Biography of Dr. Raj Jain

Professor Raj Jain is a Life Fellow of IEEE, a Fellow of ACM, a Fellow of AAAS, and a Fellow of Academy of Science St. Louis. He is a winner of 2018 James B. Eads Award from Academy of Science, Saint Louis, ACM SIGCOMM Lifetime Achievement Award 2017, 2015 A. A. Michelson Award from Computer Measurement Group, 2014 Distinguished Alumnus Award from Indian Institute of Science, Bangalore Alumni Association, 2006 ACM SIGCOMM Test of Time award, and Center for Development of Advanced Computing – Advanced Computing and Communications Society (CDAC-ACCS) Foundation Award 2009, and WiMAX Forum Individual Contribution Award 2008.

Dr. Jain is currently the Barbara J. and Jerome R. Cox, Jr., Professor of Computer Science and Engineering at Washington University in St. Louis. Previously, he was the CTO and one of the Co-founders of Nayna Networks, Inc - a next generation telecommunications systems company in San Jose, CA. 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.

He is the author or editor of 12 books including ``Art of Computer Systems Performance Analysis,'' which won the 1991 ``Best-Advanced How-to Book, Systems" award from Computer Press Association and "High-Performance TCP/IP: Concepts, Issues, and Solutions," published by Prentice Hall in November 2003. He is a co-editor of "Quality of Service Architectures for Wireless Networks: Performance Metrics and Management," published in April 2010.

Prof. Jain has 14 patents, and has written 17 book chapters, 79+ journal and magazine papers and 122+ 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 25,200+ 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. His team has developed several switch algorithms for explicit rate-based congestion avoidance in ATM networks.

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 200 contributions that ensured that his research was implemented and not just published as papers. He is acknowledged in published versions of 170+ IEEE standards. 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.

Raj Jain has served on the advisory boards of Bluesage Communications, Inc., InBay Technology Solutions, Inc, San Jose, CA and AKS University, Satna, MP, India, Indo-US Collaboration in Engineering Education (IUCEE). In the past, he has also served on the Board of Technical Advisors to a dozen Silicon Valley start ups including Nexabit Networks, Westborough, MA acquired by Lucent Corporation. (March 1997-1999), Amber Networks, Fremont, CA acquired by Nokia (1999-2001).

He was a keynote speaker at 45+ conferences including AEECT 2017, ACM SIGCOMM 2017, CITS 2017, CCISP 2016, CIC 2016, IEMCON 2016, ADCOM 2016, SSC 2016, CANSec 2016, IoT World Forum R&D Symposium 2015, ADCOM15, ADCOM14, WowMoM14, ADCOM13, ICC 2012, MCS12, ADCONS 2012, SBRC 2011, COMSNETS 2011, ANTS 2010, MICS 2010, ADCOM 2009, NBiS 2009, NetArch 2009, ICON 2008, ACM Multimedia 2008, ICCBN 2008, ICCCE 2008, AccessNets 2007, and a dozen other conferences. He has served in the program committees of over 275+ conferences.

He is on the Editorial Boards of Recent Advances in Communications and Networking, Journal of High Speed Networks (USA), Mobile Networks and Applications, International Journal of Virtual Technology and Multimedia (IJVTM) (UK), International Journal of Wireless and Optical Communications (IJWOC), Vehicular Communications (Elsevier), International Journal of Communication Networks and Distributed Systems (IJCNDS), ICST Transactions on Mobile Communications and Applications, International Journal on Advances in Internet Technology, and on the advisory boards of Global Science and Technology Forum (GSTF), Singapore, Journal of Communications (Finland), EIA Transactions on TSim Tools, Asia-pacific Journal of Neural Networks and its Applications (AJNNIA). He is also a co-guest editor of ACM/Springer Mobile Networks and Applications

(MONET) special issue on Device-to-Device Communication in 5G Networks to be published in 2017. In the past, he was Guest Co-Editor of IEEE Communications Magazine September 2012 special issue on Cloud Computing: Networking and Communications Challenges and July 2011 special issue on Future Internet Architectures: Design and Deployment Perspective.

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).

Appointments

➢ May 2016-Present, Barbara J. and Jerome H. Cox, Jr. Professor, Washington University, St. Louis, MO
➢ August 2005-May 2016, 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. 1978
➢ M. E. (Comp. Sc. _& Controls), Indian Institute of Science, Bangalore, India, 1974
➢ B. E. (Electrical. Engineering), A. P. S. University, Rewa, India, 1972

Selected Publications:

The following is a selection from 12 books, 17 book chapters, 79+ journal and magazine papers, 120+ conference papers, and 14 patents. The citation counts are from Google Scholar.

1. Raj Jain, "**The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling**," Wiley- Interscience, New York, NY, April 1991, [6552 citations]
2. Raj Jain, D. Chiu, and W. Hawe, "**A Quantitative Measure Of Fairness And Discrimination For Resource Allocation In Shared Computer Systems**," DEC Research Report TR-301, September 1984, [3707+68 citations]
3. 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, [2343 citations]
4. Raj Jain and S. Routhier, "**Packet Trains-Measurements and a New Model for Computer Network Traffic**," IEEE Journal of Selected Areas in Communications, Vol. SAC-4, No. 6, September 1986, pp. 986-995. Reprinted in Amit Bhargava, Ed., Integrated Broadband Networks, Artech House, Norwood, MA, 1990, [756 citations]
5. R.Jain, "**Congestion Control and Traffic Management in ATM Networks: Recent Advances and A Survey**," Computer Networks and ISDN Systems, Vol. 28, No. 13, October 1996, pp. 1723-1738, [691 citations]
6. K. Ramakrishnan and Raj Jain, "**A Binary Feedback Scheme for Congestion Avoidance in Computer Networks with Connectionless Network Layer**," ACM Transactions on Computer Systems, Vol. 8, No. 2, May 1990, pp. 158-181, [478 citations]
7. 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, [445 citations]

8. Raj Jain and K. Ramakrishnan, "**Congestion Avoidance in Computer Networks with A Connectionless Network Layer: Concepts, Goals, and Methodology**," Proc. Computer Networking Symposium, Washington, D.C., April 11-13, 1988, pp. 134-143, [429 citations]

9. Raj Jain, "**A Delay Based Approach for Congestion Avoidance in Interconnected Heterogeneous Computer Networks**," Computer Communications Review, ACM SIGCOMM, October 1989, pp. 56-71, [425 citations]

10. Raj Jain, A. Durresi, Gojko Babic, "**Throughput Fairness Index: An Explanation**," ATM_Forum/99-0045, February 1999, [420 citations]

11. Charny, D. Clark, Raj Jain, "**Congestion Control with Explicit Rate Indication**," Proc. IEEE International Conference on Communications (ICC'95), pp. 1954-1963, June 1995, [393 citations]

12. Raj Jain, "**Congestion Control in Computer Networks: Issues and Trends**," IEEE Network, May 1990, pp. 24-30, [363 citations]

13. Jianli Pan, Subharthi Paul, and Raj Jain, "**A Survey of Research on Future Internet Architectures**,"IEEE Communications Magazine, Vol. 49, No. 7, July 2011, pp. 26-36, [354 citations]

14. Raj Jain and Subharthi Paul, "**Network Virtualization and Software Defined Networking for Cloud Computing - A Survey**," IEEE Communications Magazine, Nov 2013, pp. 24-31, [340 citations]

15. Shivkumar Kalyanaraman, Raj Jain, Sonia Fahmy, Rohit Goyal, and Bobby Vandalore, "**The ERICA Switch Algorithm for ABR Traffic Management in ATM Networks**," IEEE/ACM Transactions on Networking, Vol. 8, No. 1, Feburary 2000, pp. 87-98, [290 citations]

16. K. Ramakrishnan and R. 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. [286 citations]

17. M. Hassan and Raj Jain, "**High Performance TCP/IP Networking**," Prentice Hall, November 2003, [275 citations]

18. Stephen B. Alexander, et al, "**A precompetitive consortium on wide-band all-optical networks**," in Abdellatif Marrakchi (ed), Selected papers on photonic switching, SPIE Milestone Series MS121, ISBN: 9780819421630, June 1996, [271 citations]

19. Raj Jain, Shiv Kalyanaraman, Rohit, Goyal, Sonia Fahmy, and Ram Viswanathan, "**ERICA Switch Algorithm: A Complete Description**," OSU-CIS Technical Report Number: OSU-CISRC-10/96-TR51, 1996, 46 pp, [269 citations]

20. Subharthi Paul, Jianli Pan, Raj Jain, "**Architectures for the Future Networks and the Next Generation Internet: A Survey**," Computer Communications, UK, Volume 34, Issue 1, 15 January 2011, pp. 2-42, [258 citations]

21. Raj Jain, "**Myths about Congestion Management in High Speed Networks**," Internetworking: Research and Experience, Volume 3, 1992, pp. 101-113, [195 citations]

22. G. Dommety and Raj Jain, "**Potential Networking Applications of Global Positioning Systems (GPS)**," Ohio State University Technical report No. OSU-CISRC-4/96-TR24, April 1996, [188 citations]

23. Raj Jain, S. Kalyanaraman, R. Viswanathan, "**Method and Apparatus for Congestion Management in Computer Networks Using Explicit Rate Indication**," US Patent No. 5,633,859, May 27, 1997, [187 Citations]

24. Raj Jain, "**A Comparison of Hashing Schemes for Address Lookup in Computer Networks**," IEEE Transactions on Communications, Vol. 40, No. 3, October 1992, pp. 1570-1573, [170 citations]

25. Raj Jain, "**A Timeout Based Congestion Control Scheme for Window Flow-Controlled Networks**," IEEE Journal of Selected Areas in Communications, Vol. SAC-4, No. 7, October 1986, pp. 1162-1167. Reprinted in C. Partridge, Ed., Innovations in Internetworking, Artech House, Norwood, MA 1988, [170 citations]

26. Raj Jain and I. Chlamtac, "**The P-Square Algorithm for Dynamic Calculation of Percentiles and Histograms without Storing Observations**," Communications of the ACM, October 1985, pp. 1076-1085, [170 Citations]

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