficient Superscalar CISC Processors,” In *Proceedings of of the 12th International Symposium on High-Performance Computer Architecture (HPCA-12)*, Austin, TX, February 2006.
55. J. F. Cantin, M. H. Lipasti, and J. E. Smith, "Improving Multiprocessor Performance with Coarse-Grain Coherence Tracking", in *Proceedings of the 32nd International Symposium on Computer Architecture (ISCA-32)*, Madison, WI, June 2005.
56. Kevin M. Lepak and Mikko H. Lipasti, “Reaping the Benefit of Temporal Silence to Improve Communication Performance,” in *Proceedings of the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS-2005)*, Austin, TX, March 2005.
57. Harold W. Cain and Mikko H. Lipasti, “Memory Ordering: A Value-Based Approach,” in *Proceedings of the 31st International Symposium on Computer Architecture (ISCA-31)*, Munich, Germany, June 2004.
58. Mikko H. Lipasti, Brian Mestan, and Erika Gunadi, “Physical Register Inlining,” in *Proceedings of the 31st International Symposium on Computer Architecture (ISCA-31)*, Munich, Germany, June 2004.
59. Gordon B. Bell and Mikko Lipasti, “Deconstructing Commit ,” in *Proceedings of the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS-2004)*, Austin, TX, March 2004 (Best Paper Award).
60. Ilhyun Kim and Mikko Lipasti, “Understanding Scheduling Replay Schemes ,” in *Proceedings of the 10th International Symposium on High-Performance Computer Architecture (HPCA-10)*, Madrid, Spain, February 2004.
61. Ilhyun Kim and Mikko Lipasti, “Macro-op Scheduling: Relaxing Scheduling Loop Constraints ,” in *Proceedings of the 36th International Symposium on Microarchitecture (MICRO-36)*, San Diego, CA, December 2003.

62. Kevin M. Lepak, Harold W. Cain, and Mikko H. Lipasti, "Redeeming IPC as a Performance Metric for Multithreaded Programs," in *Proceedings of the 12th International ACM/IEEE Conference on Parallel Architectures and Compilation Techniques (PACT-2003)*, New Orleans, LA, September 2003.
63. Harold W. Cain, Mikko H. Lipasti, and Ravi Nair, "Constraint Graph Analysis of Multithreaded Programs," in *Proceedings of the 12th International ACM/IEEE Conference on Parallel Architectures and Compilation Techniques (PACT-2003)*, New Orleans, LA, September 2003.
64. Brian Mestan and Mikko Lipasti, "Exploiting Partial Operand Knowledge," in *Proceedings of the 32nd IEEE International Conference on Parallel Processing (ICPP-32)*, Kaohsiung, Taiwan, October 2003.
65. Ilhyun Kim and Mikko Lipasti, "Half-Price Architecture," in *Proceedings of the 30th International Symposium on Computer Architecture (ISCA-30)*, Anaheim, CA, June 2003.
66. Madhusudanan Seshadri and Mikko Lipasti, "A Case for Vector Network Processors," In *Proceedings of Network Processor Conference West*, pp. 387-405, San Jose, CA, October 2002.
67. Kevin Lepak and Mikko Lipasti, "Temporally Silent Stores," In *Proceedings of the 10th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-X)*, pp. 30-41, San Jose, CA, October 2002.
68. Harold W. Cain and Mikko Lipasti, "Verifying Sequential Consistency Using Vector Clocks," In *Proceedings of the 14th ACM Symposium on Parallel Algorithms and Architectures (SPAA '02) Revue*, pp. 153-154, Winnipeg, Manitoba, August 2002.
69. Jarrod Lewis, Bryan Black, and Mikko Lipasti, "Avoiding Initializing Misses to the Heap," In *Proceedings of the 29th International Symposium on Computer Architecture (ISCA-29)*, pp. 183-194, Anchorage, AL, May 2002.
70. Ilhyun Kim and Mikko Lipasti, "Implementing Optimizations at Decode Time," In *Proceedings of the 29th International Symposium on Computer Architecture (ISCA-29)*, pp. 221-232, Anchorage, AL, May 2002.
71. Eric Weglarz, Kewal K. Saluja, and Mikko H. Lipasti, "Minimizing Energy Consumption for High-Performance Processing," In *Proceedings of the 2002 conference on Asia South Pacific design automation/VLSI Design*, pp. 199-206, Bangalore, India, January 2002.
72. Milo Martin, Daniel Sorin, Harold Cain, Mark Hill, and Mikko Lipasti, "Correctly Implementing Value Prediction in Microprocessors that Support Multithreading or Multiprocessing," In *Proceedings of the 34th International Symposium on Microarchitecture (MICRO-34)*, pp. 328-337, Austin, TX, Nov. 2001.
73. Harold Cain, Ravi Rajwar, Morris Marden, and Mikko Lipasti, "An Architectural Evaluation of Java TPC-W," in *Proceedings of the 7th International Symposium on High-Performance Computer Architecture (HPCA-7)*, pp. 229-240, Monterrey, Mexico, January 2001.
74. Kevin Lepak and Mikko Lipasti, "Silent Stores for Free," In *Proceedings of the 33rd International Symposium on Microarchitecture (MICRO-33)*, pp. 22-31, Monterey, CA, December 2000.
75. Gordon Bell, Kevin Lepak, and Mikko Lipasti, "A Characterization of Silent Stores," In *Proceedings of the 9th International ACM/IEEE Conference on Parallel Architectures and Compilation Techniques (PACT-2000)*, Philadelphia, PA, October 2000.
76. Kevin Lepak and Mikko Lipasti, "On the Value Locality of Store Instructions," In *Proceedings of the 27th International Symposium on Computer Architecture (ISCA-27)*, pp. 182-191, Vancouver, B.C., June 2000.

77. Derek L. Howard and Mikko H. Lipasti, "The Effect of Program Optimization on Trace Cache Efficiency," In *Proceedings of the 8th International ACM/IEEE Conference on Parallel Architectures and Compilation Techniques (PACT-1999)*, October 1999.
78. Mikko H. Lipasti and John Paul Shen, "The Performance Potential of Value and Dependence Prediction," In *Proceedings of the 3rd European Conference on Parallel Processing (EUROPAR-97)*, Passau, Germany, August 1997.
79. Mikko H. Lipasti and John Paul Shen, "Exceeding the Dataflow Limit via Value Prediction," In *Proceedings of the 29th International Symposium on Microarchitecture (MICRO-29)*, Paris, December 1996.
80. Mikko H. Lipasti, Christopher P. Wilkerson, and John Paul Shen, "Value Locality and Load Value Prediction," In *Proceedings of the 7th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-VII)*, Boston, October 1996.
81. Bryan Black, Andrew S. Huang, Mikko H. Lipasti, and John Paul Shen, "Can Trace-Driven Simulators Accurately Predict Superscalar Performance?" In *Proceedings of the IEEE International Conference on Computer Design (ICCD-96)*, San Antonio, Texas, October 1996.
82. Mikko H. Lipasti, William J. Schmidt, Robert R. Roediger, and Steven R. Kunkel, "SPAID: Software prefetching in pointer- and call-intensive environments," In *Proceedings of the 28th International Symposium on Microarchitecture (MICRO-28)*, Ann Arbor, Michigan, November 1995.
83. Trung A. Diep, Mikko H. Lipasti, and John P. Shen, "Architecture-Compatible Code Boosting for Performance Enhancement of the IBM RS/6000," In *Proceedings of the IEEE International Conference on Computer Design (ICCD-93)*, Boston, October 1993.

OTHER REFEREED PUBLICATIONS

84. Vignyan Reddy Kothinti Naresh, David J. Palframan and Mikko H. Lipasti, "Analyzing the Soft Error Resilience of the CRIB Microarchitecture," In *Proceedings of the 3rd Workshop on Resilient Architectures (WRA-3)*, Seattle, WA, December 2012.
85. Harold W. Cain and Mikko H. Lipasti, "Edge Chasing Delayed Consistency: Pushing the Limits of Weak Memory Models," in *Proceedings of the Workshop on Relaxing Synchronization for Multicore and Manycore Scalability (RACES'12)*, Tucson, AZ, October 2012 (archival publication via ACM Digital Library)
86. Mitchell Hayenga, Daniel Johnson, Mikko Lipasti, "Pitfalls of Orion-based Simulation," In *Proceedings of the Workshop on Duplicating, Deconstructing, and Debunking (WDDD-12)*, Portland, OR, June 2012.
87. David J. Palframan, Nam Sung Kim, and Mikko H. Lipasti, "Spare RIBs: Redundant Intermediate Bitslices," In *Proceedings of the 2nd Workshop on Resilient Architectures (WRA-2)*, Porto Alegre, Brazil, December 2011.
88. Guangyu Shi and Mikko H. Lipasti, "Perceptron Branch Prediction with Separated Taken/Not-Taken Weight Tables," in *Proceedings of the 2nd JILP Workshop on Computer Architecture Competitions: Championship Branch Prediction (JWAC-2)*, San Jose, CA, June 2011.
89. Mitchell Hayenga, Andrew T. Nere, and Mikko Lipasti, "MadCache: A PC-aware Cache Insertion Policy," in *Proceedings of the 1st JILP Workshop on Computer Architecture Competitions (JWAC-1): Cache Replacement Championship*, St. Malo, France, June 2010.
90. Andrew T. Nere and Mikko Lipasti, "Cortical Architectures on a GPGPU," in *Proceedings of the Third Workshop on General-Purpose Computation on Graphics Processing Units*, Pittsburgh, PA, March, 2010 (proceedings archived by ACM).

91. Eric Hill and Mikko Lipasti, "The Effect of Pipeline Depth on Logic Soft Errors," in *Proceedings of the 2010 IEEE Workshop on Silicon Errors in Logic - System Effects (SELSE 2010)*, Stanford University, CA, March, 2010 (paper and poster presentation).
92. Eric Hill and Mikko Lipasti, "Logic Soft Errors in a Parallel CISC Decoder," in *Proceedings of the 2010 IEEE Workshop on Silicon Errors in Logic - System Effects (SELSE 2010)*, Stanford University, CA, March, 2010 (paper and talk).
93. Karthik Jayaraman, Vivek Shrivastava, Brian Pellin, Martin Hock, and Mikko H. Lipasti, "Phase-based Adaptive Branch Predictor: Seeing the Forest for the Trees," In *Proceedings of the Workshop on Introspective Architecture (WISA)*, Austin, TX, February, 2006.
94. Pranay Koka and Mikko H. Lipasti, "Opportunities for Cache Friendly Process Scheduling," In *Proceedings of the Workshop on Interaction between Operating Systems and Computer Architecture (WIOSCA)*, October, 2005.
95. Erika Gunadi and Mikko H. Lipasti, "Cache Pipelining with Partial Operand Knowledge," in *Proceedings of the Workshop on Complexity-Effective Design (WCED)*, Munich, Germany, June 2004.
96. Pranay Koka and Mikko Lipasti, "Characterization of an IMAP server on a Shared-Memory Multiprocessor," in *Proceedings of the Workshop on Computer Architecture Evaluation using Commercial Workloads (CAECW '04)*, Madrid, Spain, February 2004.
97. Matt Ramsay, Chris Feucht, and Mikko H. Lipasti, "Exploring Efficient SMT Branch Predictor Design," In *Proceedings of the Workshop on Complexity-Effective Design (WCED)*, San Diego, CA, June 2003.
98. Harold W. Cain, Kevin M. Lepak, and Mikko H. Lipasti, "Precise and Accurate Processor Simulation," In *Proceedings of the Workshop on Computer Architecture Evaluation using Commercial Workloads (CAECW)*, Boston, MA, February 2002.
99. Morris Marden, Shih-Lien Lu, Konrad Lai, and Mikko H. Lipasti, "Comparison of Memory System Behavior in Javan and Non-Java Commercial Workloads," In *Proceedings of the Workshop on Computer Architecture Evaluation using Commercial Workloads (CAECW)*, Boston, MA, February 2002.
100. Craig Saldanha and Mikko H. Lipasti, "Power Efficient Cache Coherence," In *Proceedings of the Workshop on Memory Performance Issues (WMPI)*, Goteborg, Sweden, June 2001.
101. Jason F. Cantin, Mikko H. Lipasti, and James E. Smith, "Dynamic Verification of Cache Coherence Protocols," In *Proceedings of the Workshop on Memory Performance Issues (WMPI)*, Goteborg, Sweden, June 2001.
102. Harold Cain, Kevin Lepak, and Mikko Lipasti, "A Dynamic Binary Translation Approach to Architectural Simulation," In *Proceedings of the Workshop on Binary Translation (WBT)*, Philadelphia, PA, October 2000.

WORKSHOP PAPERS AND TECHNICAL REPORTS

103. Atif Hashmi, Andrew Nere, and Mikko H. Lipasti, "Learning through Spatially Localized and Temporally Correlated Spontaneous Activations," in *Proceedings of the 15th International Conference on Cognitive and Neural Systems (ICCN)*, Boston, MA, May 2011 (abstract and talk).
104. Atif Hashmi and Mikko Lipasti, "Discovering Cortical Algorithms," In *Proceedings of 14th Int'l Conference on Cognitive and Neural Systems (ICCN)*, Boston, MA, May 2010 (abstract and talk).
105. Atif Hashmi, Hugues Berry, Olivier Temam, and Mikko Lipasti, "Leveraging Progress in Neurobiology for Computing Systems," In *Proceedings of the 1st Workshop on New*

Directions in Computer Architecture (in conjunction with the 42nd 2009 International Symposium on Microarchitecture), New York, NY, December 2009.

106. Nathan Binkert, Al Davis, Mikko Lipasti, Robert Schreiber, and Dana Vantrease, "Nanophotonic Barriers," In *Proceedings of the 1st Workshop on Photonic Interconnects and Computer Architecture* (in conjunction with the 42nd 2009 International Symposium on Microarchitecture), New York, NY, December 2009.
107. Gordon B. Bell and Mikko H. Lipasti, "Profligate Execution," Technical Report, Department of Electrical and Computer Engineering, University of Wisconsin-Madison, September 2006. Available from <http://www.ece.wisc.edu/~pharm>.
108. Mikko H. Lipasti, "Value Locality and Speculative Execution," Ph.D. Thesis, Department of Electrical and Computer Engineering, Carnegie Mellon University, May 1997.
109. Bohuslav Rychlik, Mikko H. Lipasti, and John Paul Shen; "Experimental Characterization of Value Locality," Technical Report CMuART-1997-04, Department of Electrical and Computer Engineering, Carnegie Mellon University, 1997
110. Mikko H. Lipasti and John Paul Shen, "Approaching 10 IPC via Superspeculation," Technical Report CMU-MIG-97-1, Department of Electrical and Computer Engineering, Carnegie Mellon University, January 1997.
111. Mikko H. Lipasti, "Compilation Support for Superscalar Processors," M.S. Thesis, Department of Electrical and Computer Engineering, Carnegie Mellon University, December 1992.
112. Mikko H. Lipasti, "Cache Visualization," *IBM Technical Disclosure Bulletin*, vol. 38 no. 8, pp. 407-408, August 1995.
113. Mikko H. Lipasti and Arturo Martin-de-Nicolas, "Low-Cost Instruction and Address Tracing", *IBM Technical Disclosure Bulletin*, vol. 38 no. 8, pp. 309-310, August 1995.
114. Mikko H. Lipasti, "Compile-Time Elimination of Store-Fetch Interlock Delays," *IBM Technical Disclosure Bulletin*, vol. 37 no. 10, pp. 217-218, October 1994.

PATENT APPLICATIONS

115. Atif G. Hashmi, Andrew Nere, Mikko Lipasti, and Giulio Tononi, "Sensory Stream Analysis via Configurable Trigger Signature Detection," patent pending, filed January 2013.
116. Mikko H. Lipasti, "Memory access request reordering to reduce memory access latency," U.S. Patent number 6,487,640, issued Nov. 26, 2002.
117. Mikko H. Lipasti, "Data cache miss lookaside buffer and method thereof," U.S. Patent number 6,487,639, issued Nov. 6, 2002.
118. Mark R. Funk, Steven R. Kunkel, Mikko H. Lipasti, Bilha Mendelson, Robert R. Roediger, and William J. Schmidt., "Intelligent Cache Management Mechanism," U.S. Patent number 6,314,561, issued Nov. 6, 2001.
119. Mikko H. Lipasti, "Circuit Arrangement and Method of Dispatching Instructions to Multiple Execution Units," U.S. Patent number 6,219,780, issued April 17, 2001.
120. Keith V. Besaw, Robert J. Donovan, Patrick T. Haugen, Mark J. Hessler, Mikko H. Lipasti, and Robert R. Roediger, "Method and Apparatus for Enabling Global Compiler Optimization in the Presence of Exception Handlers within a Computer Program," U.S. Patent number 5,778,233, issued July 1998.
121. James L. Denton, Richard J. Eickemeyer, Kevin C. Griffin, Ross E. Johnson, Steven R. Kunkel, Mikko H. Lipasti, and Sandra K. Ryan, "System and method for increasing cache efficiency through optimized data allocation," U. S. Patent number 5,651,135, issued July 1997.

122. Steven R. Kunkel, et al., "Cache multi-block touch mechanism for object oriented computer system," patent pending, filed October 1996.

TEACHING EXPERIENCE

- 2009- Professor, University of Wisconsin, Madison, WI
Courses taught
- | | |
|-------------|---|
| Fall 2009 | ECE 601 Mobile Computing Systems Laboratory |
| Spring 2010 | ECE 752 Advanced Computer Architecture I |
| Fall 2010 | ECE 552 Introduction to Computer Architecture
ECE 252 Introduction to Computer Engineering |
| Spring 2011 | ECE 352 Digital Systems Fundamentals |
| Summer 2011 | Parallel Processing at NUDT Summer School, Changsha, China |
| Fall 2011 | ECE 252 Introduction to Computer Engineering |
| Spring 2012 | ECE 554 Digital Engineering Laboratory
ECE 752 Advanced Computer Architecture I |
| Fall 2012 | ECE 751 Embedded Computing Systems |
| Spring 2013 | ECE 757 Advanced Computer Architecture II |
- 2005-2009 Associate Professor, University of Wisconsin, Madison, WI
Courses taught
- | | |
|-------------|---|
| Fall 2005 | ECE 352 Digital System Fundamentals
ECE 552 Introduction to Computer Architecture |
| Spring 2006 | ECE 379 Introduction to Computer Engineering |
| Fall 2007 | ECE 252 Introduction to Computer Engineering |
| Spring 2008 | ECE 752 Advanced Computer Architecture I |
| Fall 2008 | ECE 252 Introduction to Computer Engineering
ECE 601 Mobile Computing Systems Laboratory |
| Spring 2009 | ECE 757 Advanced Computer Architecture II |
- 2005 Visiting Instructor, United States Patent and Trademark Office, Alexandria, VA
Taught a short course (3 + 2 days) covering advanced topics in processor architecture to the patent examiner art unit specializing in computer architecture.
- 1999-2005 Assistant Professor, University of Wisconsin, Madison, WI
Courses taught
- | | |
|-------------|---|
| Fall 1999 | ECE 902 Commercial Servers and Workloads |
| Spring 2000 | ECE 752 Advanced Computer Architecture I |
| Fall 2000 | ECE 757 Advanced Computer Architecture II |
| Spring 2001 | ECE 554 Digital Engineering Laboratory
ECE 752 Advanced Computer Architecture II |
| Spring 2002 | ECE 552 Introduction to Computer Architecture |
| Fall 2002 | ECE 554 Digital Engineering Laboratory |
| Spring 2003 | ECE 352 Digital System Fundamentals |
| Fall 2003 | ECE 752 Advanced Computer Architecture I |
| Spring 2004 | ECE 554 Digital Engineering Laboratory |

	Spring 2005	ECE 554 Digital Engineering Laboratory ECE 752 Advanced Computer Architecture I
Spring 1998	<u>Adjunct Faculty</u>	University of Minnesota, Minneapolis, MN I taught an advanced graduate-level class on computer architecture that was offered through both the Electrical and Computer Engineering (ECE) and Computer Science and Engineering (CSE) departments to a combined enrollment of 40 students. Class research projects resulted in two conference paper submissions.
1995-1997	<u>Undergraduate Advisor</u>	Carnegie Mellon University, Pittsburgh, PA As a Ph.D. candidate, I supervised the research projects of two undergraduate students, meeting with them regularly to advise them by setting realistic goals and helping them to attain these goals, culminating in the publication of a co-authored conference paper.
Spring 1992	<u>Teaching Assistant</u>	Carnegie Mellon University, Pittsburgh, PA For the sophomore-level digital design course, I prepared and delivered a weekly recitation; helped prepare for and supervised digital design laboratory experiments and projects; and assisted with homework, quiz, and exam preparation and grading.
Fall 1991	<u>Teaching Assistant</u>	Carnegie Mellon University, Pittsburgh, PA I prepared and delivered lectures and assisted with homework, quizzes, and exams.

GRADUATE STUDENTS SUPERVISED

Kevin Lepak	M.S. 12/2000, Ph.D. 12/2003
Ilhyun Kim	M.S. 5/2001, Ph.D. 5/2004
Harold Cain	Ph.D. 11/2004
Jason Cantin	M.S. 12/2002, Ph.D. 5/2006 (co-advisor J.E. Smith)
Gordon Bell	M.S. 5/2001, Ph.D. 12/2007
Morris Marden	M.S. 5/2001
Craig Saldanha	M.S. 5/2001
Brian Mestan	M.S. 5/2002
Jarrod Lewis	M.S. 12/2002
Madhusudanan Seshadri	M.S. 5/2002
Natalie Enright Jerger	M.S. 5/2004, Ph.D. 2008
Eric Hill	M.S. 5/2004, Ph.D. 2008
Razvan Cheveresan	M.S. 8/2003
Pranay Koka	M.S. 12/2004
Ramya Narayana	M.S. 5/2004
Matt Ramsay	M.S. 12/2003
Lixin Su	Ph.D. 8/2008
Dana Vantrease	Ph.D. 5/2010
Erika Gunadi	M.S. 5/2005, Ph.D. 5/2010
Atif Gul Hashmi	M.S. 12/2007, Ph.D. 12/2011
Mitch Hayenga	Ph.D. 2013 (expected)
Andrew Nere	M.S. 12/2009, Ph.D. 2013 (expected)
Vaishali Karanth	M.S. 5/2010
David Palframan	M.S. 5/2011, Ph.D. (expected, co-advisor N.S. Kim)

Sean Franey	M.S. 5/2011, Ph.D. 2014 (expected)
Vignyan Kothinti Naresh	Ph.D. 2014 (expected)
Arslan Zulfiqar	Ph.D. 2014 (expected)
Dibakar Gope	Ph.D. (expected)

RESEARCH FUNDING

2012-2013	Oracle Labs Research Award, \$45,000
2012-2013	NSF Innovation Corps, \$50,000
2008-2013	Philip Dunham Reed Chair, \$35,000/year
2011-2012	Oracle Labs Research Award, \$45,000
2011-2012	Google Faculty Research Award, \$40,000
2011-2014	NSF SHF, "Arbitration, Coherence, and Consistency for Nanophotonics," \$430,000
2010-2011	NSF CPA Supplement, "Lazy Logic," \$60,000
2009-2010	HP Innovation Research Award, \$75,000
2008-2009	HP Innovation Research Award, \$75,000 + \$35,000 in equipment
2008-2009	Nokia Research Award, \$70,000
2008-2009	Intel Research Council Award, \$35,000, <i>withheld due to WARF lawsuit</i>
2007-2008	Intel Research Council Award, \$35,000 + \$8,000 in equipment
2007-2010	NSF CPA, "Lazy Logic," \$300,000
2006-2007	Intel Research Council Award, \$35,000
2006-2007	IBM Faculty Partnership Award, \$30,000
2005-2006	Intel Research Council Award, \$35,000
2004-2007	NSF CPA, "Collaborative Coherence," \$175,000
2004-2005	Intel Research Council Award, \$35,000 + \$6,000 in equipment
2003-2004	Intel Research Council Award, \$35,000 + \$6,000 in equipment
2003	Intel MRL Equipment donation, ~\$60,000 for 100 CPUs and 50 motherboards
2003-2004	IBM Faculty Partnership Award, \$40,000, <i>withheld due to pending WARF litigation</i>
2003	IBM Shared University Research equipment grant, ~\$300,000, <i>also withheld</i>
2002-	Peter Schneider Computer Engineering Junior Faculty Fellowship, \$25,000
2002	Xilinx University Program equipment donation, \$244,295
2002-2003	Intel Research Council Award, \$35,000 + \$6,000 in equipment
2002-2007	NSF CAREER, "Semantic Decomposition of Instruction Sets," \$375,000
2001-2004	NSF NGS, "Wisconsin DOVE: Distributed Optimizing Virtual Environment," Co-PI Rastislav Bodik, Andrea Arpaci-Dusseau, \$600,000, 33% share
2001-2002	IBM Faculty Partnership Award, \$40,000
2001-2002	Intel Research Council Award, \$35,000 + \$16,000 in equipment
2000-2003	NSF ITR, "Dynamic Verification of Parallel Distributed Systems," Co-PI James Smith, \$450,000, 50% share
2000-2003	NSF CISE, "Exploiting Value Locality in Shared-Memory Multiprocessors," \$250,000
2000	IBM Shared University Research grant, co-PI Ras Bodik, \$500,000 in equipment
2000	Intel MRL Equipment donation, co-PI Chung-Ping Chen, \$25,000 in equipment

2000-2001 Intel Research Council Award, \$35,000 + \$20,000 in equipment
2000-2001 IBM Faculty Partnership Award, \$40,000
1999 IBM Shared University Research grant, \$716,000 in equipment

PROFESSIONAL ACTIVITIES

Co-editor, IEEE MICRO Special Issue on Systems for Very Large Scale Computing, 2011
IEEE MICRO Top Picks Program Committee: 2007, 2009, 2011
MICRO Program Co-chair: 2007
MICRO Program Committee: 2003, 2011
HPCA Program Committee: 2001, 2006, 2009, 2010, 2013
ISPASS Program Committee: 2004, 2005, 2006, 2008, 2009
ISCA Program Committee: 2004, 2005, 2010, 2012, 2013
NOCS Program Committee: 2012
PACT Program Committee: 2000, 2001
ICCD Program Committee: 2008, 2009
ICS (Int'l Conference on Supercomputing) Program Committee: 2003
ICPP Program Committee: 2001
Workshop on Duplicating, Deconstructing, and Debunking, co-organizer: 2002-2004
WDDD Program Committee: 2005-2009
WMPI Program Committee: 2006
Value Prediction Workshop Program Committee: 2003
Workshop on Optimizing Middleware Program Committee: 2001
ISCA Workshop Chair: 2005
PACT Tutorials Chair: 2001
Advised Hilldale Student/Faculty Undergraduate Research Award recipient, 2002-2003
Advised 2 undergraduates for SURE program in Summer 2000
Presenter for numerous conference publications
Invited speaker for various seminars
Member, IEEE and Tau Beta Pi
Panel member for NSF and DOE proposal review
Paper reviewer for numerous conferences and journals
University, College, and Departmental service:
CAE Executive Committee, 2011-
Curriculum Committee chair: 2005-2006, 2007-2008, 2008-2009, 2011-2013
Fellowship committee: 1999-2002, 2004-2005
College of Engineering Curriculum Committee (APCRC): 2005-2006, 2007-2010
Graduate Admissions committee: 2004-2005
Undergraduate advising committee: 2000-2009
Faculty Recruiting committee: 2002 - 2005, 2010-2011
Tenure and Promotion committee: 2009-2011, 2012-2013
Curriculum revision implementation committee: 2010-2011
Advisor, AMEP degree program: Fall 2002-
Byron Bird Award Selection Committee: 2002, 2005, 2006

PERSONAL

Male, born 4/9/1968, fluent in English and Finnish, dual citizenship (Finland/U.S.A.)

REFERENCES

Available on request.