

Curriculum Vitae, Dr. Kai Hwang

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Biographical Sketch:

Kai Hwang is a Professor of Electrical Engineering and Computer Science at the University of Southern California. He received the Ph.D. in Electrical Engineering and Computer Science from the University of California, Berkeley in 1972. Prior to joining USC in 1985, he has taught at Purdue University over 11 years. He has served as a visiting chair professor during his sabbatical visits of University of Minnesota (1989), National Taiwan University (1992), University of Hong Kong (1996-99), and Zhejiang University (2005-2007). Since 2008, he has served as a visiting Chair Professor at Tsinghua University in China, endowed by Intellectual Ventures and EMC, subsequently.

He has authored or coauthored 8 books, edited 3 books, and published over 256 scientific papers in refereed journals, conferences, and book chapters. Most of his papers appeared in IEEE or ACM publications. Five of his books *Computer Architecture and Parallel Processing* (1983), *Advanced Computer Architecture* (1993 and 2003), *Computer Arithmetic* (1978), and *Scalable Parallel Computing* (1998), *Distributed and Cloud Computing* (2012) were adopted worldwide and translated into 4 foreign languages, Spanish, Chinese, Japanese, and Korean from the English editions. These 5 book were cited over 7,000 times in Google Scholar citations. He has also co-edited the Book Series of *Annual Reviews in Scalable Computing* (1999 - present) and *Parallel Processing for Supercomputers and Artificial Intelligence* (1989).

His book *Distributed and Cloud Computing* (648 pages), coauthored with Geoffrey Fox and Jack Dongarra, was published by Morgan Kaufman in 2012. This book covers distributed systems, computer clusters, virtualization, supercomputers, computing grids, P2P systems, Internet clouds, Internet of Things, and social networks. Visit the Web site: (<http://mkp.com/books/computer-architecture-books> for details. A Chinese translation of this book appeared in January 2013. The American Library Association has named this book as an outstanding academic title published by Elsevier in 2012.

In 2017, Dr. Hwang has two new books just published: *Cloud Computing for Machine Learning and Cognitive Applications* (The MIT Press, 601 pages) and *Big Data Analytics for Cloud/IoT and Cognitive Computing* (Wiley, 410 pages). These two books consolidate his past 10 years of frontier research and updated teaching achievements at USC, THU, etc. The Chinese translation of these two book will appear in early 2018.

Dr. Hwang was awarded the *IEEE Fellow* in 1986 for making significant contributions in computer architecture, digital arithmetic, and parallel processing. He has served as a distinguished visitor of IEEE Computer Society. He received the very first *Outstanding Achievement Award* in 2004 from China Computer Federation for his leadership roles in advanced research and higher education on high-performance computer systems and Internet technology. He has received several Awards from IEEE Computer Society, including the *IEEE IPDPS Founder's Award* (2011) for his pioneering contributions to the field of parallel processing. He was awarded the *IEEE CloudCom Lifetime Achievement Award* (2012) for his outstanding academic achievements.

He has served as the founding Editor-in-Chief of the *Journal of Parallel and Distributed Computing* for 28 years from 1983 to 2011. He was on the Editorial Board of *IEEE Transactions on Parallel and Distributed System* during 2005-2009. Currently, he serves in the Editorial Board of *IEEE Trans. on Cloud Computing*, *International Journal of High-Performance Computing and Networking*, *Journal of Cloud Computing*, and *Journal of Big-Data Intelligence*.

He has supervised the completion of 21 Ph.D. theses at USC and Purdue in computer science and computer engineering. His former Ph.D. students serve mostly as academic leaders, chief scientists, or research managers at top research Universities and high-tech companies in the US, China, Korea, Taiwan, Hong Kong, etc. Among them, Ahmed Louri, D. K. Panda, Joydeep Ghosh, and Lionel Ni were elected IEEE Fellows and Jian Xu, an IBM Fellow. Dr. Xu was honored by the Hall of Fame, Woman in Technology International in 2008.

Presently, Hwang teaches computer architecture, parallel and distributed computing, wireless Internet, pervasive computing, and cloud computing courses at USC. Dr. Hwang has lectured worldwide and performed advisory work for IBM, Intel, JPL, MIT Lincoln Lab., ETL in Japan, Chinese Academy of Sciences, GMD in Germany, and INRIA in France. He has chaired numerous ACM/IEEE International Conferences and delivered 40 keynote addresses in major IEEE/ACM or International Conferences (*IPDPS*, *ICDCS*, *HPCA*, *ICPP*, *HPCC*, *NAS*, *SCC*, *ISPA*, *ISCA*, *Cluster*, *CloudCom*, *OTM*, *Ubi-Media*, *COMPAR*, *UCC*, etc.)

Dr. Hwang has received numerous research grants from the NSF, ONR, AFOSR, IBM, AT&T, MIT Lincoln Lab, Hong Kong Research Council, China 973 Research Agency, etc. As a Principal Investigator, he has led a major NSF/ITR project (\$2M) on Grid and P2P security at USC. His research contributions cover the areas of scalable multiprocessors, distributed RAID for clusters, multicore processors, trust management, job scheduling, P2P reputation systems, intrusion detection systems, benchmarking of supercomputers, parallel processing, cloud computing, virtual machines, wireless and future Internet, and network security, etc. Contact him via Email: kaihwang@usc.edu.

Publication Citation Statistics:

Dr. Hwang's work is highly cited by the computer science and networking communities on a global basis. As of today, *Google Scholar* cited his works over **16,901** citations on a global scale. The Web of Science has ranked him at the top 0.018% most cited scholars in computer science and engineering. Currently, he has a citation **h-index** of **55**. He has an **i-10-index** of **158**. Refer to <http://scholar.google.com/citations?user=R7cCjGYAAAAJ> for details.

His most-cited book, *Computer Architecture and parallel Processing*, was cited over **2,556 times**. His most-cited article on PowerTrust was cited **798 times**, which was identified the most

cited paper in *IEEE-TPDS* in 2007 [55]. His second most-cited paper on fuzzy trust management in *IEEE Internet Computing* [59] has **516 citations**. In the past 5 years, his published work= were cited over 4,758 times. He is among the **top 20** mostly cited researchers on USC campus: (http://www.usc.edu/about/faculty/highly_cited_researchers.html). For details of his scholarly work, visit his Homepage: <http://GridSec.usc.edu/Hwang.html>.

Higher Education:

- Ph.D. in EECS (1972), University of California at Berkeley (Advisor: Prof. Arthur Gill, retired)
- M.S. in EE (1969), University of Hawaii, Honolulu
- B.S. in EE (1966), National Taiwan University, Taiwan, China

Employment History: (Current position and visiting chairs in boldface)

- **1985 - Present, Professor of Electrical Engineering and Computer Science, University of Southern California, Los Angeles, CA.**
- **2013 - 2016, EMC Endowed Visiting Chair Professor in Computer Science and Engineering, Tsinghua University, Beijing, China.**
- **2010 - 2013, Visiting Chair Professor endowed by Intellectual Ventures, National Lab. for Information Science and Engineering, Tsinghua University, Beijing, China.**
- **Spring and Summer 2008, Visiting Chief Scientist, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China. (during his sabbatical from USC).**
- **2005 - 2007, Visiting Cao-Guang-Biao Chair Professor, Zhejiang University, China**
- **1996 – 1999, Chair Professor of Computer Engineering, University of Hong Kong, during sabbatical and a special research leave from USC.**
- **Spring 1989, CDC Visiting Chair Professor of Computer Science, University of Minnesota, during sabbatical leave from USC.**
- **Fall 1991, Distinguished Professor of Computer Science and Information Engineering, National Taiwan University, China, during his sabbatical leave from USC.**
- 1974-1984, Assistant Professor, Associate Professor, and Professor of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana.
- Fall 1979, Visiting Professor of Electrical Engineering, Institute of Industrial Sciences, The University of Tokyo, Japan, during sabbatical leave from Purdue University
- 1972 -1974, Assistant Professor of Electrical Engineering, University of Miami, Coral Gables, Florida.
- Summer 1972, Scientist Research Associate, Lockheed Palo Alto Research Laboratory, Lockheed Missile and Space Co., Inc., Sunnyvale, California.
- 1969 - 1972, Research Assistant, Computer Science Group, Electronics Research Laboratory, University of California at Berkeley.

Honors and Awards : (Major Awards highlighted in boldface)

- **IEEE Lifetime Achievement Award** for outstanding contributions to parallel and distributed computing, *Fourth IEEE CloudCom*, Taipei, Taiwan, Dec. 3-6, 2012.
- **Outstanding Achievement Award** for contributions to computer architecture and Internet technology, IEEE Shanghai Chapter, IPDPS 2012, May 21, 2012.
- **IEEE IPDPS Founders' Award** for pioneering contributions in parallel processing, IPDPS 25-Year Anniversary, Anchorage, Alaska, May 18, 2011.
- **Outstanding Achievement Award** from China Computer Federation in recognition of substantial contributions in research and education of high-performance computer systems and to China's computer profession, Oct. 18, 2004.
- **IEEE Fellow** for contributions to the theory, design, and applications of computer architecture, digital arithmetic, and parallel processing, IEEE Computer Society, 1986. **IEEE Life-Fellow** since 2013.
- *Distinguished Visitor* of IEEE Computer Society (1981-1984).
- *Board of Directors*, ACM Special Interest Group on Computer Architecture, (SIGARCH), 1990-1992.
- *Academic Achievement Award* for recognition of exceptional academic accomplishments, Chinese Computer Association, Los Angeles, 1994.
- **Outstanding Achievement Award** for dedicated and valued contribution to the fields of parallel and distributed processing techniques and applications, PDPTA '96, Sunnyvale, California, August 9-11, 1996.
- **Outstanding Contribution Award** for excellence in research and education, *Third Int'l Conf. on Parallel and Distributed Computing Applications and Technologies* (PDCAT), Kanazawa, Japan, Sept.4, 2002.

Journal and Proceedings Editorship: (Recent Services and JPDC , TPDS in boldface)

- **Editor-in-Chief and Co-Founder, *Journal of Parallel and Distributed Computing*, Elsevier, San Diego, 1984 – 2011.**
- **Associate Editor, *IEEE Transactions on Service Computing*, since 2015.**
- **Associate Editor, *IEEE Transactions on Cloud Computing*, since 2013.**
- **Editorial Board, *Int'l Journal of Cloud Computing*, Inter-science since 2011**
- **Editorial Board, *International Journal of High-Performance Computing and Networking*, 2005 - present.**
- **Editorial Board, *Journal of Big Data Intelligence*, 2013 – present.**
- **Associate Editor, *IEEE Transaction on Parallel and Distributed Systems*, 2005 – 2009**
- Editor, *Proceedings of the Tenth International Parallel Processing Symposium* (IPPS-96), IEEE Computer Society, Honolulu, Hawaii, April 15 -18, 1996.
- Consulting Editor, *McGraw-Hill Series in Supercomputing and Parallel Processing*, 1987 - 1990.

- Co-Editor-in-Chief, *Annual Review of Scalable Computing*, Singapore University Press and World Scientific Publishing Co., Volumes 1- 7, 1999 - present.
- Co-editor, *Proceedings of the 1986 International Conference on Parallel Processing*, (ICPP), IEEE Computer Society, St. Charles, Illinois, August 19-22, 1986.
- Editor, *Proceedings of the Seventh Symposium on Computer Arithmetic (ARITH-7)*, IEEE Computer Society, Urbana, Illinois, June 4-6. 1985.

Scientific Publications:

Textbooks and Research Books Published:

1. K. Hwang, *Cloud Computing for Machine Learning and Cognitive Applications*, The MIT Press, June 2017 (601 pages). Chinese translation will appear in early 2018.
2. K. Hwang and M. Chen, *Big Data Analytics for Cloud, IoT and Cognitive Computing*, John Wiley Publisher, U. K., May 2017. (410 pages).
3. M. Chen and K. Hwang, *Cognitive Computing and Deep Learning*, Huazhang Publisher, China (**in Chinese**), scheduled to appear in early 2018.
4. K. Hwang, G. Fox, and J. Dongarra, *Distributed and Cloud Computing : from Parallel Processing to The Internet of Things*, Morgan Kaufmann, Oct. 2013 (648 pages), (ISBN 978-0-12-385880-1). Chinese translation of *Distributed and Cloud Computing : from Parallel Processing to The Internet of Things*, Huazhang Publisher, China, Jan. 2013.
5. K. Hwang and Z. Xu, *Scalable Parallel Computing: Technology, Architecture, Programming*, a graduate-level textbook co-authored with Z. Xu, McGraw-Hill Book Company, Feb. 1998 (825 pages). (ISBN 0-07-031798-4.), Chinese translation by Shanghai Jiaotong University 2000.
6. K. Hwang, *Advanced Computer Architecture: Parallelism, Scalability, Programmability*, McGraw-Hill Book Co., New York, April 1993. (770 Pages). Chinese translation by Tsinghua University Press, China, August, 1995. Korea translation in Sept. 1997. Second Edition, McGraw-Hill Tata, India, 2012.
7. K. Hwang and F. A. Briggs, *Computer Architecture and Parallel Processing*, a graduate-level textbook by McGraw-Hill Book Co., New York, 1984, (846 pages). Chinese translation by Science Press, China, in 1987. Spanish translation by A. B. Paloma and J. Ruz Ortiz, Univ. of Madrid, Libros McGraw-Hill De Mexico, Spain 1988.
8. K. Hwang, *Computer Arithmetic: Principles, Architecture and Design*, John Wiley & Sons, Inc., Publishers, New York, N. Y. 1979, (423 pages). Chinese translation by Science Press, China, in 1980. Japanese translation by Modern Science Press, Tokyo, Japan, 1980.
9. K. Hwang and D. DeGroot (Editors and Authors), *Parallel Processing for Supercomputers and Artificial Intelligence*, a research reference book, McGraw-Hill Book Co., N. Y., March 1989, (673 pages).
10. K. Hwang (Editor and authgor), *Supercomputers: Design and Applications*, A tutorial text by IEEE Computer Society Press, Silver Spring, Maryland, August 1984. (640 pages)
11. C. K. Yuen (EIC) and K. Hwang (Co-EIC)), *Annual Review of Scalable Computing*, Singapore University Press and World Scientific Pub. Co., Volumes 1- 7, 1999 - 2005.

Chapters in Edited Books: (In reverse chronological order)

12. F. Feng, Y. Chen, D. Summervillw, and K. Hwang, “Fair Multi-Party Non-Repudiation Framework for Storage Clouds”, Part I in *Computer Communications and Networks*, (Mahmood and Hill, editors), Springer-Verlag, 2012.
13. F. Feng, Y. Chen, D. Summervillw, and K. Hwang, “Fair Multi-Party Non-Repudiation Framework for Storage Clouds”, Part II, in *Computer Communications and Networks*, (Mahmood and Hill, editors), Springer-Verlag, 2012.
14. Z. Xu and K. Hwang, “Designing Superservers with clusters and Commodity Components”, *Annual Advances in Scalable Computing*, World Scientific, Singapore, 1999.
15. K. Hwang, P. S. Tseng and D. Kim, “An Orthogonal Multiprocessor for Parallel Scientific Computations”, *Architectural Alternatives for Exploiting Parallelism*, edited by David Lilja, IEEE Computer Society Press, Los Alamitos, CA, 1991, pp. 278-293.
16. K. Hwang and D. K. Panda, “The USC Orthogonal Multiprocessor for Image Understanding”, Chap. 4 in *Parallel Architectures and Algorithms for Image understanding*, (Prasanna, Editor), Academic Press, New York, 1991.
17. K. Hwang and R. Chowkwanyun, “Multiprocessor Architectural Support for Balanced LISP Processing”, Chap. 5 in *Computers for Artificial Intelligence Applications*, (Wah and Ramamoorthy, Editors), John Wiley 1990.
18. K. Hwang and J. Ghosh, “Supercomputers and Artificial Intelligence Machines”, Chap.8 in *Computer architecture: Concepts and Systems*, (Milutinovic, Editor), Elsevier Science, New York, 1987, pp. 307-353.
19. K. Hwang, “Exploiting Parallelism in Multiprocessors and Multicomputers,” Chap.2 in *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
20. K. Hwang, R. Chowkwanyun and J. Ghosh, “Parallel Architectures for Implementing AI Systems,” Chap. 7, *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
21. K. Hwang and R. Chowkwanyun, “Multicomputer Load Balancing for Concurrent Lisp Execution.”Chap. 9 in *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
22. K. Hwang, “Parallel Programming Environment and Software Support,” Chap.10 in *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, 1989.
23. K. Hwang and S. Toborg, “Exploring Optical Computing and Artificial Neural Networks,” Chap. 16 , *Parallel Processing for Supercomputers and AI*, (Hwang and DeGroot, Editors), McGraw-Hill, N. Y. 1989.
24. K. Hwang, K. S. Fu and B. W. Wah, “VLSI Architectures for Pattern Analysis and Image Database Management,” Chap.25 in *VLSI and Modern Signal Processing*, (Ed. Kung.), Prentice-Hall, 1985.
25. “VLSI Computer Arithmetic for Real-Time Image Processing,” Chap. 2 *VLSI Electronics, Microstructure Science*, Vol. 7, (Einspruch, Editor), Academic Press, N. Y., 1984, pp. 303-331.

26. F. A. Briggs, K. S. Fu, and K. Hwang, "PUMPS: A Shared-Resource Multiprocessor Architecture for Pattern Analysis and Image Database Management," Chap.15 in *Multicomputers and Image Processing*, Academic Press, 1982, pp. 319-330.
27. K. Hwang, S. P. Su and L. M. Ni, "Vector Computer Architectures and Processing Techniques," Chap. 4 , *Advances in Computers*, (Ed. by M. Yovits), Vol. 20, Academic Press, Inc., New York, 1981, pp. 115-197.
28. F.A. Briggs, K. S. Fu, J. H. Patel, and K. Hwang, "A Shared-Resource Multiple Microprocessor System for Pattern Recognition and Image Processing," Chap.11 in *Special Computer Architecture for Pattern Processing*, CRC, Boca Raton, FL. 1982, pp. 221-230.

Refereed Journal Papers: (19 in the last 5 years highlighted in boldface)

29. **K. Hwang**, X. Bai, Y. Shi, M. Li, W.G. Chen, and Y. Wu, "Cloud Performance Modeling with Benchmark Evaluation of Elastic Scaling Strategies", *IEEE Trans. on Parallel and Distributed Systems*, Jan. 2016
30. M. Chen, Y. Qian, **K. Hwang**, J. Song, S. Mao, "Privacy Protection and Intrusion Avoidance for Cloudlet-based Medical Data Sharing", *IEEE Trans. Cloud Computing*, 2016.
31. **K. Hwang**, M. Chen, J. Wu, "Mobile Big Data Management and Innovative Applications (Gust Editors' Introduction)", *IEEE Trans. Service Computing*, Vol. 9, No. 5, pp. 784-785, 2016.
32. M. Chen, **K. Hwang**, et al, "A 5G Cognitive System for Healthcare", *Journal of Big Data and Cognitive Computing*, No.2, Vol.1, 2017.
33. M. Chen, **K. Hwang**, et al, "Narrow Band Internet of Things:", *IEEE Access*, accepted to appear 2017
34. M. Chen , **K. Hwang**, et al, "Disease Prediction by Machine Learning over Big Data from Health care Communities", *IEEE Access*, accepted to appear 2017
35. M. Chen, Y. Hao, C. Lai, D. Wu, Y. Li, **Kai Hwang**, "Opportunistic Workflow Scheduling over Co-located Clouds in Mobile Environment", *IEEE Trans. Service Computing*, 2016..
36. Y. Wu, M. Su, W. Zheng, **K. Hwang** and A. Zomaya, "Associative Big Data Sharing in Community Clouds: The MeePo Approach", *IEEE Cloud Computing*, Jan. 2016.
37. F. Zhang, **K. Hwang**, S. Khan, and Q. Malluhi, "Skyline Discovery and Composition of Inter-Cloud Mashup Services", *IEEE Trans. Service Computing*, September 2016.
38. F. Zhang, M. Sakr, **K. Hwang** and S. Khan, "Empirical Discovery of Power-Law Distribution in MapReduce Scalability", accepted *IEEE Trans. Cloud Computing*, August 2016.
39. H. Tan, C. Li, Z. He, K. Li and **K. Hwang**, "VMCD: A Virtual Multi-Channel Disk I/O Scheduling Method for Virtual Machines", *IEEE Trans. Service Computing*, accepted and online published in May 10, 2015.
40. W. He, **K. Hwang**. And D. Li, "Intelligent Carpool Routing for Urban Ridesharing by Mining GPS Trajectories", *IEEE Trans. on Intelligent Transportation Systems*, March 2015.
41. F. Zhang, J. Cao, **K. Hwang**, K. Li and S. Khan, "Adaptive Workflow Scheduling on Cloud Computing Platforms with Iterative Ordinal Optimization, *IEEE Trans. on Cloud Computing*, April, 2015.

42. F. Zhang, J. Cao, K. S. Khan, K. Li and K. Hwang, “A Task-Level Adaptive Framework for Real-Time Streaming Data in Healthcare Applications”, *Future Generation Computer Systems*, Oct. 2015..
43. K. L. Li, W. Ai, Z. Tang, F. Zhang, J. Gang, K.Q. Li, and K. Hwang, “Hadoop Recognition of Biomedical Named Entity Using Random Fields”, *IEEE Trans. on Parallel and Distributed Systems*, Dec. 2015..
44. F. Zhang, J. Cao, K. Li, S. Khan, K. Hwang, “Multi-Objective Scheduling of Many Tasks in Cloud Platforms”, *Future Generation Computer Systems*, Elsevier, Jan. 2015.
45. J. Cao, K. Hwang, K. Li, and A. Zomaya, "Optimal Multiserver Configuration for Profit Maximization in Cloud Computing", *IEEE Trans. Parallel, and Distributed Systems*, Special issue on Cloud Computing, Vol. 24, No.6, June 2013, pp.1087-1096.
46. S. Cheung, Y. Sun, K. Aberer, J. Haritsa, B. Horne, and K. Hwang, **Guest-Editorial: Special Issue on Privacy and Trust Management in Cloud and Distributed Systems**, *IEEE Tran. On Information Forensics and Security*, June 2013, pp. 835-837.
47. H. Shen and K. Hwang, “Locality-Preserving Clustering and Discovery of Resources in Wide-Area Computational Grids”, *IEEE Transactions on Computers*, Vol.61, No.4, April 2012, pp.458-473.
48. X. Lou and K. Hwang, “Quality of Data delivery in P2P Video Streaming”, *ACM Transactions on Mobile Computing, Communications and Applications, (TOMCCAP)*, Feb. 2012, pp.12-1 to 12-22.
49. K. Hwang, J. Dongarra, and G. Fox, "Cloud Computing: Trust Managements in Virtual Datacenters", *Microsoft TechNet Magazine*, Dec. 2011.
50. Z. Li, G. Xie, K. Hwang, and Z. Li, “Chern-Resilient Protocol for Massive Data Dissemination in P2P Networks”, *IEEE Trans. on Parallel and Distributed Systems*, Vol.22, No.9, August 2011.
51. K. Hwang and D. Li, “Trusted Cloud Computing with Secure Resources and Data Coloring”, *IEEE Internet Computing*, Vol.14, Sept. 2010, pp.14-22.
52. Y. Wu, K. Hwang, Y. Yuan, and W. Zheng, “Adaptive Workload Prediction of Grid Performance in Confidence Windows”, *IEEE Trans. on Parallel and Distributed Systems*, Vol.21, No.7, July 2010, pp.925-938.
53. Q. Y. Feng, K. Hwang, and Y.F. Dai, “Rainbow Product Ranking for Upgrading E-Commerce”, *IEEE Internet Computing*, Special Track on e-Commerce, Sept./Oct. 2009, pp.72-80.
54. K. Chen, K. Hwang, and G. Chen, “Heuristic Discovery of Role-based Trust Chains in P2P Networks”, *IEEE Trans. Parallel and Distributed Systems*, Jan. 2009, pp.83-96.
55. X. Lou and K. Hwang, “Collusive Piracy Prevention in P2P Content Delivery Networks”, *IEEE Trans. Computers*, Vol.58, No.9, Sept.2009, pp.970-983.
56. R. Zhou, K. Hwang, and M. Cai, “GossipTrust for Fast Reputation Aggregation in Peer-to-Peer Networks”, *IEEE Trans. Knowledge and Data Engineering, (TKDE)*, Sept. 2008, pp.1282-1295.
57. Y. Chen, K. Hwang, and W. S. Ku, “Collaborative Detection of DDoS Attacks over Multiple Network Domains”, *IEEE Trans. on Parallel and Distributed Systems*, Vol. 18, No.12, Dec. 2007, pp.1649-1662.
58. K. Hwang, M. Cai, Y. Chen, and M. Qin, “Hybrid Intrusion Detection with Weighted Signature Generation over Anomalous Internet Episodes”, *IEEE Trans. on Dependable and Secure Computing*, Vol.4, No.1, Jan-March, 2007, pp.41-55.
59. M. Cai, K. Hwang, J. Pan and C. Papadopoulos, "WormShield: Fast Worm Signature Generation with Distributed Fingerprint Aggregation", *IEEE Trans. of Dependable and Secure Computing (TDSC)*, Vol.4, No. 2, April/June 2007, pp.88-104.

60. K. Hwang, Y. Kwok, S. Song, M. Cai, Yu Chen, and Ying Chen, "DHT-based Security Infrastructure for Trusted Internet and Grid Computing", *International Journal on Critical Infrastructures*, Vol.2, No.4, Dec. 2006, pp. 412-433.
61. R. Zhou and K. Hwang, "PowerTrust: A Robust and Scalable Reputation System for Trusted Peer-to-Peer Computing", *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, Vol. 18, No.4, April, 2007, pp.460-473. (**593 citations** as of Jan.26, 2016)
62. Y. K. Kwok, Kai Hwang, and S. Song, "Selfish Grids: Game-Theoretic Modeling and NAS/PSA Benchmark Evaluation", *IEEE Trans. on Parallel & Distributed Systems*, Vol. 18, No.5, May, 2007, pp.621-636.
63. S. Song, K. Hwang, and Y. Kwok, "Risk-Resilient Heuristics and Genetic Algorithms for Security-Assured Grid Job Scheduling", *IEEE Trans. on Computers*, Vol. 55, No.6, June 2006, pp.703-719.
64. Y. Chen and K. Hwang, " Collaborative Detection and Filtering of Shrew DDoS Attacks with Spectral Analysis", *Journal of Parallel and Distributed Computing*, Special Issue on Security in Grids and Distributed Systems, Vol.66, No.9, Sept. 2006, pp.1137-1151.
65. S. Song, K. Hwang, R Zhou, and Y.K. Kwok, "Trusted P2P Transactions with Fuzzy Reputation Aggregation", *IEEE Internet Computing*, Special Issue on Security for P2P and AD Hoc Networks, Vol.9, Nov/Dec. 2005, pp. 24-34 (**cited 437 times** as of Jan.26, 2016).
66. M. Cai, K. Hwang, Y. K. Kwok, S. Song, and Y. Chen, "Collaborative Internet Worm Containment", *IEEE Security and Privacy*, May/June 2005, pp.25-33.
67. S. Song, K. Hwang, and Y. K. Kwok, " Trusted Grid Computing with Security Binding and Trusty Integration", *Journal of Grid Computing*, Vol.3, Nos.1-2, Sept. 2005, pp.53-73.
68. K. Hwang, H. Jin, and R. S. Ho, "Orthogonal Striping and Mirroring in Distributed RAID for I/O-Centric Cluster Computing", *IEEE Trans. on Parallel and Distributed Systems*, Vol. 13, No.2, Jan. 2002. pp.26-44
69. M. Theys, S. Ali, H.J. Siegel, M. Chandy, K. Hwang, K. Kennedy, L. Sha, K.G. Shin, M. Snir, L. Snyder, and T. Sterling, "What are the Top Ten Most Influential Parallel and Distributed Processing Concepts of The Past Millenium", *Journal of Parallel and Distributed Computing*, Vol. 61, Dec. 2001, pp. 1827-1841.
70. S. W. Lin, R. W. Lau, K. Hwang, X. Lin, and P. Y. Cheung, "Adaptive Parallel Rendering on Multiprocessors and Workstation Clusters ", *IEEE Trans. on Parallel and Distributed Systems*, Vol.12, No.3, March 2001, pp.241-258.
71. H. Jin and K. Hwang, "Adaptive Sector Grouping to Reduce False Sharing of Distributed RAID Clusters", *Journal of Cluster Computing*, Vol.4, No.2, April 2001, pp.133-143.
72. H. Jin and K. Hwang, "Striped Mirroring RAID Architecture ", *Journal of Systems Architecture*, Vol.46, Elsevier, March 2000, pp.543-550.
73. H. Jin and K. Hwang, "Optimal Striping in RAID Architecture", *Concurrency: Practice and Experience*, Vol.12, Wiley, 2000, pp.909-916.
74. K. Hwang, C. M. Wang, C. L. Wang, and Z. Xu, "Resource Scaling Effects on MPP Performance: STAP Benchmark Implications", *IEEE Trans. on Parallel and Distributed Systems*, May 1999, pp.509-527.
75. K. Hwang, H. Jin, E. Chow, C. L. Wang, and Z. Xu, "Designing SSI Clusters with Hierarchical Checkpointing and Single-I/O Space", *IEEE Concurrency*, Jan.1999, pp.60-69.
76. K. Hwang, " Gigabit Networks for Building Scalable Multiprocessors and Multicomputer Clusters", *Hong Kong Institute of Engineers Transactions*, 50th Anniversary Issue, Hong Kong Institution of Engineers, Vol. 2, No.3, Dec. 1997, pp. 82-87.

77. K. Hwang and Z. Xu, "Scalable Parallel Computers for Real-Time Signal Processing", *IEEE Signal Processing*, July 1996, pp.50-66.
78. K. Hwang, Z. Xu and M. Arakawa, "Benchmark Evaluation of the IBM SP2 for Parallel Signal Processing", *IEEE Trans. on Parallel and Distributed Systems*, Vol.7, No.5, May 1996, pp.522-536.
79. Z. Xu and K. Hwang, "Early Prediction of MPP Performance: SP2, T3D, and Paragon Experiences", *Journal of Parallel Computing*, Vol.22, No.7, October 1996, pp. 917-942.
80. Z. Xu and K. Hwang, "Modeling Communication Overhead: MPI and MPL Performance on The IBM SP2 Multicomputer", *IEEE Parallel and Distributed Technology*, March 1996, pp. 9-23.
81. H. C. Wang and K. Hwang, "Multicoloring of Grid-Structured PDE Solvers for Parallel Execution on multiprocessors," *IEEE Trans. on Parallel and Distributed Systems*, Vol.6, No.11, Nov.1995, pp. 1195-1205.
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215. K. Hwang and A. Louri, "Optical Arithmetic Using Symbolic Signed-Digit Substitution," *1988 Int'l Conf. on Parallel Processing (ICPP)*, St. Charles, IL, August 15-19, 1988.
216. K. Hwang and A. Louri, "New Symbolic Substitution Algorithms for Optical Arithmetic Using Signed-Digit Representation," *SPIE Proceedings*, Vol. 880 Los Angeles, California, Jan. 11-12, 1988.
217. J. Ghosh and K. Hwang, "Optically-Connected Multiprocessor for Simulating Artificial Neural Networks," *SPIE Proc.*, Vol. 882, Los Angeles, California, Jan. 13-14, 1988.
218. A. Louri and K. Hwang, "A Parallel Architectures for Optical Computing," *Proc. of Third SIAM Conf. on Parallel Processing for Scientific Computing*, Los Angeles, California, Dec. 1987, pp.414-418.
219. H. C. Wang and K. Hwang, "An Augmented Tree Multiprocessor for Parallel Execution of Multigrid Algorithms," *Proc. of SIAM Conf. on Parallel Processing for Scientific Computing (PPSC)*, Los Angeles, Dec. 1-4, 1987, pp.424-428.
220. D. Kim and K. Hwang, "Mesh-Connected Array Processor with Bypass Capability for Signal/Image Processing," *Proc. of 21st Hawaii Int'l. Conf. On System Sciences*, Kona, Hawaii, Jan. 5-8, 1988.
221. K. Hwang and J. Ghosh, "Hypernets for Parallel Processing with Message Passing," *Proc. of Int'l. Conf. on Parallel Processing (ICPP)*, St. Charles, IL., August 17-21, 1987, pp.810-819.
222. K. Hwang, H. C. Wang and Z. Xu "Evaluating Elementary Functions with Chebyshev Polynomials on Pipeline Nets," *Proc. of 8th Symp. Computer Arithmetic*, Como, Italy, May 19-21, 1987.
223. K. Hwang and D. Kim, "Parallel Pattern Clustering on Orthogonal Multiprocessors with Orthogonally Shared memory," *Proc. of Int'l. Conf. on Parallel Processing (ICPP)*, St. Charles, Illinois, Aug. 17-21, 1987, pp.913-916.
224. Hwang, et al, "Opcom: An Architecture for Optical Computing Based on Pipeline Networking," *Proc. of 20th Annual Hawaii Int'l Conf. on Systems Sciences*, Jan. 6-9, 1987.
225. K. Hwang and Z. Xu, "Multipipeline Networking for Computing Vector Compound Functions," *Proc. of Int'l. Conf. Parallel Processing (ICPP)*., Aug. 19-22, 1986, pp.495-502.
226. K. Hwang and P.S. Tseng, "Parallel Preprocessing and Postprocessing in Finite-Element Analysis on A Multiprocessor Computer," *Proc. of ACM/IEEE 1986 Fall Joint Computer Conf. (FJCC)*, Dallas, Nov. 2-6, 1986. pp.307-314.
227. K. Hwang and P. S. Tseng, "A Multiprocessor for VLSI Image Processing," *Proc. IEEE Workshop on Computer Architecture for Image Processing*, Nov. 1985.
228. K. Hwang and P. S. Tseng, "An Efficient VLSI Multiprocessor for Signal/Image Processing", *IEEE Int'l Conf. Computer Design: VLSI in Computers*, N. Y., Oct. 7-10, 1985.
229. P.S. Tseng, K. Hwang, and V. Prasanna, "A VLSI-Based Multiprocessor for Implementing Parallel Algorithms", *Int'l. Conf. on Parallel Processing*, St. Charles, IL. Aug. 20, 1985, pp. 657-664.
230. K. Hwang and Z. Xu, "Remps: A Reconfigurable Multiprocessor for Scientific Supercomputing," *Int'l. Conf. on Parallel Processing*, August 20-23, 1985, pp102-111.
231. K. Hwang and Z. Xu, "Multiprocessors for Evaluating Compound Arithmetic Functions," *7th Symposium on Computer Arithmetic*, Urbana, IL., June 4-6, 1985, pp. 266-275.
232. W. W. Carlson and K. Hwang, "On Structured Data Accessing in Dataflow Computers," *Proc. of The First Int'l. Conf. on Computers and Applications*, Beijing, China, June 20-24, 1984.

233. C.Y. Chin and K. Hwang, "Connection Principles of Multipath Packet Switching Networks," *11th Annual Int'l Symp. Computer Architecture (ISCA'84)*, Ann Arbor, MI June 4-7, 1983, pp/99-108.
234. V. Milutinovic, K. Hwang, B. Furht, N. Lopez-Benitez, and K. Waldschmidt, "The VM Architecture: A HLL Microprocessor Architecture for Dedicated Real-Time Applications," *Proc. of the Int'l Workshop on High-Level Computer Architecture*, Los Angeles, CA., May 21-25, 1984, pp. 7.20-7.27,
235. C. Y. Chin and K. Hwang, "Prioritized Packet Switching Networks," *Int'l. Conf. on Parallel Processing*, Michigan, August 1984.
236. L. M. Ni and K. Hwang, "Pipelined Evaluation of First-Order Recurrence Systems," *Proc. Int'l. Conf. on Parallel Processing*, (ICPP) Aug. 1983, pp. 537-543.
237. L. M. Ni and K. Hwang, "Pipelining of Vector Reduction Arithmetic," *IEEE Sixth Symp. on Computer Arithmetic*, Aarhus, Denmark, June 20-22, 1983, pp. 144-150.
238. C.Y. Chin and K. Hwang, "A New Probabilistic Routing Algorithm for Packet Switched Computer Communications Networks," *Proc. of National Computer Conference*, AFIPS, Anaheim, CA May 16-19, 1983, pp. 705-719.
239. S. P. Su and K. Hwang, "VLSI Feature Extraction and Pattern Classification," *Proc. Int'l Symp. VLSI Technology and Systems*, Taipei, Taiwan, March 1983.
240. S. P. Su and K. Hwang, "Multiple Pipeline Scheduling in Vector Supercomputers," *Proc. of 1982 Int'l Conf. Parallel Processing*, August 1982, pp. 226—234.
241. K. Hwang, F. A. Briggs, K. S. Fu, and B. W. Wah, "PUMPS Architecture for Pattern Analysis and Image Database Management," *Proc. Workshop on CAPAIDM*, Hot Springs, Virginia, Nov. 1981, pp. 178-189.
242. S. P. Su and K. Hwang, "A VLSI Approach to Pattern Recognition," *Proc. Workshop on Computer Architecture for Pattern Analysis and Image Database Management*, Hot Springs, Virginia, Nov. 11-13, 1981, pp. 168-177.
243. L. M. Ni and K. Hwang, "Optimal Load Balancing Strategies For a Multiple Processor System," *1981 Int'l Conf. on Parallel Processing*, August 25-28, 1981, pp. 352-357.
244. K. Hwang and Y. H. Cheng, "Partitioned Algorithms and VLSI Structures For Large-Scale Matrix Computations," *Fifth Symposium on Computer Arithmetic*, May 18-19, 1981, Ann Arbor, Michigan, pp. 222-232.
245. K. Hwang, B. W. Wah, and F. A. Briggs, "Engineering Computer Network (ECN): A Hardwired Network of UNIX Computer Systems," *Proc. of National Computer Conf.*, AFIPS, Vol. 50, May 1981, pp. 191-201.
246. F. A. Briggs, K. Hwang, and M. Dubois, "Throughput Analysis and Configuration Design of A Shared-Resource Multiprocessor System: PUMPS," *Proc. 8th Annual Symp. on Computer Architecture (ISCA)*, May 12- 14, 1981, Minneapolis, pp. 67-80.
247. K. Hwang and Y. H. Cheng, "VLSI Computing Structures for Solving large-scale Linear System of Equations," *Proc. 1980 Int'l. Conf. Parallel Processing*, pp. 86-94, 1980.
248. L. M. Ni and K. Hwang, "Performance Evaluation and Resource Optimization of Multiple SIMD Computer Organizations," *1979 Int'l Parallel Processing Conf.*, August 21-24, 1979, pp. 86-94.
249. K. Hwang, F. Briggs, K. S. Fu, and J. Patel, "PM4: A Reconfigurable Multiprocessor System for Pattern Recognition and Image Processing," *Proc. of National Computer Conf.* AFIPS, June 1979, pp. 255-265.

250. L. M. Ni and K. Hwang, "Modeling and Analysis of Shared-Resource Multiple SISD/SIMD Computer Systems," *Proc. of the Third Int'l Computer Symposium*, Dec. 18-20, 1978, Taipei, China.
251. T. P. Chang and K. Hwang, "A New Interleaved Rational/Radix Arithmetic Systems for High-Precision Computations," *IEEE Fourth Symp. on Computer Arithmetic*, Oct. 1978, Santa Monica, CA pp. 15-24.
252. K. Hwang, "Designing Reliable Microprogram Control with Partitioned Hybrid Redundancy," *Sixth IEEE Annual Int'l Symp. on Fault-Tolerant Computing*, June 21-23, 1976, pp. 45-51.
253. K. Hwang and S. B. Yao, "Parallel Processing of Multiway Search Trees," *IEEE Conf. on Computer Graphics, Pattern Recognition and Data Structures*, May 4, 1975, pp. 170-176.
254. K. Hwang, "Designing Storage/Output for Chinese Input/Output Digital Computers," *Proc. of the First Int'l Symp. On Computers and Chinese I/O Systems*, August 1973, pp. 931-942.
255. K. Hwang, "On the direct-Product of Periodically Varying Sequential Machines," *Proc. of the First Princeton Conf. on Information Science and Systems*, March 1971, pp. 23.
256. K. Hwang, "Some Bounds on the Tails of Power Spectrum," *Proc. of the Second Hawaii Int'l Conf. on System Sciences*, January 1969, pp. 803-806.

Ph.D. Thesis Supervision Completed :

1. **Xiaosong Lou**, Ph.D. May 2009 , USC, " P2P Video Streaming with Copyright Protection", USC Computer Engineering, now Performance Engineer, AT&T Internet Technology, Glendale, CA.
2. **Runfang Zhou**, Ph.D. May, 2007, USC. *Thesis title : Scalable Reputation Systems for Peer-to-Peer Networks*, presently employed at LinkedIn, Silicon Valley.
3. **Yu Chen**, Ph.D. Dec. 2006, USC, *Thesis title : Collaborative Detection and Filtering of DDoS Attacks in ISP Core Networks*, Associate Professor, Electrical and Computer Engineering, State University of New York, Binghamton, N.Y.
4. **Min Cai**, Ph.D. Dec. 2006, USC, *Thesis Title : Distributed Indexing and Aggregation Techniques for P2P and Grid Computing*, presently employed at Uber, San Francisco.
5. **Shanshan Song**, Ph.D. Dec. 2005, USC, *Thesis Title: Trusted Grid and P2P Computing with Security Binding and Reputation Aggregation*, Presently employed as a Technical Staff Member at Oracle Corporation, San Francisco, CA.
6. **J. C. Liu**, Ph.D. August 1998, USC, *Thesis Title: Performance Evaluation of Branch Strategies in Superscalar Microprocessors*, working in computer industry, Taiwan, China.
7. **C. M. Cheng**, Ph.D, December 1993 at USC, *Thesis Title: Program and Data Distribution on Scalable Multiprocessors*. Presently employed with Advanced Computing Systems Co. in Los Angeles, CA.
8. **Shi-Sheng Shang**, Ph.D. September 1993 at USC, *Thesis Title: Fast Barrier Synchronization in Shared-Memory Multiprocessors*. Manager, Computer and Comm. Res. Lab., Industrial Technology Research Institute, Taiwan.
9. **Scott Toborg**, Ph.D. August 1992 at USC, *Thesis Title: Cooperative Vision Integration: From Neural Network Algorithms to Wafer-Scale Architectures*. Staff Engineer, Hughes Research Laboratories, Malibu, California.

10. **H. C. Wang**, Ph.D. August 1992 at USC, *Thesis Title: Parallelization of Iterative PDE Solvers on Shared-Memory Multiprocessors*. Professor, Dept. of Computer Science at Wu-Fung Institute of Technology, Taiwan.
11. **D. K. Panda**, Ph.D. August 1991 at USC, *Thesis Title: Vectorized Interprocessor Communication and Data Movement in Shared-Memory Multiprocessors*. Professor of Computer Science, Ohio State University, Columbus, Ohio, IEEE Fellow.
12. **Jian Xu**, Ph.D. August 1990 at USC, *Thesis Title: Load Balancing Methods for Message-Passing Multicomputers*. Almaden Research Center, San Jose, California, IBM Fellow..
13. **Ahmed Louri**, Ph.D. August 1988 at USC, *Thesis Title: A Bit-Plane Architecture and 2-D Symbolic Substitution Algorithms for Optical Computing*. Professor of Electrical and Computer Engineering, University of Arizona, Tucson, Arizona, IEEE Fellow.
14. **Dongseung Kim**, Ph.D. June 1988 at USC, *Thesis Title: Orthogonal Architectures for Parallel Image Processing*. Professor of Computer Science, Korea University, Seoul, Korea.
15. **Raymond Chowkwanyun**, Ph.D. June 1988 at USC, *Thesis Title: Dynamic Load Balancing for Concurrent Lisp Execution on a Multicomputer System*, presently self-employed.
16. **Joydeep Ghosh**, Ph.D. April 1988 at USC, *Thesis Title: Communication-Efficient Architecture for Massively Parallel Processing*. Professor of Electrical and Computer Engineering, University of Texas, Austin, Texas, IEEE Fellow..
17. **Zhiwei Xu**, Ph. D. August 1987 at USC, *Thesis Title: Multipipeline and Language Constructs for Vector Processing*. Vice Director, Computing Technology Institute, Chinese Academy of Sciences, Beijing, China.
18. **Chi-Yuan Chin**, Ph.D. December 1983, Purdue University, *Thesis Title: Packet Switching Networks for Multiprocessor Systems*. Manager, Industrial Technology Research Institute, Taiwan, China.
19. **Shun-Piao Su**, Ph.D. December 1982, Purdue University, *Thesis Title: Pipelining and Dataflow Techniques for Designing Supercomputers*. Fairchild Research Laboratory, Palo Alto, CA.
20. **Tian-Pong Chang**, Ph.D. August 1982, Purdue University, *Thesis Title: Reliability Analysis of Multiprocessor Systems*. Member of Technical Staff, Bell Lab, Holmdel, New Jersey.
21. **Lionel M. Ni**, Ph.D. Dec.1980, Purdue University, *Thesis Title: Performance Optimization of Parallel Processing Computer Systems*. Professor and Chair of Computer Science, Hong Kong University of Science and Technology, Hong Kong. IEEE Fellow.

Ph.D. Student currently under Supervision as Advisor:

Yue Shi, working on Cloud Computing and Big-Data Analytics, USC, since 2014.

Research Grants Awarded : (as Principal Investigator or Co-PI)

(Totaled US \$ 11 M awarded in 25 Research Grants)

1. "High-Throughput Systems for Cloud Computing Services", \$600K awarded to Tsinghua University from China's 973 Research Program , Ministry of Science and Technology, China. 2010-2015. (serving as a Co-PI as a visiting chair professor at Tsinghua University)
2. "Intellectual Ventures -endowment of \$!M to establish Visiting Chair Professor Group in Distributed Computing Research at Tsinghua University (THU) with matching fund by THU Foundation, 2010 - 2013. (serving as PI and Chief Chair Professor of the IV-endowed Visiting Chair Group at THU).

3. "GridSec: Trusted Grid Computing with Dynamic Resources and Automated Intrusion Responses: NSF Information Technology Research (ITR) Grant No. ACI-0325409, \$2M, 2003 - 2007.
4. "Setup Fund for USC Internet and Cluster Computing Laboratory", Engineering Dean's Office, Univ. of Southern California, \$50K, 1999 - 2002.
5. "Integrated Information Technology for A Value-Added Economy in Hong Kong", Area of Excellence Development Grant, Univ. of Hong Kong, \$580 K, 1998 - 2001.
6. "Clustering of Symmetric Multiprocessors for Distributed Parallel Processing", Grant from Hong Kong Research Grants Council, \$40K Sept. 1997.
7. "Distributed Computing and Multimedia Applications", Central Allocation Grant from Hong Kong Research Grants Council, \$ 432K, Feb.1997.
8. "STAP Benchmarking on Scalable Parallel Processors", Subcontract from MIT Lincoln Lab. 1995 - 1997, \$174,000.
9. "STAP Benchmark Experiments on The IBM/SP2 Massively Parallel Processor", subcontract from MIT Lincoln Lab to USC, 1994 -1995, \$150,000.
10. "Viscom: A Multiprocessor System for Image/Vision Processing and Neural Network Computing," NSF Grant No. MIP-8904172 , 1989 - 1992, \$757,000.
11. "Avionics AI Processor Definition," Air Force Wright Aeronautical Lab subcontract from Hughes Aircraft, 1989 - 1991, \$75,000.
12. "Optical Multicomputer Networks for Balanced Parallel Processing," AT & T Grant, 1988 - 1990, \$195,000.
13. Research Donation for funding USC/Alliant Symposium Series on Parallel Processing, Alliant Computer Systems Corporation, Littleton, MA, Nov.1, 1988, \$20,000.
14. "Augmenting a Multiprocessor with Enhanced Arrays for On-Board Image Processing and Scene Analysis," Office of Naval Research, Contract N14-86-K-559 , 1986 - 1988, \$318 K.
15. "Multicomputer Architectures for Image Preprocessign and Discrimination," Naval Ocean Systmes Center, Contract No. 85-D-203, July 1, 1986 - Sept. 30, 1987, \$143K. .
16. "Design Mehtodologies for Developing Multiprocessor Supercomputers," NSF Grant DMC-84-21022, 1985 - 1988, \$160L..
17. "Supercomputers for Solving PDE Problems," AFOSR Grant 85-NM-250, 1985 - 1987, \$165,000.
18. "Computer Architecture Research Laboratory and VLSI Design Laboratory, Equipment grant from AT&T Foundation to USC, Nov., 1985, \$25,000.
19. "Parallel PDE Algorithms and Supercomputer Architectue," Research Contract from AFOSR to Purdue University, 1984 - 1985, \$150,000 (with John Rice).
20. "Large Scale Circuit Analysis on a Cyber 205 Supercomputer," IBM Contract PO709654 to Purdue University, 1981 - 1984, \$260K, (with P. M. Lin).
21. "VLSI Multiprocessor Architecture and Relational Database For Analysis of Imagery Data," NSF Grant No, ECS-80-16589 to Purdue University, May 1981 - May 1984, \$450K, (with K. S. Fu and F. A. Briggs).
22. "Intelligent Control and Computer Network Management for Traffic System," DOT Contract No. R920044, US Department of Transportation to Purdue University, 1980 - 1981, \$70K, (with George Saridis).

23. "A Reliability Study of Multiprocessor Systems, David Ross Fellowship from Purdue Research Foundation, 1979-1981, \$9,800.
24. "Parallel Algorithms and Computer Architectures for Pattern Recognition and Image Processing," NSF Grant No. MCS-78-18906 to Purdue Univ., 1979 - 1981, US \$210 K. (with T. S. Huang).
25. "Performance Optimization of Parallel Processing Computer Systems," David Ross Fellowship from Purdue Research Foundation, 1975 - 1977, US \$7,800.

Courses Taught at USC, Purdue, and HKU : (Current offerings at USC in boldface)

- **Internet and Cloud Computing (USC EE 542, new course starting from Fall 2014)**
- **Wireless Internet and Pervasive Computing, (USC EE 532 since 2001)**
- **Computer Systems Architecture (USC EE 557, Purdue 1974, HKU 1996)**
- **Parallel and Distributed Computing (USC EE 657)**
- **Computer System Organizations (USC EE 457, since 1986)**
- Computer Networks and Clustering (USC, HKU 1997)
- Foundations of Computer Engineering (Purdue EE 608, 1974)
- Fundamentals of Distributed Computing (HKU, 1997)
- Scalable Parallel Computers (HKU, 1998)
- Logic Design and Switching Theory (Purdue, 1974)
- Digital Computer Arithmetic (Purdue 1976, USC, 1986)

Invited Lectures, Conference and Consulting Activities:

Keynote or Plenary Speeches (14 recent ly delivered talks highlighted in boldface)

1. Invited Plenary Talk : "**Security Infrastructure for Trusted Offloading in Mobile Cloud Computing**", Futurewei R/D Forum, Santa Clara, CA. Nov.8, 2014.
2. Invited Plenary Speech: "**Enabling Cloud Analytics for Big-Data Security and Intelligence**", *ASE BigData Science Conference*, May 29, Stanford Univ., 2014
3. Keynote Speech : "**Enabling Cloud Analytics for Big-Data Security and Intelligence**", *Ph.D. Forum*, China Computer Federation, Dong-Guan, China, Dec.14, 2013.
4. Lifetime Achievement Award acceptance Speech on "**Trusted Mobile and Cloud Computing with Assured Big-Data Security and Privacy**", *IEEE CloudCom*, Taiwan, China, Dec.5, 2012.
5. Keynote address: "**Future Internet Architecture and Cloud Ecosystems**", the *4-th Workshop on Cloud Computing Technologies and Applications*, National Center for High-Speed Networking and Computing, Taiwan, China, March 19, 2012. (<http://accta.nchc.org.tw>)
6. Keynote speech: "**Research Frontiers in Clouds, Many-Core and Internet of Things**", *9th IEEE Int'l Symp. on Parallel and Distributed Processing with Applications (ISPA2011)*, Bushan, Korea, May 26, 2011.
7. Keynote address: "**Security, Privacy and Data Protection for Cloud Computing**", *Second International Conference on Cloud Computing*, Indianapolis, IN. Dec.3, 2010.

8. Keynote address: **“Data Security and Privacy in Trusted Cloud Computing”**, *International Symp. on Parallel and Distributed Computing (PDCS2010)*, Marina Del Rey, CA. Nov. 8-10, 2010
9. Keynote address : **“Cloud Security and Trust Management”**, *International Cloud Computing Conference*, Melbourne, Australia, May 17, 2010.
10. Keynote address : **“Virtual Clusters for Grid, Cloud, and High-Performance Computing”**, *Eleventh IEEE international Conf. on High-Performance Computing and Communications*, (HPCC-09), Seoul, Korea, June 25-27, 2009.
11. Keynote address: **“Virtual Clusters for Cloud Computing”**, *IEEE International Conference on Networking, Architecture, and Storage*, (NAS-2009), Zhangjiajie, Hunan, China July 9-11, 2009.
12. Keynote address: **“Cloud Security with Disaster Recovery Through Virtualization”**, *Fifteenth IEEE International Conf. on Parallel and Distributed Systems*,(ICPADS09), Shenzhen, China, Dec.8-11,, 2009.
13. Keynote address : **“Cloud Computing: Virtual Clusters, Data Security and Disaster recovery”**, *OTM Fourth Int’l Symposium on Information Security (IS-2009)*, Portugal, Nov.1-2, 2009, p.795.
14. Keynote address : **“Cloud Security with Virtual Clusters and Protected Datacenters”**, *First IEEE International Workshop on Security in Cloud Computing*, (SCC09), Chengdu, China, Dec.12-15, 2009.
15. Keynote address on “Massively Distributed Systems: From Grids and P2P to The Clouds”, *IEEE Int’l Conf. on Grid and Pervasive Computing*, (GPC-2008), Kunming, China, May 25, 2008.
16. Keynote address on “Digital Content Distribution in P2P Networks”, *IEEE International Conference on Ubiquitous Multimedia (Ubi-Media 2008)*, Lanzhou, China, July 15, 2008.
17. *IEEE International Workshop on Trust and Reputation Management in Massively Distributed Computing Systems (TRAM-2007)*, Keynote address on “Trust and Reputation Management in P2P and Grid Systems, ”, in conjunction with ICDCS-2007, Toronto, June 29, 2007.
18. *IEEE International Workshop on Dependable, Parallel, and Distributed Network-centric Systems (DPDNS-2007)*, Keynote address on “Recent Advances in Trusted Grid and Peer-to-Peer Computing Systems”, in conjunction with IPDPS-2007, Long Beach, CA. March 30, 2007, p.1
19. *International Computer Innovation 6016 Workshop on Information Intelligence and Internet Security*, Keynote address on “Internet Security and Cyber Trust for Integrated Web Services and P2P Grid Computing”, Beijing, China, Dec.4, 2005.
20. *IEEE Workshop on Security in Systems and Networks, (SSN’05)*, Keynote address on “Defending Distributed Computing Systems against Malicious Intrusions and Network Anomalies”, with IPDPS-2005, Denver, CO. April 8, 2005.
21. *IFIP International Network and Parallel Computing*, (NPC2004), “Secure Grid Computing with Trusted Resources and Internet Datamining”, China, Oct.18, 2004
22. *ISCA Int’l Conf. on Parallel and Distributed Computer Systems*, (PDCS-2004), “Trust management and Internet Datamining for Secure Grid/P2P Computing”, S. F. Sept.16, 2004
23. *IEEE International Conference on Cluster Computing (Cluster 2003)*, “Distributed Security Enforcement for Trusted Cluster and Grid Computing”, Hong Kong , December 2 - 4, 2003.

24. *IEEE International Workshop on Grid and Cooperative Computing*, (GCC2002), Sanya, China, Dec.26, 2002
25. *IEEE Int'l Conf. on Algorithms and Architectures for Parallel Processing*, Beijing, China, October 23, 2002
26. *Parallel and Distributed Computing Applications and Technologies*, (PDCAT 2002), "Wireless Internet Security for M-Commerce", Kanazawa, Japan, Sept. 4, 2002, pp.1-16.
27. *IEEE Int'l Conf. on Parallel and Distributed Systems*, (ICPADS -2001), "Micro-Firewalls and Mobile Agents for Securing Grid and Clusters", Chojung, Korea, June 28, 2001
28. *IEEE 2000, Int'l Conf. on Cluster Computing*, (Cluster 2000), "Internet Security and Firewall Architectures for Reliable Cluster Computing", Chemnitz, Germany, Nov. 20-Dec.2, 2000.
29. *Int'l Workshop on Cluster Computing*, (IWCC 2000), Melburon, Australia, Dec. 2-3, 1999.
30. *Int'l Symp. Low-Power and High-Speed Microprocessors (COOL Chips)*, Tokyo, Japan, April 15, 1998
31. *IEEE Computer Society 1997 Int'l Conf. on Parallel and Distributed Systems*, Seoul, Korea, Dec 13, 1997
32. *IEEE Int'l Conf. on Algorithms and Architectures for Parallel Processing*, Singapore, June 11-13, 1996.
33. *National Computer Symposium*, keynote speech on Recent advances in *High-Performance Computer Systems*, Kaoshung, Taiwan, Dec.17-21, 1996.
34. *Fifth Int'l Parallel Processing Symp. (IPPS)*, Anaheim, CA, April, 1991.
35. *Symp. on Parallel and Distributed Processing Techniques*, Sunnyvale, CA., August 9-11, 1996.
36. *National Convention of Computer and Information Technology*, Bangolore, India, Oct. 31, 1996.
37. *National Computer Symposium*, Taiwan, China 1984, 1994, 1996
38. *High-performance Computing Conference 1994: Challenges into the 21st Century*, "Crossbreeding Technologies for Scalable Computing and Multimedia Applications", National Supercomputing Research Center, Singapore, Sept. 29-30, 1994.
39. *European Symp. on Parallel and Vector Porcessing*, (CONPAR'94), "Scalability and Programmability of Massively Parallel Processors", Linz, Austria, Sept. 6-8, 1994

Chair or Program Chair of Conferences: (7 Chair roles in past 4 years highlighted in bold)

1. Co-Chair, **Second IEEE International Conference on Big Data Science, Social Computing and Cybersecurity**, Stanford University, May 27-30, 2014.
2. General Co-Chair, **The Third IEEE International Conference on Cloud Computing Technology and Sciences**, (CloudCom2011), Athens, Greece, Nov.29-Dec.1, 2011.
3. General Co-Chair: **International Conference on Utility and Cloud Computing, (UCC2011)** Melbourne, Australia, Dec. 2011.

4. Program Co-Chair: *OTM 12th Int'l Symposium on Distributed Objects, Middleware, and Applications (DOA'10)*, Crete, Greece, Oct.24-29, 2010.
5. General Co-Chair, *Tenth Int'l Conf. On Parallel and Distributed Computing, Applications and Technology, (PDCAT-2010)*, Hiroshima, Japan, Dec.8, 2010.
6. General Co-Chair, *Second International Workshop on Security in Cloud Computing, (SCC'2010)*, San Diego, Sept.13, 2010
7. General Chair, *11th IEEE international Conf. on High-Performance Computing and Communications, (HPCC-09)*, Seoul, Korea, June 25-27, 2009.
8. Program Chair, *The 7-th IEEE International Symposium on Network Computing and Applications*, (NCA08), Cambridge, MA., July 10-12, 2008..
9. General Chair, *IEEE Fourth International Symposium on High-Performance Computer Architecture (HPCA-4)*, Las Vegas, Nevada, Feb.1-4, 1998.
10. General Chair, *International Parallel and Distributed Computing Symposium (IPDC 97)*, Shanghai, China, March 19-21, 1997.
11. Program Chair, *IEEE Tenth International Symposium on Parallel Processing (IPPS 96)*, Honolulu, Hawaii, April 15-18, 1996.
12. Program Co-Chair, *International Conference on Parallel Processing (ICPP 86)*, St. Charles, IL. August 15-18, 1986.
13. Program Chair, *IEEE Seventh Symposium on Computer Arithmetic (ARITH-7)*, Urbana, IL. June 4-6, 1985.

Consulting and Advisory Work:

- Chief Scientist, Institute of Computing Technology, Chinese Academy of Sciences, Jan –Aug. 2008
- Chief Technology Officer, IST International, Inc. Aliso Viejo, CA. 2001-2002
- TriTech Microelectronics, Inc. Singapore, August 1997
- Caltech Jet Propulsion Laboratory, Pasadena, CA., 1992 - 1993.
- MIT Lincoln Laboratory, Lexington, MA., 1993 - 1998.
- IBM Fishkill Facilities, New York, 1982-83.
- Motorola Research Lab., Austin, Texas 1994.
- Electrotechnical Laboratory, Tsukuba, Japan, 1986.
- Fujitsu Laboratory, Kawasaki, Japan 1979.

Invited Distinguished Lectures or Short Courses: (Recent offerings in Blodface)

- Distinguished Lecture Series, “**Smart Clouds with Data Analytics and IoT Sensing**”, Wuhan University, Wuhan, China, March 6 – 28, 2016.
- Distinguished Lecture Series, “**Big Data Analytics on Smart Clouds with IoT Sensing**”, South East University, Nanjiang, China Dec.28-30, 2015.
- Short Course, “**Big Data, Cloud Analytics and IoT Sensing Applications**”, Tsinghua University, May 27 to June 24, 2015

- Invited Talk: **“Cloud Analytics for Scientific Discovery and Social-Media Applications”**, Wuhan University, June 19, 2015.
- Invited Talk: **“Spark Programming for Big Data Analytics”**, Chinese Academy of Science, Institute of Advanced Technology, Shenzhen, June 15, 2015.
- Invited Talk: **“Cloud Analytics for Scientific Discovery and Social-Media Applications”**, MIT LIGO Research Center, March 7, 2014.
- Invited Seminar, **“Enabling Cloud Analytics for Big-Data Security and Intelligence”**, Tsinghua University, Beijing, China, Dec.20, 2013, also at the Institute of Computing Technology, Chinese Academy of Sciences, Dec.23, 2013.
- A Series of 5 Lectures on **“Recent Advances in Information Security and Big-Data Research”**, Chinese Academy of Sciences, Institute of Information Engineering, Beijing June-July 2013.
- Invited Seminars, **“BigData Security and Repository Design for Trusted Mobile Cloud Computing”**, Hunan University, Defence University of Science and Technology, Hua-Zhong University of Science and Technology, July 3-5, 2013.
- Invited Seminar, : **“BigData Privacy Preservation in Cloud Computing”**, Shanghai Jiaotong Univ. June 2, 2013.
- Short course: **“Distributed and Cloud Computing Systems”**, offered during short visits of Tsinghua University in Beijing, China during Fall 2011 and Fall 2012.
- Global Vision Lecture, **“Global Advances in Computer and Information Technology : Can China Take the Lead ? ”**, Tsinghua University, Beijing, Jan. 6, 2009.
- Distinguished Lecture Series: **“Cloud Computing: Virtual Clusters, Security, and Geospatial Applications”**, Temple University, Computer Science Department, Philadelphia, Nov.18, 2009.
- Institute Seminar, **“Recent Advances in Cloud Computing”**, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China, May 28, 2009
- Distinguished Lecture on **“Virtual Clusters for Web-Scale Cloud Computing”**, Michigan State University, E. Lansing, MI. April 9, 2009.
- Distinguished lecture on **“Web-Scale Cloud Supercomputing”**, Peking University, Beijing, April 26, 2008.
- Distinguished Lecture on **“Internet Security Cyber Trust for Integrated Web Services and P2P Grid Computing”**, Zhe-Jiang University, Hangzhou, China, July 11- 29, 2006
- Distinguished Lecture on **“Trusted Grid and P2P Computing”**, Tsinghua University, Beijing, China, Dec.5, 2005
- Distinguished Lecture on **“Internet Security and Cyber Trust for Integrated Web Services and P2P Grid Computing”**, Peking University, Beijing, China, Dec.6, 2005
- Distinguished Lecture on **“Trusted Grid and P2P Computing”**, Science and Technology University of China, Hefei, China, June 28, 2005
- Distinguished Lecture on **“Security Issues in Distributed Supercomputing”**, Shanghai Jiaotong University, Shanghai, China, June 27, 2005
- **“Network Security and Trusted Grid Computing”**, Sydney University, Sydney, Australia, July 3, 2004.
- **“Research on Trusted Grid Computing”**, Melbourne University, Melbourne, Australia, July 10, 2004.

- “Secure Grid Computing with Trusted Resources and Internet Datamining”, INRIA at Sophia Antipolis, Nice, France, July 22, 2004.
- Lecture Series on Grid Computing, Network Security, and Distributed Computing”, Deakin University Distinguished Visitor Program, Melbourne, Australia, May 26 - June 12, 2003
- “Internet Security and Distributed Firewalls for E-Commerce and Cluster Computing”, *Distinguished Lecture Series in Computer Science*, Florida Atlantic Univ., Jan.18, 2001.
- “Security Issues in Cluster Computing”, National Center for High-Performance Computing, Taiwan, China, Dec.19, 2000
- “*Scalable Parallel Computer Architectures*”, *CERN School of Computing*, Egmond Aan Zee, The Netherlands, September 8-21, 1996.
- *Seminar Series on Scalable Parallel Computing*, MIT Lincoln Lab. Lexington, MA. October 1995
- *First Annual Conf. of the Advanced School for Computing and Imaging*, Invited Lecture on Scalable Parallel Computers, The Netherlands, May 16-18, 1995.
- *Short Course on Parallel Computers and Programming Systems*, Institute of Information Science, Academia Sinica, Taipei, Taiwan, China, July 8-15, 1993.
- Visiting Professor taught a course on *Multiprocessor Architecture and Programming*, National Taiwan University, Taipei, Taiwan, China, Sept. 1991 to Jan,1992
- *Invited Speaker, GMD Symposium in honor of the 80-th birthday of Konard Zuse*, German National Computer Research Center, Bonn, German, Oct. 1989.
- Invited Short Course on “Supercomputing Architecture”, *Electrotechnical Laboratory (ETL)*, Tsukuba, Japan. July, 1986.
- *US National Academy of Science Specialist* sent to China teaching a short course on “Local-Area Networks”, and advising Chong-Ching University, Szechuan, China, Dec.8 -30, 1985.
- *IEEE Distinguished Visitor Speaker*, IEEE Computer Society, 1981- 1984
- Invited Speaker, *NATO Advanced Study Institute on Spatially Distributed Image Processing*, Italy, 1983
- Short Course on Advanced Computers and Parallel Processing, *Graduate School of Chinese Academy of Sciences*, Beijing, China, July-August, 1980
- Seminars given as a Visiting Research Fellow, *Institute of Information Science*, Academia Sinica, Taipei, Taiwan, China, Jan.-June, 1980.