

DAVID HUNG-CHANG DU

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Short Bio

Dr. Du is currently the Qwest Chair Professor of Computer Science and Engineering at University of Minnesota, Minneapolis. He was the Center Director of the NSF multi-university (joint with Texas A&M and Temple University) IUCRC Center of Research in Intelligent Storage (CRIS) from 2009-2021. In addition to NSF, CRIS was sponsored by 18 companies in the past with 3.35M industrial membership funding to University of Minnesota. These companies include Xyratex (2010-2014), Seagate (2010-2019), Los Alamos National Lab (2010-2012), Symantec (2010-2012), Veritas (2016-2019), NEC-Lab (2012-2015), NetApp (2012-2017), Dell/Compellent (2013-2018), HPE (2013-2019), Hitachi Global Storage Systems (2013-2014), LSI (2012-2014), SGI (2013-2016), FedCentric (2013-2015), SK-Telecom (2014-2016), Cray Research (2014-2016), IBM (2015-2017), Intel (2015-2018), Huawei (2016-2018), and Salesforce (2016-2018). The other faculty involved in CRIS include David Lilja, Jon Weissman, Abhishek Chandra, and Mohamed Mokbel. Before NSF IUCRC Center, he organized an Intelligent Storage Consortium at Digital Technology Center with industrial funding from StorageTek, Veritas, LSI Logic, LANL, Sun Micro, ETRI/Korea, and ITRI/Taiwan from 2002-2009. He was a Program Director (IPA) at National Science Foundation CISE/CNS Division from March 2006 to August 2008. At NSF, he was responsible for NeTS (Networking Research cluster) NOSS (Networks of Sensor Systems) Program and worked with two other colleagues, Karl Levitt and Ralph Wachter, on Cyber Trust (Internet Security) Program. In 2008 he was also assigned to CSR (Computer System Research) Cluster for handling research in computer systems. Dr. Du receives a B.S degree in Mathematics from National Tsing-Hua University (Taiwan) in 1974 and an M.S. and Ph.D. degrees from University of Washington (Seattle) in 1980 and 1981 respectively. He joined University of Minnesota as a faculty since 1981. Dr. Du also has been a visiting professor in Germany, Korea, Singapore, Hong Kong and Taiwan.

Research Expertise: Dr. Du's current research focuses on intelligent storage systems, sensor/vehicular networks, and cyber physical systems. He has had research in high-speed networking, database design, multimedia computing and CAD for VLSI circuits. In his early career time, he worked on parallel processing and database design especially on hashing and partial match retrieval [319-334]. In 1980s and 1990s, he worked on Computer-Aided Design for VLSI circuits [283-318]. He has worked on computer networking and its related applications including multimedia computing from late 1980s to now [125-282]. His recent research on networking focuses on sensor and vehicular networks. Starting from 2000, due to the data amount increases dramatically each year, his research group focuses on new memory and storage technologies for handling extremely large volume of available data and how to preserve data over decades [1-124]. Currently his research focuses on hyper-converging infrastructure since our Internet today becomes the largest existing computer system in which data are collected and stored all the time, networks connecting all devices and computers become soft-defined and programmable networks and emerging non-volatile memory may become the future main memory in all computers/devices. Therefore, we no longer can separate research into architecture, computer systems, computer networking and storage. All aspects of these need to be integrated and considered together to construct the future Internet infrastructure. Some initial

research results on hyper-converging including how to scale up the performance of distributed Key-Value stores with in-switch coordination [38], and how to use SDN for transaction processing in distributed Key-Value stores [39]. By now, he has authored and co-authored 343 technical papers including 151 referred journal publications in these research areas. He has graduated 67 Ph.D. (58 as single adviser and 9 jointly supervised) and 109 M.S. students in the last 40 years. His research in intelligent storage systems focuses on new and emerging storage technologies/architectures, that can handle semantic data and adaptive to long-term data preservation, and efficient power management for data centers. His research in sensor/vehicular networks and cyber physical systems focuses on vehicle-to-vehicle communications, future intelligent transportation systems, next generation air-transportation systems and security and privacy issues for cyber physical systems. His research in CAD includes physical layout, timing verification and delay fault testing for high-speed and very large-scale circuits. His research in high-speed networking includes heterogeneous high-performance computing over high-speed networks, quality of service, parallel data archive for high-performance computing, and optical networks.

Professional Activities and Awards: Dr. Du is an IEEE Fellow (since 1998) and a Fellow of the Minnesota Supercomputer Institute. He is currently a member of Advisory Committee to Institute of Information Science and Research Center for Information Technology Innovation, Academic Sinica in Taiwan and a member of International Advisory Board to Korean Journal of Computer Science and Engineering. He was an Editor of IEEE Transactions on Computers from 1993 to 1998. He was the US WEST Chair Professor at the University of Minnesota from 1994 to 2000. He has served on the Editorial Boards of several international journals including IEEE Transactions on Vehicle Technology. He has also served as Conference Chair and Program Committee Chair for several conferences in multimedia, networking security and database areas. Most recently, he is the General Chair for IEEE Security and Privacy Symposium (Oakland, California) 2009, Program Committee Co-Chair for International Conference on Parallel Processing 2009, and Workshop Co-Chair and the General Chair for IEEE International Conference on Distributed Computing Systems 2010 and 2011 respectively. General, Co-Chair of ACM International Conference on Underwater Networks and Systems 2013 and General Chair of International Conference on Parallel Processing (ICPP) 2014. He also served as the Chair of Steering Committee for ICPP from 2012-2017 and General Co-Chair of IEEE Conference on Computer Communication Security (CNS) 2015.

He has been the recipients of the following awards:

National Science Foundation, Director's Award for Collaborative Integration, 2008

ACM Recognition of Service Award 2013

IEEE Certificate of Appreciation 2007 and 2012

He has had research grants from the National Science Foundation, DARPA, ONR, DOE and companies like 3M, Northern Telecom, Unisys, IBM, Seagate Technology, US WEST, Honeywell, Sun Micro, Intel, Cisco, HPE, NetApp, Dell/EMC, ETRI (Korea), ITRI (Taiwan) and etc.

Industrial Experiences: Dr. Du has served as a consultant to a number of companies in the past, including: Honeywell, NCR, Unisys, 3M and IXMICRO. In 1996, he spent 6 months in the Computer Communications Lab (CCL) of the Industrial Technology Research Institute (ITRI) in Taiwan. His major function at CCL/ITRI was to plan several long term (5-year) R&D projects funded by the Ministry of Economic Affairs. He has served as a member of Technical Advisory Committee for CCL/ITRI from 1995 to 2010. In 1998, he joined IXMICRO as the Vice President of Research and Development for one year. He led a team of 30+ engineers to develop products

such as ATM network interface cards, ATM switches, Fast Ethernet switches, wireless mice, ADSL modems, and streaming video servers. He has co-founded a startup company called Streaming21 and also helped to establish another startup company called Baynacre with his former students. Baynacre was later acquired by Apache Design Solutions. He has served as Chairman and CEO for Streaming21 in 2000 and 2001. During this period, he helped to raise \$18M funds from VCs for Streaming21 and managed 60+ employees. Streaming21 was focused on developing streaming video products for carrier and entertainment markets. Baynacre was focused on static timing analysis software tools for nano-technology.

EDUCATIONAL BACKGROUND:

Degree	Institution	Year Completed
Ph.D. in Computer Science	University of Washington (Seattle)	1981
M.S. in Computer Science	University of Washington (Seattle)	1980
B.S. in Mathematics	National Tsing-Hua University (Taiwan)	1974

PROFESSIONAL EMPLOYMENT:

Position	Employer	Period
Program Director	National Science Foundation CISE/CNS	March 2006 – August 2008
Qwest Chair Professor	University of Minnesota	2007-Present
Professor		1991 - Present
Chairman and CEO	Streaming21	2000 - 2001
US WEST Chair Professor	University of Minnesota	1994 - 2000
Vice President of Engineering	3CX, San Jose, California	Jan. 1998 – Dec. 1998
Associate Professor	University of Minnesota	1987 - 1991

Assistant Professor	University of Minnesota	1981 - 1986
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RESEARCH INTERESTS

Intelligent Storage Systems, Multimedia Computing, Cyber Physical Systems, Sensor/Vehicular Networks, Cyber Security, High-Speed Networks, Distance Education, Database Design, Parallel/Distributed Architectures/Systems, CAD for VLSI Circuits.

Awards and Honors:

IEEE Fellow since 1998

Fellow, Minnesota Supercomputer Institute

Center Director, National Science Foundation I/UCRC Center on Intelligent Storage since 2009

National Science Foundation, Director's Award for Collaborative Integration, September 8, 2008

ACM Recognition of Service Award, 2013

IEEE Certificate of Appreciation, 2012 for contributing to the growth of the communications industry and the society as a loyal communications society member

IEEE Certificate of Appreciation, 2007

Member of Technical Review Committee, Information Communication Lab at Industry Technology Research Institute, Taiwan, 2008, 2010, and 2013

Member of Advisory Committee for Innovation and Advanced Research, Institute of Information Industry, Taiwan, 2016-present

Member of International Advisory Committee, Research Center for Information Technology Innovation, Academic Sinica, Taiwan, 2011-present

Member of International Advisory Committee, Institute of Information Science, Academic Sinica, Taiwan, 2008-2016

Member of International Advisory Board of the Journal of Computer Science and Engineering, Korea, 2007-present

Member of External Review Committee, Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University, May 2023

Invited Keynote Speaker, International Photonics and Optoelectronic Meetings at Wuhan, China, 2022

Invited Keynote Speaker, joint meeting National Yang-Ming Chao-Tung University and Institute of Information Industry, August 2022

Invited Plenary Speaker, National Cheng-Kung University, Tainan, Taiwan, July 2022

Invited member of visiting committee of Chinese University of Hong Kong for reviewing Departments of Biomedical Engineering, Computer Science and Engineering, Electronic Engineering, Information Engineering, Mechanical and Automation Engineering, and Systems Engineering and Engineering Management 2018

Invited Speaker at Salesforce, February 2018, San Francisco

Invited Plenary Speaker at IEEE ICNC (International Conference on Computing, Networking and Communications) 2017, San Jose, CA

Invited Keynote Speaker at the 6th IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA) 2017, Hsin-Chu, Taiwan

Invited Speaker at Huawei Strategy and Technology Workshop 2016, Shenzhen, China, May 2016

Invited Speaker at National Taiwan University, 9/7/2016

Invited Speaker at Industrial Technology and Research Institute, Taiwan, 9/9/2016

Invited Speaker at Asia University, Taiwan, 9/13/2016

Invited Speaker at National Central University, Taiwan, 9/21/2016

Invited Distinguished Speaker at Huawei Storage Summit, Shenzhen, China, November, 2015

Invited Speaker, University of Central Florida, October, 2015

Invited Speaker Distinguished Industrial Lecture Series in ICT for 2020 - Storage Systems Research Trends in Big Data Era at CITI (Center for Information and Technology Innovation), Academic Sinica, Taiwan August 2014

Invited Keynote Speaker, the 16th IEEE International Conference on Communication Technology, Nov. 2014, Shenzhen, China

Invited Keynote Speaker, the 15th IEEE International Conference on Communication Technology, Nov. 2013, Guilin, China

Invited Keynote Speaker, IEEE 2nd International Conference on Cloud Computing and Intelligence Systems, Oct. 30 to November 1, 2012, Hangzhou, China

Invited Speaker, Old Dominion University, Norfolk, Virginia, February 2012

Invited Keynote Speaker, the 17th IEEE Conference on Parallel and Distributed Systems (ICPADS), December 7-9, 2011, Tainan, Taiwan

Invited Speaker, NEC Research, Princeton, New Jersey, December 2011

Invited Speaker, Department of Computer Science and Engineering, University of Alabama, Tuscaloosa, Alabama, November 2011

Invited Speaker, IBM Almaden, San Jose, California, March 2011

Invited Speaker, Samsung Electronics Research, San Jose, California, March 2011

Invited Keynote Speaker, the 16th International Conference on Distributed Multimedia Systems, October 14-16, Chicago, 2010

Invited Plenary Speaker, Cyber Physical System Summit (organized by Taiwan Government Executive Yuan Strategy Research Board), September 2010, Taipei, Taiwan

Invited Plenary Speaker, Globecom 2010 on “Future Generation Networks”, Dec. 2010

Invited President Distinguished Speaker, Haungzhou Electronic University, China, March 2010

Invited Speaker, Institute of Computing Technology, Chinese Academic of Sciences, February 2010

Invited Keynote Speaker, the 2nd International workshop on Critical Infrastructure Protection, December 2009, Taipei, Taiwan

Invited Keynote Speaker, 10th International Symposium on Pervasive Systems, Algorithms and Networks, Taiwan, Dec. 2009

Invited Keynote Speaker, 5th International Conference on Mobile Ad-Hoc and Sensor Networks (MSN 2009), Wu Yi Mountain, China

Invited Distinguished Speaker, William and Mary College, November 2008

Invited Keynote Speaker, D2D Workshop, October 25, 2008, Shenzhen, China

Invited Keynote Speaker, SNAPI08, Workshop on Storage Network Architecture and Parallel I/Os, September 2008, Baltimore, Maryland

Invited Keynote Speaker, IFIP International Conference on Network and Parallel Computing, Oct. 18, 2008, Shanghai, China

Invited Keynote Speaker, International Workshop on Wireless Security and Privacy, June 20, 2008, Beijing, China

Invited Keynote Speaker, Workshop on Mission Critical Networks, April 18, 2008, Phoenix, Arizona

Invited A* Visiting Professor, Data Storage Institute, Singapore, January 2009

Invited Speaker, Symantec, Mountain View, California, April 2008

Invited Keynote Speaker, International Conference on Wireless Algorithms, Systems and Applications, August 2007

Invited Keynote Speaker, Korean Computer Congress (KCC), June 2007

Invited Sensor Network Panel Organizer at Infocom, May 2007

Invited Speaker, Boeing, Seattle, May 2007

Invited Keynote Speaker at IEEE International Conference on Service-Oriented Computing and Applications, June 2007, Newport Beach, California

Invited Speaker at Boeing, March 2007

Invited Plenary Speaker at Navy Undersea Distributed Networked Systems Conference in Newport, RI, February 13-15, 2007

Invited Keynote Speaker at NASA Earth Science Web Meeting in San Diego, February 13-14, 2007

Invited Keynote speaker at Trusted Computing Group Annual Meeting, January 2007, Atlanta

Invited Speaker at DOE Salishan High Speed Computing Conference, April 2006

Invited Speaker at Cisco Fast Router Symposium, August 2006

Invited Speaker at Distinguished Lecture Series at Michigan State University, November 2006

Invited Keynote Speaker at GENI Great Plains Network Workshop, Nov. 2006, Kansas State University

Invited keynote Speaker, the 9th IASTED Conference on Internet and Multimedia Systems and Applications, August 2005, Honolulu, Hawaii

Invited Plenary Speaker, the IEEE Conference on Next Generation Web Services and Practices, Seoul, Korea 2005

Digital Technology Center, Outstanding Service Award, 2004

Invited Korea IT Promotion Agency Distributed Visiting Professor at Chung-An University,

Invited Speaker, Han-Wha S&C, Seoul Korea, June 17th, 2003

Invited Keynote Speaker at Digital Convergence Workshop, June 18th, 2003

Invited Speaker at KAIST (Korea Advanced Institute for Science and Technology), June 20th, 2003

Invited Speaker, Seoul National University, June 25th, 2003

Invited Keynote Speaker at Korea Electronic Conference, July 9th, 2003

Invited Speaker at Samsung Electronics, July 15th, 2003

Invited Speaker at HanYang University, July 16th, 2003

Invited Speaker at Samsung Advanced Institute of Technology, July 25th, 2003

Invited Keynote Speaker, Workshop on Architectural and OS Support for Multimedia Applications, Minneapolis, August 1998

Invited Keynote Speaker, International Conference on Internet Technology, 1998

Invited Keynote Speaker, Pacific Workshop on Distributed Multimedia Systems, Taipei, Taiwan, July 1998

Invited Keynote Speaker, 11th International Conference on Computer Applications in Industry and Engineering, Las Vegas, Nevada, Nov. 11-13, 1998

Certificate of Appreciation from IBM, 1997

Invited Distinguished Visitor, National University of Singapore, 1996

Best Paper Award, "Link Delay Modeling for Two-Way Traffic Road Segment in Vehicular Network," Proc. of International Conference on Internet of Vehicles (IOV) 2015, Chengdu, China (with Jinlo Lee and Jaehoon Jeong)

Best Paper Award, International Conference on Computer Design, Austin, Texas 1998, "Finding the Longest Simple Path in Cyclic Combinatorial Circuits," (with Y.C. Hsu and S.Z. Sun)

"On the General False Path Problem," Proc. of Design Automation Conference 1989, pp. 555-560 (with H.C. Yen). *This paper has been nominated for the best paper award.*

PROFESSIONAL ACTIVITIES

Member of International Advisory Board, Journal of Computing Science and Engineering, 2006-2012

Co-Editor, IEEE JSAC Special Issue on Mission Critical Networking, 2009

Associate Editor, IEEE Transactions on Vehicle Technology since 2013

Editor, Journal of Information Science and Engineering, 2002 -2012

Editor, IEEE Trans. on Computers, 1992 to 1997

Editor, Parallel and Distributed Computing Practices, 1997-present

Editor, International Journal on Cluster Computing, 1998 –present

Editor, International Journal of Contemporary Computing, 2010-present

Editor, International Journal of Computer Science and Applications, 2004-present

Guest Editor, Journal of Communications Special Issue on Recent Advances on Controlling Unwanted Internet Traffic 2010

Guest Editor, IEEE JSAC (Journal Selected Area of Communications) Special Issue of Mission Critical Networks, 2009

Guest Editor, Special Issue of IEEE Computer on “Continuous Media on Demand”, September 2001

Guest Editor, Special Issue of Communications of ACM on "Experiments and Experiences with ATM Networks" published in Feb. 1995.

General Co-Chair, IEEE Conference on Computer Communication Security (CNS) 2015, Florence, Italy

General Chair, the 43rd International Conference on Parallel Processing, Minneapolis, Sept. 2014

General Co-Chair, the 6th International Workshop on Sensor Networks (SN 2013), July 30th-August 2, 2013, Nassau, Bahama

General Co-Chair, the 8th ACM International Conference on Underwater Networks and Systems, Kaohsiung, Taiwan, Nov. 11th-13th, 2013

General Co-Chair, the 15th International Conference on Communication Technology, Guilin, China, Nov. 17th-19th, 2013

PC Vice Chair, the International Conference on Distributed Computing Systems (ICDCS), Philadelphia, June 2013

PC Co-Vice Chair, the 4th International Conference on Emerging Data and Web Technologies (EIDWT), 2013

General Co-Chair, the 5th International Workshop on Sensor Networks (SN 2012), July 30-August 2, 2012, Munich, Germany

Conference General Co-Chair, the 5th International Conference on Networking, Architecture and Software (NAS), Dalian, China, July 2011

Workshop Co-Chair, the 30th International Conference on Distributed Computing Systems, Genova Italy, June 2010

General Chair, The 31st IEEE International Conference on Distributed Computing Systems, Minneapolis Minnesota, June 2011

Program Committee Chair, International Conference on Parallel Processing, Vienna Austria, September 2009

General Chair, The 30th IEEE Security and Privacy Symposium, May 2009, Oakland, California

General co-chair, 4th International Conference on Next Generation of Web Services, Seoul, Korea, October 2008

Program Committee Vice-Chair, IEEE International Conference on Distributed Computing Systems (ICDCS), 2008

Treasurer, IEEE Privacy and Security Symposium, 2008

Member of Steering Committee, ACM Workshop on Underwater Networks (WUWNet), 2007-2009

General Co-Chair, ACM Workshop on Underwater Networks (WUWNet), 2008

Member of International Program Committee, SIGMAP (International Conference on Signal Processing and Multimedia Applications), 2007

Member of Program Committee, ACM Conference on Computer and Communications Security, 2007

Conference Co-General Chair, IEEE International Conference on Next Generation Web Services, August 2005, Seoul, Korea

Program Committee Vice Chair, IEEE International Conference on Distributed Computing Systems (ICDCS), 2005

Conference Co-Organizer: Intelligent Storage Workshop, 2003 to 2006

Program Committee Co-Chair: Intelligent Storage Workshop 2004

Invited Panelist, Storage Workshop, Supercomputing 2004

International Program Committee Member of IASTED (International Association of Science and Technology Development), 2004 and 2005

Program Committee Member, IEEE ICME 2001-2006

Program Area Committee Chair, IEEE ICME 2002

Program Committee Member, SPIE Conference on Multimedia Computing and Networking (MMCN), 2004-2008

Program Committee Member, Distributed Multimedia Systems, 1996-2005

Workshop Co-Organizer : NSF IMA Workshop on “Digital Library: Asset Management” Feb. 2001

Program Committee Vice Chair, IEEE International Conference on Distributed Computing, 2000

Invited Panelist, "Storage Architecture and Multimedia", IEEE International Conference on Multimedia Computing Systems, 1999

Principal Organizer, Internet2 Day at University of Minnesota, 1999

General Chair, International Conference on Parallel Processing, Minneapolis, 1998

Program Committee Member of IEEE Workshop on Communication and Architectural Support for Network-Based Parallel Computing 1997

Program Committee Member of 1997 and 1998 Pacific Workshop on Distributed Multimedia Systems

Program Committee Member of IEEE Local Computer Conference, 1997 and 1998

Program Committee Co-Chair of 1996 Pacific Workshop on Distributed Multimedia Systems

Steering Committee Member of High Performance Computing- Asia 1995 and 96 (HPC-ASIA'95 and '96)

Steering Committee Member of International Computer Symposium 1996

Program Committee member of IEEE International Conference on Distributed Computing Systems, 1995

Program Committee member of 1995 Pacific Workshop on Distributed Multimedia Systems

Program Committee member of Workshop on High-Speed Network Computing (HiNet'95 and HiNet'96)

Program Committee member of Third IEEE Workshop on the Architecture and Implementation of High Performance Communication Subsystems (HPCS'95)

General Chairman, International Conference on Management of Data (SIGMOD), 1994

Invited Visiting Professor, University of Essen, Germany for 2 months 1994

Program Committee member of International Conference on Parallel and Distributed Systems 1994

Program committee member of the International Conference on Computer Designs, 1992-1993,

Program committee member of GLOBECOM, 1993

Invited Visiting Professor at National Singapore University for 3 months 1991

Program committee member of the International Conference on Data Engineering 1986-1989

Award committee chairman of the International Conference on Data Engineering 1989

Program committee member of the International Conference on Local Area Network, 1989-2000

Program committee member of the International Conference on Very Large Databases, 1989

Session chairs of various conferences

Invited Speaks at many companies including IBM, Intel, Cisco, Dell Computer, etc.

Reviewer and panelist for NSF, various journals and conferences

Major University Committees and Contributions:

Founder of National Science Foundation I/UCRC Center on Intelligent Storage, 2009- 2021

Member of CSE Presidential Postdoctoral Fellowship Program (PPFP) Committee 2021

Chair, Institute of Technology Honors and Awards Committee, 2005

Assisted in establishing a joint computer engineering degree in ECE and CSE Departments

Assisted in establishing a joint Bachelor Degree in Information Technology in Networking between North Hennepin Community College and the University

Founder of Intelligent Storage Consortium in Digital Technology Center

Served on Internet2 Ad Hoc Committee to assist CIO from 1996 to 1999

University Distance Learning Committee, 1997

Institute of Technology Promotion and Tenure Committee, 1996-1998

Institute of Technology Honors and Awards Committee, 2003 – 2005

Elected to University of Senate, 3-year term, 2003-2005

Participated and Chaired several search committees; served on ADC Chair Search Committee and was the Chair of the ADC Chair Search Committee from 2002 to 2005

GRANTS Awarded :

MEIS DASE, 1983

MEIS Small Grant, 1984

Graduate School Faculty Summer Research Grant, 1984

NSF Equipment Grant, \$82,500 1984

CDC/Honeywell/Sperry Research Grant, "Database Management for ECAD" \$30,000, Sept. 1984- Dec. 1984 and \$90,000 for 1985 (with V. Berzins and S. March)

NSF Research Grant, Grant No. DCR-8405498, "Studies in Associative Retrieval," \$80,552, Sept. 1984- Feb. 1987

Northern Telecom Inc. Research Grant, "Local Area Networks for Office Automation," \$60,000, 1985 (with K. Maly)

NSF CER Research Grant DCR-8420935, "Experimental Research in Computer Algorithms", \$3,622,190 (participating with S. Sahni as PI), 1985-1990

Northern Telecom Research Grant, "Local Area Network for Office Automation", \$60,000 for 1986-1988

HP Equipment Grant, "Studies in Distributed Systems", \$198,778 for 1986 (with A. Tripathi)

MEIS Research Grant, "Computer-Aided-Design for VLSI", \$270,000 for 1986-1989 (with G. Sobelman)

NSF Research Grant MIP-8605297, "Studies in Layout Problems", \$80,116 for 1986-1989

NCR Comten Research Grant, "Studies in Computer Networking", \$25,000 for 1989-1990

Computer-Integrated-Manufacturing Consortium, Productivity Center
Principal Investigator for Network and Database Projects, 1990-1994

"Performance-Driven Layout," \$74,920, National Science Foundation MIP-9007168, 1991-1993

"Collaborative Research in Networking," \$100,000 IBM Rochester 1992-1993; A set of research equipment including one AS/400, 2 PS/2 and 6 Terminals are also provided

"Heterogeneous Computing in High Speed Networks", \$30,000, 1993, Bellcore

Broadband ISDN Compass Testbed, US West, 1992-1995

Founder of the Distributed Multimedia Research Center at University of Minnesota, 1994-1997, Industrial Sponsors: US WEST, Honeywell, Computing Devices International, Network Systems and IVI Publishing; Each industrial sponsor contributes \$50,000/year

"Real Time and Multimedia Network Services for Distributed Control Applications," \$61,858, ARPA (Joined with Honeywell; the total project budget \$701,000) from June 1994 to December 1995

"High-Performance Computing over A Cluster of IBM RS/6000 Workstations"
Equipment Grant from IBM, \$979,000 (with Co-PI Don Riley), 1995

"Advanced Multimedia Communications," \$89,000, 3M, 1993-1994, \$45,000 from 3M, 1995-1996

"Applications over High-Speed Networks : A Pilot Project for the NII"

NSF CISE Research Infrastructure Grant 1995-2000, \$1,500,000 with \$600,000 matching from University of Minnesota and \$800,000 matching from IBM (with P. Woodward, V. Kumar and P.C. Yew as co-PIs)

"Research in Distance Learning" IBM Research Partnership Grant \$120,000 from 1995 to 1997.

"High-Performance Computing Using Clusters of Workstations," IBM SUR Project, Equipment Grant from IBM, \$800,000 in 1997 and \$600,000 in 1998

"Performance Evaluation of Fibre Channel - Arbitrated Loop" Computing Devices International, \$25,976 from June 1995 to June 1996.

"Transaction Processing Using Internet Web", \$27,000 from United Health Inc, 1997

NSF vBNS connection to Minnesota, NSF \$350,000 1996-1997 (with Don Riley, et al. as co-PI)

"Video IP Project" \$25,000 from NYSErnet

"Design and Performance Study of Serial Storage Interface Technology", \$68,000 from Seagate Technology, 1997-1998

"Performance Evaluation of Future Serial Storage Interface," \$72,000 from IBM Storage Systems Division, 1998-1999

"Collaborative Research Activities over the VBNS," \$124,000, NSF, April 1, 1999- March 31, 2000

"Internet Integrated Services over ATM Networks," \$105K, National Sandia Labs, 2000-2003

"Research in Multimedia Computing," \$3,000, Dell Computer, 2000

"A System for Multi-Axial Subassemblage Testing (MAST)," \$6.47M NSF Grant CMS-0086602 and \$6M matching by the University and the State, January 1, 2001 to December 31, 2004 (with Kathy French as PI, and Carol Shield, Douglas Ernie, Jerry Hajjar and Arturo Schultz as co-PIs)

"Research in Emerging Network Infrastructure and Server Technology," \$50,000 from International Simulation and Training Systems, January 1, 2002 to December 31, 2002

"Efficient Shared File Systems for iSCSI," \$100K gift from Intel, June 1, 2002 to May 31, 2004

"Collaborative Research Resources: Collaborative Data Analysis and Visualization," \$500,000, NSF CNS-0224424, Sept. 15, 2002 to Sept. 14, 2005 (with Paul Woodward as PI, and Jon Weissman, et. al. as co-PIs)

"Intelligent Storage Consortium," \$250,000 in 2002 and \$150,000 in 2003, Digital Technology Center, University of Minnesota, (with Jon Weissman, Ahmed Tewfik, David Lilja, Yongdae Kim, and Zhi-Li Zhang)

"Intelligent Storage Consortium," \$165,000, StorageTek, Nov. 15, 2002 to Nov. 14, 2005

“Performance and Efficient Accesses for Future Storage Area Networks,” \$75,000, gift from Cisco, Sept. 2003- August 2004

“Intelligent Storage Consortium,” \$135K, Veritas, May 2003 to May 2006

“Intelligent Storage Consortium,” \$110K, LSI Logic (Engenio), March 2004-March 2006

“A Parallel Archive System Using Object-based Storage Targets and Lustre,” \$50K, 2004, DOE

“Intelligent Storage Consortium”, \$55K, Sun Micro, 2004

“SIMON: SIMulation and MOdeling for SAN,” ONR STTR Phase 1 Grant, \$75,000 with ATC Corp, 2004-2005 (with Yongdae Kim); Phase 2 funding for \$500,000 from 2005-2007

“Development of A System for Interactive Analysis and Visualization”, NSF CNS-0421423, \$300,000 from 7/15/04 to 7/14/06 (with Paul Woodward as PI)

“Intelligent Storage Consortium”, \$55K, ETRI/Korea, September 2004 to September 2005

“Designing OSD-Based File Systems”, \$20K, ETRI/Korea, 9/1/04-12/31/04 (with Yongdae Kim)

“Intelligent Storage Support to Micro-Array Data”, NIH Equipment Grant \$222,000 (participating researcher with Chris Chute from Mayo Clinic as PI), 2005

“Intelligent Storage Consortium,” \$55K, ITRI/Taiwan, December 2005 to December 2006

“Parallel Archive System Using Object-Based Storage Target and Lustre File System”, \$155,000 from Los Alamos National Lab, March 2006- January 2009

“Database Applications with Intelligent Storage System”, \$60,000 from ETRI/Korea, April 2006 to April 2007, and \$100,000 each year in 2007-2010

“Integrated Infrastructure for Secure and Efficient Long-Term Data Management,” (was PI for the project with co-PIs Yongdae Kim and David Lilja; Due to my appointment at NSF, Andrew Odlyzko has substituted as the PI), NSF CCF-0621462, \$696,999 from 9/15/06-9/14/09

“Global Time-Synchronized Delivery Architecture to Support Mission-Critical Traffic on the Internet” \$55,000, gift from Cisco, May 2007-April 2008

NSF I/UCRC Center on Intelligent Storage (joint with UC Santa Cruz), \$10K for planning in 2008

“Travel Support for IEEE Symposium on Security and Privacy 2009,” \$15K from NSF, \$10K from ARO and \$10K from ONR

“Efficient Dataduplication with Consideration of Data Chunk Frequency,” NSF \$300,000 9/1/09-8/31/2012

“Collaborative Research: Predictable Delivery for Large-Scale Real-Time Applications”, NSF CNS-1016350, \$268,522 9/1/10-8/31/2013

“Collaborative Research : A Multi-University I/UCRC Center on Intelligent Storage,” NSF IIP-0934396, \$400,000, 8/1/09-7/31/2014

“Collaborative Research Phase II: A Multi-University I/UCRC Center Research on Intelligent Storage,” NSF IIP-1439622, \$631,800, 2014-2021

“Supplement to Collaborative Research Phase II: A Multi-University I/UCRC Center Research on Intelligent Storage,” NSF IIP-1536447, \$589,930, 2015-2021

NSF I/UCRC Center Membership

\$200,000 from Xyratex 2010-2014
\$450K from Seagate, 2010-2019
\$100K from Los Alamos National Lab 2010-2012
\$100K 2010-2012 and \$300K 2013-2016 from Symantec
\$150K from Veritas 2016-1019
\$150K from NEC-Labs 2012-2015
\$500K from NetApp 2012-2017
\$250K from Dell/Compellent 2013-2018
\$500K from HPE 2013-2019
\$50K from Hitachi Global Storage Systems 2013-2014
\$100K from LSI 2012-2014
\$150K from SGI 2013-2016
\$100K from FedCentric 2013-2015
\$100K from SK-Telecom 2014-2016
\$100K from Cray 2014-2016
\$100K from IBM 2015-2017
\$150K from Intel 2015-2018
\$100K from Huawei 2016-2018
\$100K from Salesforce 2016-2018

“Efficient Buffer Management in FTL for High Performance Solid State Drives,”
NSF CNS-115471 \$130,000, 2011-2012

“Integrating Flash and Phase Change Memory into Memory/Storage Hierarchies for Enhancing High-End and Data Intensive Computing”
NSF IIP-1127829 \$199,428, 2011-2012

“Information Dissemination in Vehicular Networks for Reduced Traffic Congestion,” NSF award CNS-1217572, \$420K from August 16, 2012 to August 15, 2015

“Prediction-Based Data Placement for New Memory and Storage Hierarchies,” NSF award CNS-1217569, \$450K from Sept. 1, 2012 to August 31, 2015

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“Travel Support for the 43rd Annual International Conference on Parallel Processing,” NSF Award CNS-1438816, \$10K from 3/28/2014 to 2/21/2015

“CSR:Small:Collaborative Research: Software Defined Energy Adaption in Large Scale Data Centers,” NSF Award CNS-1421913, \$250K from 8/26/2014 to 1/14/2017

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54. “CDBB: An NVRAM-based Burst Buffer Coordination System for Parallel File Systems,” High Performance Computing Conference (HPC) 2018 (with Ziqi Fan, Fenggang Wu, Jim Diehl, and Doug Voigt)
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- 282. "Disk Pairing: An Effective Data Placement Scheme to Serve Popular Video On-Demand," Proc. of 1996 Pacific Workshop on Distributed Multimedia Systems, Hong Kong, July 1996 (with S. Shim)

CAD for VLSI Circuits (Journals):

- 283. "Performance Optimization by Gate Sizing and Path Sensitization," IEEE Trans. on CAD/ICS, Vol 17, No, 5, May 1998, pp. 459-462 (with J.H. Kim)
- 284. "Efficient Timing Analysis for CMOS Circuits Considering Data Dependent Delays," a short version appeared in the Proc. of International Conference on Computer Design 1994; also appeared in IEEE Trans. on CAD/ICS, Vol. 17, No. 6, June 1998, pp. 546-552 (with S. Sun and H.C. Chen)
- 285. "Water Packing Using Full Mask Exposure Fabrication," IEEE Electronic Letters, Vol. 34, No. 7, 1998, pp. 659-660 (with C.T. Wu and A. Lim)
- 286. "An Efficient Parallel Critical Path Algorithm," a short version appeared in the Proc. of the Design Automation Conference (1991) pp. 535-540 and also appeared in IEEE Trans. on CAD/ICS Vol. 13, No. 7, July 1994, pp. 909-919 (with H.C. Chen and L.R. Liu)
- 287. "The Calculation of Signal Stable Ranges in Combinational Circuits," appeared in the Proc. of ICCAD 1991; also appeared in IEEE Trans. on CAD/ICS, Vol. 13, No. 8, August 1994, pp. 1016-1023 (with H.C. Chen and L.R. Liu)
- 288. "On Valid Clocking for Combinational Circuits," Proc. of ICCD 1994, pp. 381-384 (with S.Z. Sun and Y.C. Hsu)
- 289. "Archiving the Shortest Clock Period by Inserting the Minimum Amount of Delay," Computer Science Lecture Notes, 1994, Volume 834/1994, 669-677 (with Shangzhi Sun and Guoliang Xue)
- 290. "The Role of Long and Short Paths in Circuit Performance," appeared in Proc. of Design Automation Conference 1992, pp. 543-548; also appeared in IEEE Trans. on CAD/ICS Vol. 13, No. 7, July 1994, pp. 857-864 (with S.W. Cheng and H.C. Chen)
- 291. "On Wafer Packing Problems," IEEE Trans. on Computers, Vol. 42, No. 11, Nov. 1993, pp. 1-7 (with I.C. Lin)
- 292. "Path Sensitization Criteria in Critical Path Problem," a short version appeared in Proc. of ICCAD 1991 ; also appeared in IEEE Trans. on CAD/ICS, Vol. 12, No. 2, pp. 196-207, Feb. 1993 (with H.C. Chen)

293. "Critical Path Selection for Delay Optimization," a short version appeared in Proc. of Design Automation Conference, 1991; also appeared in IEEE Trans. on CAD/ICS, Vol 12, No. 2, pp. 185-195, Feb. 1993 (with H.C. Chen)
294. "Efficient Algorithms for Extracting the K Most Critical Paths in Timing Analysis," a short version appeared in the Proc. of Design Automation Conference 1989, pp. 649-654; also appeared in the International Journal of Computer Aided VLSI Designs, Vol. 3, No. 2, 1991, pp. 193-216 (with H.C. Yen and S. Ghanta)
295. "SPYDER : A Goal Directed Serial/Parallel Router," Integration, the VLSI Journal 7(1989), pp. 151-187 (with R. Enbody)
296. "Gate Matrix Layout Synthesis with Two-Dimensional Folding," a short version appeared in the Proc. of Design Automation Conference 1989, pp. 37-42 ; also appeared in International Journal of Computer Aided VLSI Design (with I. Lin and H.C. Yen)
297. "A Near-Optimal Algorithm for Single Row Routing," (with L.C. Liu), IEEE Trans. Computers, Vol. 38, No. 4, April 1989, pp. 603-608
298. "A Framework for Efficient IC/VLSI Databases" Information Sciences 48, pp. 195-215, 1989 (with S. Ghanta)
299. "Layer Assignment Problem for Three-Layer Routing," IEEE Trans. Computers, vol. 37, no. 5, May 1988, pp. 625-631. (with K.C. Chang)
300. "On Two Dimensional Via Assignment for Single Row Routing," IEEE Trans. Computers, Vol. 37, No. 6, June 1988, pp. 721-726.(with F. Naveda and O. Ibarra)
301. "Single Row Routing with Crossover Bound," IEEE Trans. CAD/ICS, vol. CAD-6, no. 2, March 1987, pp. 190-201. (with O. Ibarra and F. Naveda)
302. "Heuristic Algorithms for Single Row Routing," IEEE Trans. Computers, vol. C-36, no. 3, March 1987, pp. 312-320. (with L.C. Liu)
303. "Efficient Algorithms for Layer Assignment Problem," IEEE Trans. CAD/ICS, vol. CAD-6, no. 1, Jan. 1987, pp.67-78. A short version also appeared in the Proc. of International Symp. on VLSI Technology, Systems and Applications, pp. 129-133, 1985 (with K.C. Chang)

CAD for VLSI Circuits (Conference Proceedings):

304. "Finding the Longest Simple Path in Cyclic Combinational Circuits," Proc. of the International Conference on Computer Design, Austin, Texas, 1998 (with Y.C. Hsu and S.Z. Sun) ***This paper has been selected to receive the best paper award.*
305. "Timing Analysis of Combinational Circuits Containing Complex Gates," Proc. of International Conference on Computer Design, 1998 (with Y.C. Hsu, H.C. Chen and S.Z. Sun)
306. "Enhancing Circuit Performance Under A Multiple-Phase Clocking Scheme," Proc. of IEEE International Symposium on Circuits and Systems, 1998 (with Y.C. Hsu)
307. "Testability Considerations," Proc. of International Conference on Computer Design 1994 (with S.z. Sun)
308. "A Path Sensitization Approach to Area Reduction" Proc. of International Conference on Computer Design, 1993 (with H.C. Chen, et al)
309. "An Efficient Timing Driven Placement Algorithm for Macro Cells," Proc. of the Fifth International Conference on VLSI Design, 1992, pp. 31-35 (with C.T. Wu and A. Lim)
310. "Circuit Testability Enhancement by Eliminating Long False Paths," appeared in Proc. of Design Automation Conference, 1992, pp. 249-252(with H.C. Chen)
311. "Wafer Packing for Full Mask Exposure Fabrication," Proc. of ICCAD 1991, pp. 52-55. (with C.T. Wu).

- 312. "Performance Driven Constructive Placement," Proc. of Design Automation Conference, 1990, pp. 103-106 (with I.C. Lin)
- 313. "On the General False Path Problem," Proc. of Design Automation Conference 1989, pp. 555-560 (with H.C. Yen). *This paper has been nominated for the best paper award.*
- 314. "A Path Selection Algorithms for Timing Analysis," Proc. of Design Automation Conference 1988, pp. 720-723 (with S. Ghanta and H.C. Yen)
- 315. "A General Purpose Router," Proc. of the 24th Design Automation Conference (1987), pp. 637-640. (with R. Enbody)
- 316. "Near-Optimal n-Layer Channel Routing," Proc. of the 23rd Design Automation Conference (1986), pp. 708-714. (with R. Enbody)
- 317. "A New Approach to Multiple-Layer PCB Routing," Proc. of the 23rd Design Automation Conference (1986), pp. 696-701. (with K.C. Chang and F. Naveda)
- 318. "A Preprocessor for Layer Assignment Problem," Proc. of the 23rd Design Automation Conference (1986), pp. 702-707 (with K.C. Chang)

Database and File Design (Journals):

- 319. "Dynamic File Organizations for Partial Match Retrieval Based on Linear Hashing," The Computer Journal, vol. 35, 1992, A467 (with T.S. Yuen)
- 320. "On the File Allocation for Power-2 Cartesian Product Files," The Computer Journal, vol. 35, 1992, pp. A149-157.
- 321. "A Locking Scheme for Associative Retrieval," Proc. of 1986 International Conference on Data Engineering, pp. 574-581, also appeared in The Computer Journal, vol. 35, 1992, pp. A141-A148. (with E. Onuegbe)
- 322. "Multi-Level Extendible Hashing: A File Structure for Very Large Databases," IEEE Trans. on Data and Knowledge Engineering Vol.3, No. 3, Sept 1991, pp. 357-370 (with H.S. Tong)
- 323. "An Efficient File Structure for Document Retrieval in the Automated Office Environment," A short version appeared in the Proc. of the International Conference on Data Engineering, 1987, pp. 165-172, also appeared in IEEE Trans. on Knowledge and Data Engineering, vol. 1, no. 2, June 1989, pp. 258-273 (with S. Ghanta, K. Maly and S. Sharrock)
- 324. "Dynamic Hashing Schemes," ACM Computing Surveys, Vol. 20, No. 2, June 1988, pp. 85-114. (with R. Enbody). *This paper has been translated into Japanese.*
- 325. "On Multiple Random Accesses and Physical Data Placement in Dynamic Files," IEEE Trans. Software Engineering, Vol. SE-13, No. 8, August 1987, pp. 977-987 (with J.H. Wang & T.S. Yuen)
- 326. "Dynamic File Structure for Partial Match Retrieval Based on Overflow Bucket Sharing," IEEE Trans. Software Engineering, Vol. SE-12, No. 8, August 1986, pp. 801-810. (with T.S. Yuen).
- 327. "Disk Allocation Methods for Binary Cartesian Product Files," BIT, 26 (1986), pp. 138-147.
- 328. "On the File Design Problem for Partial Match Retrieval," IEEE Trans. on Software Engineering, vol. SE-11, no. 2, Feb. 1985, pp. 213-222.
- 329. "Distributing a Database for Parallel Processing is NP-hard," SIGMOD RECORD, vol. 14, no. 1, March 1984, pp. 55-60.
- 330. "Symbolic Gray Code as a Multi-key Hashing Function," IEEE Trans. Pattern Analysis and Machine Intelligence, vol. PAMI-2, no.1, pp. 83-90, January 1980. (with R.C.T. Lee)
- 331. "Disk Allocation for Cartesian Product Files on Multiple-Disk Systems," ACM Trans. Database Systems, vol. 7, no.1, March 1982, pp. 82-101 (with J.S. Sobolewski)

332. "Common Properties of Some Multi-attribute File Systems," IEEE Trans. Software Engineering, vol. SE-5, March 1979, pp. 160-174 (with W.C. Lin and R.C.T. Lee)

Database and File Systems/Design (Conferences)

333. "Towards Efficient Search on Unstructured Data : An Intelligent-Storage Approach", *ACM Sixteenth Conference on Information and Knowledge Management*, (2007), CIKM 2007, pp. 951-954 (with Aravindan Raghuvier; Meera Jindal; Mohamed Mokbel; Biplob Debnath)
334. "Some Properties of Cartesian Product Files," ACM SIGMOD Conference Proceedings, 1980, pp. 157-168 (with W.C. Lin and R.C.T. Lee)

Ph.D. Students (67 graduated):

1. Tak-Sun Yuen (finished August 1985)
Thesis Title : Hashing Based Dynamic File Structures for Associative Retrieval
Initial Employer : Pace University
2. Kou-Chuan Chang (finished June 1986)
Thesis Title : On Via Minimization and Layer Assignment Problems,
Initial Employer : Boeing Electronics Company
3. Fernando Naveda (joint with Professor Ibarra ; finished June 1986)
Thesis Title : On the Routing Problem for Printed Circuit Boards
Initial Employer : University of Kansas
4. Suzanne Sharrock (finished March 1987)
Thesis Title : Voice/Data/Video Integration on Local Area Networks
Initial Employer : Network Architecture Company
5. Richard Enbody (finished June 1987)
Thesis Title : On Multiple Layer Channel Routing Problems
Initial Employer : Michigan State University
6. Lee-Chin Liu (finished March 1989)
Thesis Title : Routing Problems for VLSI Designs
Initial Employer : IBM, Rochester, Minnesota
7. Ren-Ben Shu (finished June 1989)
Thesis Title : Efficient and Reliable Architectures for Massively Connected Multiprocessors
Initial Employer : National Singapore University
8. Hung-Chuan Yen (finished June 1989)
Thesis Title : Timing Analysis for VLSI
Initial Employer : Cadence Co.
9. Shu-Ping Chang (finished December 1989)
Thesis Title : Multiple Packet Multiple Channel Local Area Networks
Initial Employer : IBM T.J. Watson Research Center

10. Yean-Shiang Leu (finished by March 1990)
Thesis Title : Network Architectures for High-Speed Communications
Initial Employer : IBM, San Jose, California
11. Ichiang Lin (finished June 1990)
Thesis Title : New Techniques for Performance Driven Layout
Initial Employer : IBM, Kingston, New York
12. Chih-Hsiang Chou (finished Dec. 1990)
Thesis Title : Network Architectures for Metropolitan Area Networks
Initial Employer : IBM, Rochester, Minnesota
13. Ching-Tin Wu (finished September 1991)
Thesis Title : Performance-Driven Layout and Wafer Packing Problems for VLSI
Initial Employer : 3M, Minnesota
14. Swie Tsing Tan (finished July 1991)
Thesis Title : Distributed Processor Allocation for Hypercube Multiprocessors and Embedded Virtual Incomplete Hypercubes for High-Speed Optical Networks
Initial Employer : AT&T Bell Lab
15. Lee-Ren Liu (Finished August 1991)
Thesis Title : Efficient Algorithms for Timing Verification and Delay Fault Testing
Initial Employer : Actel, California
16. Hsi-Chuan Chen (Finished Jan. 1992)
Thesis Title : Study of Timing Verification and Timing Optimization of Combinational Circuits
Initial Employer : AT&T Bell Lab
17. Ron Vetter (finished June 1992)
Thesis Title : Network Architectures for High Performance Computing Environment
Initial Employer : Moorhead State University, Moorhead, Minnesota
18. Kent Williams (finished August 1992)
Thesis Title : Study of Design Issues for High-Speed Optical Passive Star Networks
Initial Employer : North Carolina A&T University
19. Keumog Ahn (finished June 1993; joint with S. Sahni)
Thesis Title : Study of VLSI Circuits Layout Design Issues
Initial Employer : AT&T Bell Labs
20. Sanghyun Ahn (finished January 1994),
Thesis Title : ATM Network VP Layout Design and Multicasting Group Communication Problems
Initial Employer : Seoul City University (Korea)
21. Sheau-Ru Tong (finished March 1994)
Thesis Title : Hot-Spot Problem for Interconnection Networks and High Performance Computing on Passive Star Networks
Initial Employer : Industrial Technology Research Center (Taiwan)

22. Meng-Jou Lin (finished September 1994)
 Thesis Title : Distributed Network Computing Over Switch-Based High-Speed Local Area Networks
 Initial Employer : Apple Computer
23. Rose Tsang (finished Sept. 1995)
 Thesis Title : High Speed Network Support for Multimedia Traffic
 Initial Employer : National Sandia Lab
24. James Schnepf (finished Sept. 1995)
 Thesis Title : Multimedia Support for Distance Education
 Initial Employer : St. John's University, Minnesota
25. Juho Kim (finished Sept. 1995)
 Thesis Title : Timing Analysis of CMOS VLSI and Performance Optimization
 Initial Employer : Cadence Corp.
26. Shang-Zhi Sun (finished Nov. 1995)
 Thesis Title : Studies on Timing Analysis, Clock Period Optimization and Testability
 Initial Employer : Lattice Semiconductor
27. Mohamad Rooholamini (finished May 1996; joint with V. Cherkassky)
 Thesis Title : ATM as the System Interconnect of a Multimedia Server
 Initial Employer : Dell Computer
28. Yaun-Chung Hsu (finished in June 1996)
 Thesis Title : Study on Timing Analysis and Clocking Problems of Logic Circuits
 Initial Employer : IBM Rochester
29. Ching-Liang Liu (finished in June 1996)
 Thesis Title : Efficient Design of Video on Demand Server
 Initial Employer : Washington State University
30. Ren-Wei Hsieh (finished in June 1997)
 Thesis Title: High-Speed Network Support for High-Performance Network and Multimedia Communications
 Initial Employer: Dell Computer
31. Sangyup Shim (finished in July 1997)
 Thesis Title: Supporting I/O Intensive Applications in A High Performance Storage System
 Initial Employer: San Jose State University
32. Yuewei Wang (finished in September 1997)
 Thesis Title: Video Allocation Schemes for Video-on Demand Services
 Initial Employer: IxMicro Inc., California
33. A. Pavan (finished in March 1998)
 Thesis Title: Topological Issues in Time and Wavelength Division Multiplexed Multihop Lightwave Networks
 Initial Employer: Honeywell Technology Center

34. Yen-Jen Lee (finished in February 2000)
Thesis Title: Scalable Architectures for Multimedia Communications in Education and Entertainment
Initial Employer : Streaming21, San Jose, California³⁶.
35. Wei-Hsiu Ma (finished in June 2000)
Thesis Title: Video Delivery and Caching with Proxy Servers for Reducing Bandwidth Requirement over Wide Area Networks
Initial Employer: Streaming21, San Jose, California
36. Seijun Song (Joint with Zhi-Li Zhang; finished in August 2000)
Thesis Title: A Software-Based Approach to Scalable Fault-Tolerant Real-Time Ethernet for Networked Control Systems
Initial Employer: Cisco
37. Srihari Nelakuditi (Joint with Zhi-Li Zhang; finished in October 2001)
Thesis Title: Localized Approach to Providing Quality-of-Service
Initial Employer: University of South Carolina
38. Tai-Sheng Chang (finished in December 2002)
Thesis Title: On Several Design Issues of Intelligent High-Performance Storage Systems
Initial Employer: General Electric Medical Imaging Division
39. Zhenhai Duan (joint with Zhi-Li Zhang; finished in July 2003)
Thesis Title: On Scalable Support of Quality of Services in the Internet
Initial Employer: University of Florida State
40. Yingfei Dong (Joint with Zhi-Li Zhang; finished in July 2003)
Thesis Title: Efficient Resource Management in Multimedia Network Systems
Initial Employer: University of Hawaii at Manoa
41. Bae Young Choi (Joint with Zhi-Li Zhang; finished in August 2003)
Thesis Title: Scalable Network Monitoring in High-Speed Large Networks
Initial Employer: US Sprint
42. Ewa Kusmierk (Joint with Zhi-Li Zhang; finished in May 2004)
Thesis Title: Adaptive Streaming Techniques for Large Scale Video Delivery
Initial Employer: Poznan Supercomputer Center (Poland)
43. Dan Edeen (finished in May 2005)
Thesis Title: An Model for ADSL Link Aggregation with Qualify of Service Support
Initial Employer: Qwest Communications
44. Ying-Ping Lu (finished in November 2005)
Thesis Title: Design Issues in Networked Intelligent Storage Systems : Performance and Quality of Service
Initial Employer: Silicon Graphics Inc.
45. James Beyer (finished in March 2006)
Thesis Title: Control Algorithms for Observation Systems

Initial Employer: CRAY Research

46. Dingshen He (finished in August 2006)
Thesis Title: Data Management in Intelligent Storage Systems
Initial Employer: Microsoft
47. Xiaobo Zhang (finished in July 2006)
Thesis Title: Tape Storage Solutions: Meeting Growing Data Demands
Initial Employer: Symantec
48. Hyeran Lim (finished in September 2006)
Thesis Title: Designing Fair, Efficient and Scalable Storage Systems Based on Emerging Storage Technologies
Initial Employer: Samsung Electronics (Korea)
49. Aravindan Raghuvver (finished in January 2008)
Thesis Title: Techniques for Streaming, Storage and Search of Video
Initial Employer: Yahoo India
50. Jaehoon Jeong (finished in December 2009)
Thesis Title: Wireless Sensor Networking for Intelligent Transportation Systems
Initial Employer: Brocade
51. Guanlin Lu (finished in December 2011)
Thesis Title: Efficient Data Deduplication
Initial Employer: EMC Corp. San Jose
52. Dongchul Park (finished in July 2012)
Thesis Title: Hot and Cold Data Identification: Applications to Storage Systems
Initial Employer: Samsung Electronic Research Center, San Jose
53. Sarah Sharafkandi (finishing date: May 2013)
Thesis Title: On QoS Provisioning for Vehicular Safety Communication
Initial Employer: Qualcomm
54. Muthukumar Murgan (finishing date: June 2013)
Thesis Title: Towards A Flexible and Energy Adaptive Datacenter Infrastructure
Initial Employer: HP
55. Xiaoxiao Jiang (finishing date: July 2015)
Thesis Title: Improving the Reliability and Efficiency of Data Transmission in Ad-Hoc Vehicle Networks
Initial Employer: Verizon
56. Weiping He (finishing date: July 2015)
Thesis Title: The Applications of Workload Characterization in the World of Massive Data Storage
Initial Employer: Dell
57. Nagapramod Mandagere (finishing date: October 2015)
Thesis: Techniques for Optimizing Cost of Enterprise Data Management

Initial Employer: IBM Almaden Research Center

58. Ziqi Fan (finishing date: May 2017)
Thesis Title: Improving Storage Performance with Non-Volatile Memory-based Caching Systems
Initial Employer: Samsung Electronics, San Jose, California
59. Xiang Cao (finishing date: June 2017)
Thesis: Efficient Data Management and Processing in Big Data Applications
Initial Employer: Grand Valley State University, Michigan
60. Xiongzi Ge (finishing date: July 2017)
Thesis Title: Improving Data Management and Data Movement Efficiency in Hybrid Storage Systems
Initial Employer: NetApp Advanced Technology Group, North Carolina
61. Alireza Haghdoost (finishing date: June 2018)
Thesis Title: Towards Performance and Reliability Enhancements of Enterprise Data Storage Systems
Initial Employer: Dell/EMC, Minneapolis
62. Hao Wen (finished date: May 2019)
Thesis Title: Improving Application Performance in the Emerging Hyper-Converged Infrastructure
Initial Employer: Twitter Company
63. Fenggang Wu (finished date: May 2020)
Thesis Title: Large Capacity and High Performance Storage Devices/Systems for Big Data
Initial Employer: Facebook
64. Zhichao Cao (finished date: June 2020)
Thesis Title: High Performance and Cost-Effective Storage Systems for Supporting Big Data Applications
Initial Employer: Facebook
65. Baoquan Zhang (finished date: December 2020)
Thesis Title: Storage System Designs with Emerging Storage Technologies
Initial Employer: Facebook
66. Milan Shetti (finished date: April 2021)
Thesis Title: Nubes: Towards Building a Secure and Scalable Hybrid Cloud Infrastructure
Initial Employer: HPE & RocketSoftware
67. Hebatalla Eldakiky (finished date: August 2021)
Thesis Title: Scaling Up The Performance of Distributed Key-Value Stores Using Emerging Technologies for Big Data Applications
Initial Employer: Amazon

Current Ph.D. Students (8):

Ben Dischinger (passed WPE and Preliminary Oral)
Ming-Hung Yang (passed WPE)
Chia-Wen Hsieh (passed WPE)
Yixun Wei (passed WPE)
Huibing Dong
Haoyu Gong
Wenlong Wang
Zhaokang Ke

Pos-Doc (2):

Bingzhe Li (Ph.D. from University of Minnesota; Finished July 2019 and currently Assistant Professor at Oklahoma State University)

Naeyoung Song (Ph.D. from National Seoul University; Finished July 2020 and currently employed by Zoom)

Master Students (109 graduated)

1982: Eunjin Han, Mai-Yung Yeh, Shuhua Lee

1984: Hasan Moustafa Dandashly, Alfred Huang, Eling Lou, Hanhsing Tan, Shuhwa Yu, Kouchuan Chang, Yeanshiang Lee

1987: Jan Kaldager, Earl Roethke, Karen Kleckner

1988: Tyan Leemay Yen, Aling Wu

1989: Corey Carlson, Yeongleh Lee, Shijer Lin

1990: Tim Barry

1991: Victor Lin, Wayne Schaffran

1993: Yiju Yu, Ming-Tsung Darda Chang

1994: Lu Cheng, Michael H Lee, Ailing Ding, Charlene Sheueling Du

1995: Keith Cramer, Liangwei Kang, Paisal Keattithananant, Lan Lai

1996: Mahmood Qadir, Anthony Harder, Sudesh Kamath, Dan Li, Daiwei Yau, Weimin Xin, Anand Srinivasan

1997: Ying-Li Wu, Dongli Su, Xiaolei Hu

1998: Shu-Fen Jen, Shouyen Teng, Hyeran Lim

1999: Zhifang liu, Feng Nie, Suhnil Ghelani, Aarti Lakhani, Visha Sinha, Jeong-Hyeok Seo, Aditya Datta

2000: Vikram Kapoor, Chirag Wighe, Calvin Chu, Imelda Sutedjo, Sai Chivukula, Hongjing Zeng, Feng Li

2001: Peng-Fei Chuang, Suthep Vichiendilokkul, Aixin Liu

2002: Mahjabeen Parween, Biren Damani, Fang Zhang, Vikas Nahata, Sai Bathina, Avindashreddy Bathula, Urooj Ahmed

2003: Ming Yu, Priyanka Jain, Rupali Jain, Parthasarathy Sundaram, Heyi Wang, Zeyan Wang, Yu-Han Yang, Xu Zhang, Kartik Gopal, Shuang Yi Tang, Abhishek Dhasmana, Sughosh Kalghatgi, Nishesh Gupta, Hui Ye, Jibin Zheng, Srikanth Chirravuri, Amit Paka, Shankar Srinivasan, Praveen Venkataramaiah, Farrukh Norman, Durgaprasad Velagaleti, Geeta Gharpure, Aravindan Raghuvveer, Rajiv Srinivassan

2004: Vijaya Lenka, Jingjing Gu, Subramanya Abhishek, Nitin Bhandari, Brad Pokormy, Joengmin Hwang, Rao Raghavendra

2005: Muhammad Jawad, Jinglei Li, Xianbo Zhang

2006: Ben Miller

2007: Meera Jindal, Girish Moodalbail

2008: Sunil Subramanya, John Unterholzner

2013: Pradeep Ganesan, Muthukumar Murugan, Sandeep Ummadi, Xinyang Yang
2016: Jeremy Kieser