

# Curriculum Vitae

## Kai Li

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### Education

Ph.D. 1986, Yale University. Yale Fellowships.  
Dissertation: *Shared Virtual Memory on Loosely Coupled Multiprocessors*.  
Advisers: Paul Hudak and Alan Perlis.

### Research Interests

Distributed and parallel systems, operating systems, storage systems, and content-based search for large datasets.

### Full Time Employment

- Paul M. Wythes '55, P'86 and Marcia R. Wythes P'86 Professor, Department of Computer Science, Princeton University, since 2009.
- Charles Fitzmorris Professor, Department of Computer Science, Princeton University, 2002-2009.
- Chief Technology Officer, Data Domain, Inc. 2002.
- Chief Executive Officer, Data Domain, Inc. 2001-2002.
- Professor, Department of Computer Science, Princeton University, 1995-2001.
- Associate professor, Department of Computer Science, Princeton University, 1992-1995.
- Assistant professor, Department of Computer Science, Princeton University, 1986-1992.

### Some Honors and Awards

- Member of National Academy of Engineering, 2012.
- Member of Washington State Academy of Sciences, 2012.
- ACM SIGOPS Hall of Fame Award, 2012.
- Distinguished Achievement Award, Chinese Institute of Engineers, 2012.
- IEEE Fellow, 2011.
- Overseas Outstanding Contribution Award, China Computer Federation, 2008.
- ACM Fellow, 1998.

### Patents

1. Efficient Data Storage System (with Ming Benjamin Zhu and Hugo Patterson), U.S. Patent 8,275,955. 2012.
2. Partitioning a data stream using embedded anchors (with Umesh Maheshwari and Hugo Patterson). U.S. Patent 8,234,413. 2012.
3. Partitioning a data stream using embedded anchors (with Umesh Maheshwari and Hugo Patterson). U.S. Patent 7,979,584. July 2011.
4. Similarity search system with compact data structures (with Qin Lv and Moses Charikar). U.S. Patent 7,966,327. June 2011.
5. Cluster storage using delta compression (with Hugo Patterson, Ming Benjamin Zhu, Sazzala Venkata Reddy, Umesh Maheshwari, Edward K. Lee). U.S. Patent 7,962,520. June 2011.

6. Efficient computation of sketches, (with Ming Benjamin Zhu). U.S. Patent 7,844,652. 2010.
7. Efficient Data Storage System (with Ming Benjamin Zhu and Hugo Patterson). U.S. Patent 7,769,967. August 2010.
8. Network file system-based data storage system (with Hugo Patterson; Zhu; Ming Benjamin, Allan Bricker. Richard Johnsson, Sazzala Reddy, Jeffery Zabarsky). U.S. Patent 7,747,581. June 2010.
9. Network file system-based data storage system (with Hugo Patterson; Zhu; Ming Benjamin, Allan Bricker. Richard Johnsson, Sazzala Reddy, Jeffery Zabarsky). U.S. Patent 7,689,633. March 2010.
10. Efficient data storage using resemblance of data segments (with M. Zhu, U. Maheshwari, Z. Yang). U.S. Patent 7,562,186. 2009.
11. Efficient Data Storage System (with Ming Benjamin Zhu and Hugo Patterson). U.S. Patent 7,434,015. October 2008.
12. Efficient Data Storage System (with Ming Benjamin Zhu and Hugo Patterson). U.S. Patent 7,373,464. May 2008.
13. Efficient Data Storage System (with Ming Benjamin Zhu and Hugo Patterson). U.S. Patent 7,305,532. December 2007.
14. Efficient Data Storage System (with Ming Benjamin Zhu and Hugo Patterson). U.S. Patent 7,065,619. June 2006.
15. Archival Data Storage System and Method (with Howard Lee). U.S. Patent 7,007,141. 2006.
16. Efficient Data Storage System (with Ben Zhu and Hugo Patterson). U.S. Patent 6,928,526. August 2005.
17. Optical blending for multi-projector display wall systems (with Yuqun Chen and Timothy Housel). U.S. Patent 6,570,623. 2000.
18. Method for Improving Cache Locality of A Computer Program (with Jan Edler and James Philbin). U.S. Patent 5,724,586. 1996.
19. User-Level Direct Memory Access (with Matthias Blumrich, Cezary Dubnicki, and Edward Felten). U.S. Patent 5,659,798. 1996.
20. Real Time, Concurrent Garbage Collection System and Method (With Andrew Appel and John Ellis). U.S. Patent 5,088,036. 1989.

## **Publications**

1. Qian Zhu, Aaron Wong, Arjun Krishnan, Miriam Aure, Alicja Tadych, Ran Zhang, David Corney, Casey Greene, Lars Bongo, Vessela Kristensen, Moses Charikar, Kai Li, Olga Troyanskaya: Targeted exploration and analysis of large cross-platform human transcriptomic compendia. *Nature Methods*. Advanced online publication. (2015)
2. Li-Fang Cheng, Michael Draugelis, Kai Li and Barbara Engelhardt. A Temporal-Difference Approach with Unsupervised Data Imputation for Early Sepsis Prediction. 2nd Workshop on Machine Learning for Clinical Data Analysis, Healthcare and Genomics (NIPS 2014)
3. Wei Dong, Kai Li, Zhe Wang. High Confidence Near-Duplicate Image Detection. ACM International Conference on Multimedia Retrieval (ICMR), 2012.
4. Gala Yadgar, Michael Factor, Kai Li and Assaf Schuster. *Management of Multilevel, Multiclient Cache Hierarchies with Application Hints*. ACM Transactions on Computer Systems (TOCS). Volume 29 Issue 2, May 2011.

5. Wei Dong, Moses Charikar, Kai Li. Efficient K-Nearest Neighbor Graph Construction for Generic Similarity Measures. In Proceedings of the 20<sup>th</sup> International World Wide Web Conference. Hyderabad, India. March 2011.
6. Wei Dong, Fred Douglis, Kai Li, Hugo Patterson, Sazzala Reddy, Philip Shilane. Tradeoffs in Scalable Data Routing for Deduplication Clusters. In Proceedings of the 9<sup>th</sup> USENIX Conference on File and Storage Technologies, 2011.
7. Christian Bienia and Kai Li. Fidelity and Scaling of the PARSEC Benchmark Inputs. In Proceedings of the 2010 IEEE International Symposium on Workload Characterization, December 2010.
8. Jia Deng, Alex Berg, Kai Li and Li Fei-Fei. What does classifying more than 10,000 image categories tell us? European Conference on Computer Vision, September 2010.
9. Christian Bienia and Kai Li. Characteristics of Workloads Using the Pipeline Programming Model. In Proceedings of the Third Workshop on Emerging Applications and Many-Core Architecture. Held in conjunction with the 37<sup>th</sup> International Symposium on Computer Architecture, June 2010.
10. William K. Josephson, Lars A. Bongo, David Flynn, and Kai Li. DFS A File System for Virtualized Flash Storage. 8<sup>th</sup> USENIX Conference on File and Storage Technologies, February 2010.
11. J. Deng, W. Dong, R. Socher, L.-J. Li, K. Li and L. Fei-Fei, ImageNet: A Large-Scale Hierarchical Image Database. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 2009.
12. J. Deng, K. Li, M. Do, H. Su, L. Fei-Fei, Construction and Analysis of a Large Scale Image Ontology. Annual Conference of Vision Sciences Society (VSS), May 2009.
13. Hibbs, M.A.; Myers, C.L.; Huttenhower, C.; Hess, D.C.; Li, K.; Caudy, A.A.; Troyanskaya, O.G. Directing Experimental Biology: A Case Study in Mitochondrial Biogenesis, PLoS Computational Biology, 2009.
14. Christian Bienia and Kai Li. PARSEC 2.0: A New Benchmark Suite for Chip-Multiprocessors. In Proceedings of the 5<sup>th</sup> Annual Workshop on Modeling, Benchmarking and Simulation, June 2009.
15. Wei Dong, Zhe Wang, Moses Charikar, Kai Li. Efficiently Matching Sets of Features with Random Histograms. In *Proceedings of the 16th ACM International Conference on Multimedia*. Vancouver, Canada. October 2008.
16. Wei Dong, Zhe Wang, William Josephson, Moses Charikar, Kai Li. Modeling LSH for Performance Tuning.. In *Proceedings of ACM 17th Conference on Information and Knowledge Management (CIKM)*. Napa Valley, CA, USA. October 2008.
17. Brendan Collins, Jia Deng, Kai Li and Fei-Fei Li Towards scalable dataset construction: An active learning approach. In *Proceedings of the European Conference on Computer Vision (ECCV) 2008*.
18. Wei Dong, Moses Charikar, Kai Li. Asymmetric Distance Estimation with Sketches for Similarity Search in High-Dimensional Spaces. *Proceedings of the 31st Annual International ACM SIGIR Conference on Research & Development on Information Retrieval*. Singapore. July 2008.
19. Gala Yadgar, Michael Factor, Kai Li, and Assaf Schuster. MC2: Multiple Clients on a Multilevel Cache. Proceedings of the 28<sup>th</sup> International Conference on Distributed Computing Systems (ICDCS). June 2008.
20. Benjamin Zhu, Kai Li and Hugo Patterson. Avoiding the Disk Bottleneck in a Deduplication Storage System. In Proceedings of The 6<sup>th</sup> USENIX Conference on File and Storage Technologies (FAST'08). February 2008.

21. Matthew A. Hibbs, David C. Hess, Chad L. Myers, Curtis Huttenhower, Kai Li, and Olga Troyanskaya. Exploring the Functional Landscape of Gene Expression: Directed Search of Large Microarray Compendia. *Bioinformatics* 23(20):2692-2699; doi:10.1093/bioinformatics/btm403. October 2007.
22. Qin Lv, William Josephson, Zhe Wang, Moses Charikar, Kai Li. Multi-Probe LSH: Efficient Indexing for High-Dimensional Similarity Search. In *Proceedings of the 33rd International Conference on Very Large Data Bases (VLDB)*. Vienna, Austria. September 2007.
23. William Josephson, Ruby Lee and Kai Li. ISA Support for Fingerprinting and Eraser Codes. In *Proceedings of IEEE Application-Specific Systems, Architectures and Processors*. August 2007.
24. Zhe Wang, William Josephson, Qin Lv, Moses Charikar, Kai Li. Filtering Image Spam with Near-Duplicate Detection. In *Proceedings of the 4th Conference on Email and Anti-Spam (CEAS)*. Mountain View, CA, USA. August 2007.
25. Matthew Hibbs, Grant Wallace, Maitreya Dunham, Kai Li, and Olga Troyanskaya. Viewing the Larger Context of Genomic Data through Horizontal Integration. *Proceedings of the 11th IEEE International Conference of Information Visualization*, July 2007.
26. Grant Wallace and Kai Li. Virtually Shared Displays and User Input Devices. In *Proceedings of the 2007 USENIX Annual Technical Conference*. Pp 375-380. June 2007.
27. D.A. Batchelor, M. Beck, A. Becoulet, R.V. Budny, C.S. Chang, P.H. Diamond, J.Q. Dong, G.Y. Fu, A. Fukuyama, T.S. Hahm, D.E. Keyes, Y. Kishimoto, S. Klasky, L.L. Lao, K. Li, Z. Lin, B. Ludaescher, J. Manickam, N. Nakajima, T. Ozeki, N. Podhorszki, W.M. Tang, M.A. Vouk, R.E. Waltz, S.J. Wang, H. R. Wilson, X.Q. Xu, M. Yagi and F. Zonca. Simulation of Fusion Plasmas: Current Status and Future Direction. *Plasma Science and Technology*. 9:312-387, 2007.
28. Zhe Wang, Qin Lv, William Josephson, Wei Dong, Moses Charikar, Kai Li. Sizing Sketches: A Rank-Based Analysis for Similarity Search. *Proceedings of ACM SIGMETRICS 2007*, San Diego, CA, USA. June 2007.
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30. Lars A Bongo, Grant Wallace, Tore Larsen, Kai Li, Olga Troyanskaya. Systems Support for Remote Visualization of Genomics Applications over Wide Area Networks. *Proceedings of the International Workshop on Distributed, High-Performance and Grid Computing in Computational Biology (GCCB)*, 2006. Also in *Lecture Notes in Computer Science*, Springer Berlin - Heidelberg, vol 4360, pp157-174. March 7, 2007,
31. Qin Lv, William Josephson, Zhe Wang, Moses Charikar, and Kai Li, Efficient Filtering with Sketches in the Ferret Toolkit, In *Proceedings of the 8th ACM SIGMM International Workshop on Multimedia Information Retrieval*, October 2006.
32. Zhe Wang, Matthew Hoffman, Perry Cook and Kai Li. VFerret: Content-Based Similarity Search Tool for Continuous Archived Video. In *Proceedings of ACM workshop on Continuous Archiving and Recording of Personal Experiences CARPE-06*. October 2006.
33. Qin Lv, William Josephson, Zhe Wang, Moses Charikar, and Kai Li. Ferret: A Toolkit for Content-Based Similarity Search. In *Proceedings of ACM SIGOS EuroSys Conference*. April 2006.

34. Han Chen, Kai Li and Bin Wei. Memory Performance Optimizations For Real-Time Software HDTV Decoding. *Journal of VLSI Signal Processing*. 41(2): 193-207. September 2005.
35. Grant Wallace, Otto Anshus, Peng Bi, Han Chen, Yuqun Chen, Perry Cook, Adam Finkelstein, Thomas Funkhouser, Anoop Gupta, Matthew Hibbs, Kai Li, Zhiyan Liu, Rudrajit Samanta, Rahul Sukthankar, and Olga Troyanskaya. Tools and Applications for Large-Scale Display Walls. *IEEE Computer Graphics & Applications, Special Issue on Large Displays*. 25(4):24-33, July/August 2005.
36. Nitin Garg, Sumeet Sobti, Junwen Lai, Fengzhou Zheng, Kai Li, Arvind Krishnamurthy, and Randolph Wang. Bridging the Digital Divide: Storage Media + Postal Network = Generic High-Bandwidth Communication. *ACM Transactions on Storage (TOS)*. 1(2):246-275. May 2005.
37. Matthew Hibbs, Nathaniel C. Dirksen NC, Kai Li, and Olga G. Troyanskaya, Visualization Methods for Statistical Analysis of Microarray Clusters, *BMC Bioinformatics*, 6:115, May 2005.
38. Kai Li, Matthew Hibbs, Grant Wallace and Olga Troyanskaya. Dynamic Scalable Visualization for Collaborative Scientific Applications. *Proceedings of The Next Generation Software Workshop*. Denver, Colorado, April 2005.
39. Yuanyuan Zhou, Angelos Bilas, Suresh Jagannathan, Dimitrios Xinidis, Cezary Dubnicki and Kai Li. VI-attached Database Storage. *IEEE Transactions on Parallel and Distributed Systems*. 16(1): 35-50, January 2005.
40. Grant Wallace, Han Chen and Kai Li. Automatic Alignment of Tiled Displays for a Desktop Environment. *Journal of Software*. 15(12): 1776-1786. December 2004.
41. Qin Lv, Moses Charikar and Kai Li. Image Similarity Search with Compact Data Structures. *Proceedings of the ACM SIGIR 13th Conference on Information and Knowledge Management (CIKM)*. Pages 208-217, November 2004.
42. Wen Xu, Sanjeev Kumar, Kai Li. Fast Paths in Concurrent Programs. In *Proceedings of ACM/IEEE International Conference on Parallel Architecture and Compilation Techniques (PACT)*, Nice, France, September 2004.
43. Yuanyuan Zhou, Zhifeng Chen and Kai Li. Second-Level Buffer Cache Management. *IEEE Transactions on Parallel and Distributed Systems*. (15(6):505-519. June 2004.
44. Yuqun Chen, James Plank, and Kai Li. CLIP: A Checkpointing Tool for Message Passing Parallel Computers. *Scalable Input/Output: Achieving System Balance* (Edited by Daniel Reed). MIT Press. January 2004.
45. Yuanyuan Zhou, Limin Wang, Douglas W. Clark, and Kai Li. Thread Scheduling for Out-of-Core Applications with a Memory Server. *Scalable Input/Output: Achieving System Balance* (Edited by Daniel Reed). MIT Press. January 2004.
46. Yuanyuan Zhou, Liviu Iftode, and Kai Li. A Scalability Study of Shared Virtual Memory Systems. *Scalable Input/Output: Achieving System Balance* (Edited by Daniel Reed). MIT Press. January 2004.
47. Peter F. Corbett, Jean-Pierre Prost, Chris Demetriou, Garth Gibson, Erik Riedel, Jim Zelenka, Yuqun Chen, Ed Felten, Kai Li, John Hartman, Larry Peterson, Brian Bershad, Alec Wolman and Ruth Aydt. Proposal for a Common Parallel File System Programming Interface. *Scalable Input/Output: Achieving System Balance* (Edited by Daniel Reed). MIT Press. January 2004.
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49. Zhifeng Chen, Yuanyuan Zhou and Kai Li. Eviction-based Placement for Storage Caches. In *Proceedings of USENIX Technical Conference*, June 2003.
50. Grant Wallace, Han Chen, and Kai Li.. Color Gamut Matching for Tiled Display Walls. *Immersive Projection Technology Workshop (IPT2003)*, May 2003.
51. Sanjeev Kumar, Kai Li. Using Model Checking to Debug Device Firmware. In *Proceedings of USENIX Operating Systems Design and Implementation (OSDI)*, 2002.
52. Han Chen, Rahul Sukthankar, Grant Wallace and Kai Li. Scalable Alignment of Large-Format Multi-Projector Displays Using Camera Homography Trees. In *Proceedings of IEEE Visualization (Vis2002)*, October 2002.
53. Han Chen, Kai Li, and Bin Wei. Memory Performance Optimizations for Real-Time Software HDTV Decoding. *IEEE International Conference on Multimedia and Expo (CME2002)*, August 2002.
54. Qin Lv, Pei Cao, Edith Cohen, Kai Li, and Scott Shenker, Search and Replication in Unstructured Peer-to-Peer Networks. *Proceedings of the ACM 16th International Conference on Supercomputing*, pages 84-95, June 2002.
55. Sanjeev Kumar, Kai Li. Dynamic Memory Management for Programmable Devices. *International Symposium of Memory Management (ISMM)*, pages 139-149. June 2002.
56. Yuanyuan Zhou, Suresh Jagannathan, Angelos Bilas ,Cezary Dubnicki, James F Philbin, Kai Li. Experience with VI Communication for Database Storage. In *Proceedings of the 29th ACM International Symposium of Computer Architecture*. May 2002.
57. Han Chen, Kai Li, and Bin Wei. A Parallel Ultra-High Resolution MPEG-2 Video Decoder for PC Cluster Based Tiled Display System. In *Proceedings of International Parallel and Distributed Processing Symposium (IPDPS2002)*, April 2002
58. Zhiyan Liu, Adam Finkelstein and Kai Li. Improving progressive view-dependent isosurface propagation. *Computers and Graphics*, 26 (2): 209-218. *Special Issue on Visualization on Very Large Datasets*. April 2002.
59. Han Chen, Grant Wallace, Anoop Gupta, and Kai Li, Tom Funkhouser, Perry Cook, Experiences with Scalability of Display Walls. In *Proceedings of the 7th Annual Immersive Projection Technology Symposium (IPT)*, March 2002.
60. Sanjeev Kumar, and Kai Li. Performance Impact of Using ESP to Implement VMMC Firmware. *Workshop on Novel Uses of System Area Networks (SAN-1)*, February 2002.
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64. Yuanyuan Zhou, James F. Philbin, and Kai Li. The Multi-Queue Replacement Algorithm for Second Level Buffer Caches. In *Proceedings of USENIX Technical Conference*, June 2001.
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66. Zhiyan Liu, Adam Finkelstein, and Kai Li. Progressive View-Dependent Isosurface Propagation. IEEE TCVG Symposium on Visualization (VisSym 2001). Ascona, Switzerland. May 28 - May 30, 2001.
67. Xiang Yu, Ben Gum, Yuqun Chen, Randy Wang, Kai Li, Arvind Krishnamurthy, and Thomas Anderson, Trading Capacity For Performance In A Disk Array. The 4th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2000), Paradise Point Resort, San Diego, California , October 23-25, 2000.
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  91. Pei Cao, Edward W. Felten, Anna R. Karlin, and Kai Li. Implementation and Performance of Integrated Application-Controlled File Caching, Prefetching and Disk Scheduling. *ACM Transactions on Computer Systems*. 14(4):311-343. Nov 1996.
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