

Biography of Dr. Raj Jain



Raj Jain is a Professor of Computer Science and Engineering at Washington University in St. Louis. He was one of the Co-founders of Nayna Networks, Inc - a next generation telecommunications systems company in San Jose, CA. Previously, he was a Senior Consulting Engineer at Digital Equipment Corporation in Littleton, Mass and then a professor of Computer and Information Sciences at Ohio State University in Columbus, Ohio.

Dr. Jain is a Fellow of IEEE, a Fellow of ACM and ranks among the top 50 in Citeseer's list of [Most Cited Authors in Computer Science](#). He is the author of "[The Art of Computer Systems Performance Analysis](#)," which won the 1991 "Best-Advanced How-to Book, Systems" award from Computer Press Association. His fourth book entitled "[High-Performance TCP/IP: Concepts, Issues, and Solutions](#)," was published by Prentice Hall in November 2003. He is also a winner of ACM

SIGCOMM Test of Time award.

He is the Co-Editor in Chief of [ICST Transactions Networking and Communications](#) and is on the Editorial Boards of [Computer Communications](#) (UK), [Journal of High Speed Networks](#) (USA), [Mobile Networks and Applications](#), [International Journal of Virtual Technology and Multimedia](#) (UK), [International Journal of Wireless and Optical Communications](#) (IJWOC), and [International Journal of Communication Networks and Distributed Systems](#) (IJCND) and on the advisory board of [Journal of Communications](#). In the past, he was also on the Editorial Board of [IEEE/ACM Transactions on Networks](#) and Computer Networks: The International Journal of Computer and Telecommunications Networking and has served as a Guest Editor of IEEE Communications Magazine April 2001 special issue on TCP Performance over Emerging High-Speed Networks, IEEE Communications Magazine March and July 1999 special issues on Satellite Networks, Computer Networks and ISDN System October 1998 special issue on ATM Traffic Management, and Computer Communications (UK), April-May 1993 issue.

He has served as a Distinguished Lecturer for the IEEE Communications Society (1997, 1999-2006), ACM Lecturer (1991-97), IEEE Computer Society Distinguished Visitor (1993-96), Vice-Chair of ACM SIGCOMM (1991-95), Chair of TIA/SCD/CIS Working Group on ATM Traffic Management (1996-1998), Editor of the [WiMAX Forum System Evaluation Methodology](#) (2005-2008), Editor of ATM Forum Performance Testing Specification (1996-1998), Member of IEEE Computer Society Education Board, Member of IEEE Computer Society Publication Board (1995-1997), Member of the 1997 National Science Foundation Research Infrastructure Program Final Evaluation Panel, Member of U.S. delegation (Computer Communications) to People's Republic of China in July 1987.

Dr. Jain was the General Chair of International Conference on Convergence and Broadband Networking (ICCBN 2008), General Co-Chair of SPIE's Broadband Access Communication Technologies Conferences in 2007 and 2008, and the founding General Chair of the First International Conference on Broadband Networking (Broadnets 2004). He has served as program committee member on 130+ other conferences.

He was the keynote speaker at IEEE International Conference on Networking (ICON) 2008, ACM Multimedia 2008, International Conference on Communication, Convergence and Broadband Networking (ICCBN) 2008, International Conference on Computer and Communications Engineering (ICCCE) 2008, AccessNets 2007, 11th IEEE International Conference on Parallel and Distributed Systems (ICPADS-2005), IEEE Local Computer Networking Conference (LCN) 2004, International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS'04), Concord Users Group Conference 2002, OpNetwork 2001, NREN Gigabit Networking Workshop 2000, Summer Computer Simulation Conference SCSC/SPECTS 2000, International Conference on Networking (ICON) 1999, High Performance Computing (HiPC) 1998, ATM: Technology, Standards, Trials and Applications 1994, Gigabit Networks-

Key to Information Superhighway, 1994, IEEE Local Computer Networking Conference LCN92, International Conference on Modeling Techniques and Tools for Performance Evaluation 1992.

A distinguishing factor of his research is its relevance to the Industry. As a faculty member, Dr. Jain actively participates in industry forums like WiMAX Forum, IEEE Standards group, ATM Forum and Internet Engineering Task Force and has made over 100 contributions that ensured that his research was implemented and not just published as papers. Based on his active participation in the computer industry, Dr. Jain was awarded 1999 siliconindia Leadership Awards for Excellence and Promise in Business and Technology. He is also the recipient of "**Lumley Engineering Research Award 1999**" and "**Research Accomplishment Award 1996**" by The Ohio State University, College of Engineering and "**Ameritech Prize 1995**" by Ohio State University.

Raj Jain has served on the Board of Technical Advisors to Mercury, Mountain View, CA (2004), Teradiant Networks, San Jose, CA, Corona Networks, Inc., Milpitas, CA (2000-2004), Avatar Networks, Fremont, CA (2001-2002), Rhonet Systems, Columbus, OH (2002-2003), Chip Engines, Inc., Sunnyvale, CA (2000-2002), EdgeNet Communications Corporation, Burlingame, CA (2000-2002), Tivre Networks, San Jose, CA (2001-2002), Irvine Networks, Irvine, CA acquired by Simple Technologies. (2000-2001), Beacon Telco, Boston, MA (2001-2002), iBEAM Broadcasting Corporation, Sunnyvale, CA (2000-2001), Nexabit Networks, Westborough, MA acquired by Lucent Corporation. (March 1997-1999), Amber Networks, Fremont, CA acquired by Nokia (1999-2001) and on the Board of Directors of MED-I-PRO Systems, LLC, Pomona, CA, (1998-2000). He was also a consultant to several networking companies.

His Ph.D. thesis entitled "[Control theoretic Formulation of Operating Systems Resource Management Policies](#)" was published in the Outstanding Dissertations in the Computer Sciences Series by Garland Publishing Company, New York, NY.

In 1984, 1985, and 1987 he taught a graduate course on performance analysis at Massachusetts Institute of Technology. His third book "[FDDI Handbook: High-Speed Networking with Fiber and Other Media](#)" was published in 1994 by Addison Wesley. He has contributed chapters to 14 other books.

Until 1994, he was a Senior Consulting Engineer at Digital Equipment Corporation, Littleton, Massachusetts, where for 16 years, he lead the design and analysis of many computer systems and networking technologies including VAX Clusters, Ethernet, DECnet, OSI, FDDI, and ATM networks. He was also an active member of the All-Optical Networking (AON) consortium consisting of Digital, M.I.T./Lincoln Lab, and AT&T that successfully bid for DARPA funding and started the research on Dense Wavelength Division Multiplexing (DWDM) networks.

He is very active in the areas of next generation Internet architecture, wireless networking, network security, optical networking, traffic management and quality of service in data networks. His research has influenced the directions of Traffic Management and Testing working groups of ATM Forum. He is an active participant in several other industry forums including WiMAX Forum, Internet Engineering Task Force (IETF), Optical Interoperability Forum (OIF), Institute of Electrical and Electronic Engineering (IEEE), American National Institute (ANSI), and Telecommunications Institute of America (TIA).

He has 14 patents and has written 7 books, 14 book chapters, 47+ journal and magazine papers, and 72+ conference papers. His papers have been widely referenced and he is known for his research on congestion control and avoidance, traffic modeling, performance analysis, and error analysis. Google Scholar lists over [9800+](#) citations to his publications. He is a co-inventor of the DECbit scheme, which has been implemented in various forms in DECnet, OSI, Frame Relay, and ATM Networks (Explicit Forward Congestion Indication). His team has developed several switch algorithms for explicit rate-based congestion avoidance in ATM networks. Recently, Dr. Jain and his team have proposed a new clean slate architecture for the next generation Internet called "Internet 3.0."

Appointments

- August 2005 - Present, Professor, Washington University, St. Louis, MO
- April 2000-July 2007, Co-Founder and Chief Technology Officer, Nayna Networks, Inc., Milpitas, CA
- September 2002-June 2003 and November 2003-Present, Adjunct Professor, Ohio State Univ., Columbus, OH
- April 1994 –August 2002, Professor, Ohio State Univ., Columbus, OH
- May 1978- March 1994, Senior Consulting Engineer, Digital Equipment Corp., Littleton, MA
- January 1987-June 1987, Honorary Lecturer, Massachusetts Inst. of Technology, Cambridge, MA
- January 1985-June 1985, Honorary Lecturer, Massachusetts. Inst. of Technology, Cambridge, MA
- September 1983-June 1984, Visiting Scholar, Massachusetts. Inst. of Technology, Cambridge, MA

Education

- Ph. D. (Applied Math/Comp. Sci), Harvard University, Cambridge, MA. Thesis published as distinguished dissertations in Computer Science. GPA 4.0/4.0, 1978
- M. E. (Comp. Sc. & Controls), Indian Institute of Science, Bangalore, India, GPA: 4.0/4.0, 1974
- B. E. (Electrical. Engineering), A. P. S. University, Rewa, India, Marks 92%. Record not yet broken, 1972

Selected Publications:

1. Chakchai So-In, Raj Jain, and Abdel-Karim Tamimi, "**Scheduling in IEEE 802.16e Mobile WiMAX Networks: Key Issues and a Survey**," IEEE Journal on Selected Areas in Communications (JSAC), Vol. 27, No. 2, Feb 2009, <http://www.cse.wustl.edu/~jain/papers/sched.htm>
2. Jianli Pan, Raj Jain, Subharthi Paul, Mic Bowman, Shanzhi Chen, "**Enhanced MILSA Architecture for Naming, Addressing, Routing and Security Issues in the Next Generation Internet**," To appear in Proceedings of IEEE International Conference in Communications (ICC) 2009, Dresden, Germany, June 14-18, 2009, <http://www.cse.wustl.edu/~jain/papers/emilsa.htm>
3. R. Jain, C. So-in, A. Tamimi, "**System Level Modeling of IEEE 802.16e Mobile WiMAX Networks: Key Issues**," IEEE Wireless Communications, Vol. 15, No. 5, October 2008, <http://www.cse.wustl.edu/~jain/papers/slm.htm>
4. V. Paruchuri, A. Durresi, Raj Jain, "**On the (in)effectiveness of Probabilistic Marking for IP Traceback under DDoS Attacks**," Proceedings of IEEE Global Communications Conference, (GLOBECOM) 2007, Paper #IPS06-5, Washington, DC, November 26-30, 2007, http://www.cse.wustl.edu/~jain/papers/ppm_gc07.htm
5. Vijay Bulusu, Arjan Durresi, Vamsi Paruchuri, Raj Jain, "**Key Distribution in Mobile Heterogeneous Sensor Network**", Proceedings IEEE GLOBECOM 2006, San Francisco, CA, November 27 - December 1, 2006, <http://www.cse.wustl.edu/~jain/papers/key.htm>
6. Raj Jain, "**Internet 3.0: Ten Problems with Current Internet Architecture and Solutions for the Next Generation**," in Proceedings of Military Communications Conference (MILCOM 2006), Washington, DC, October 23-25, 2006, <http://www.cse.wustl.edu/~jain/papers/gina.htm>
7. D. Chiu and Raj Jain, "**Analysis of the Increase/Decrease Algorithms for Congestion Avoidance in Computer Networks**," Journal of Computer Networks and ISDN, Vol. 17, No. 1, June 1989, pp. 1-14, http://www.cse.wustl.edu/~jain/papers/cong_av.htm [Cited by 1147 papers]
8. K. Ramakrishnan and Raj Jain, "**A Binary Feedback Scheme for Congestion Avoidance in Computer Networks with Connectionless Network Layer**," Proc. SIGCOMM'88, August 1988, pp. 303-313. Selected as the best paper and published in ACM Transactions on Computer Systems, Vol. 8, No. 2, May 1990, pp. 158-181, Reprinted in 25th Anniversary Special Issue of Computer Communication Review, Vol. 25, No. 1, Jan 1995, pp. 138-156, Winner of ACM SIGCOMM Test of Time Paper Award, <http://www.cse.wustl.edu/~jain/papers/cr2.htm> [Cited by 520 papers]

Further information about Dr. Jain including all his publications can be found at <http://www.cse.wustl.edu/~jain/index.html>. In particular, a detailed CV is at http://www.cse.wustl.edu/~jain/cv_jain.htm