Biography of Dr. Raj Jain



Raj Jain is 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.

Dr. Jain is a Fellow of IEEE (1993), a Fellow of ACM (1995), a Fellow of AAAS (2012), and a Fellow of the Academy of Science St. Louis (2018). He is a recipient of the 2018 James B. Eads Award from the Academy of Science, Saint Louis, the 2017 ACM SIGCOMM Lifetime Achievement Award, the 2015 A. A. Michelson Award from Computer Measurement Group, the 2014 Distinguished Alumnus Award from the 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.

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 the 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.

He has 15 patents and has written or edited 13 books, 20 book chapters, 110+ journal and magazine papers, and 130+ conference papers. He is known for his research on the application of quantum computing, AI, and blockchain to Cybersecurity, wireless technologies for IoT, 4G and unmanned aircraft systems, congestion control and avoidance, traffic modeling, performance analysis, and error analysis. His papers have been widely referenced. Google Scholar lists over **45,000+ 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. He 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 260+ IEEE standards. Based on his active participation in the computer industry, Dr. Jain was awarded the 1999 siliconindia Leadership Awards for Excellence and Promise in Business and Technology.

Raj Jain is one of the fellows advising Digital Transactions Limited, a blockchain company in Hong Kong. In the past, he has served on serves on the advisory board of the School of Computing and Information Sciences at Caritas Institute of Higher Education, Hong Kong, Astra (2018-2019), Bluesage Communications, Inc. (2013-2018), InBay Technology Solutions, Inc, San Jose, CA (2012-2015), AKS University, Satna, MP, India (2012-2015), Indo-US Collaboration in Engineering Education (IUCEE) (2013-2015), DOCOMO Innovations, Inc., San Jose, CA (2011), 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.

Service:

He has been a keynote speaker at 60+ conferences, including AIIoT22, ICCEDE22, ISBA, ICDSIS22, FITM21, IPCC21, CyberWeek21, DX21, ICBC20, ICBCT20, IoTSecurity20, CoCoNet19, ICNC 2019, SSIC 2019, ISC2-2018, NetSoft 2018, HPSR 2018, AFECT 2017, ACM SIGCOMM 2017, CITS2017, CCISP 2016, CIC 2016, IEMCON 2016, ADCOM 2016, SSC 2016, ADCOM15, WowMoM14, ICC 2012, COMSNETS 2011, NetArch 2009, ICON 2008, ACM Multimedia 2008, AccessNets 2007.

He is on the Editorial Boards of the 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), 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), Open Computer Science. He is also a co-guest editor of the ACM/Springer Mobile Networks and Applications (MONET) special issue on Device-to-Device Communication in 5G Networks 2017. In the past, he has served on the Editorial Boards of Recent Advances in Communications and Networking, Journal of Innovation in Digital Ecosystems, Computer Communications (UK), IEEE/ACM Transactions on Networking, Computer Networks: The International Journal of Computer and Telecommunications Networking, Journal of Telecommunication System and Management (JTSM), Central European Journal of Computer Science (Poland), Infocommunications Journal (Hungary) and ICTACT Journal on Communications Technology, and has served as a Guest Co-Editor of IEEE Communications Magazine September 2012 special issue on Cloud Computing: Networking and Communications Challenges, July 2011 special issue on Future Internet Architectures: Design and Deployment Perspective, 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 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 US delegation (Computer Communications) to People's Republic of China in July 1987, Member of National Science Foundation's site visit team to evaluate NSF Engineering Research Center program at Center for Telecommunications Research, Columbia University 1991.

Dr. Jain was the Conference Chair of the International Conference on Communications, Image, and Signal Processing (CCISP 2016), General Chair of the International Conference on Convergence and Broadband Networking (ICCBN 2008), General Co-Chair of SPIE's Broadband Access Communication Technologies Conferences in 2007-2011, and the founding General Chair of the First International Conference on Broadband Networking (Broadnets 2004). He has served as a program committee member on 275+ other conferences.

Appointments

- May 2016 - Present, Barbara J. and Jerome R. 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. The thesis was published as a distinguished dissertation 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 13 books, 20 book chapters, 100+ journal and magazine papers, 135+ conference papers, and 14 patents. The citation counts are from Google Scholar.

1. Zebo Yang, Ali Ghubaish, Raj Jain, Ala Al-Fuquha, Aiman Erbad, Ramana Compella, Hassan Shapourian, Raza Nejabati, "**Layer-Wise Security Framework and Analysis for the Quantum Internet**," IEEE Selected Areas in Communications, June 2025, http://www.cse.wustl.edu/~jain/papers/quint.htm
2. Zebo Yang, Ali Ghubaish, Raj Jain, Ramana Kompella, and Hassan Shapourian, "**Multi-Tree Quantum Routing in Realistic Topologies**," IEEE Communications Magazine, Vol. 62, No. 10, October 2024, pp. 78-85, http://www.cse.wustl.edu/~jain/papers/multitree.htm
3. Zebo Yang, Ali Ghubaish, Raj Jain, and H. Shapourian, "**Asynchronous Entanglement Routing for the Quantum Internet**," AVS Quantum Sci. 6, 013801, Jan 2024, http://www.cse.wustl.edu/~jain/papers/qrout.htm
4. Zebo Yang, Haneen Alfauri, Behrooz Farkiani, Raj Jain, Roberto DiPietro, and Aiman Erbad, "**A Survey and Comparision of Post-quantum and Quantum Blockchains**," IEEE Communications Surveys & Tutorials, October 2023, http://www.cse.wustl.edu/~jain/papers/qbpqb.htm [110+ citations]
5. Zebo Yang, Tara Salman, Raj Jain, and Roberto Di Pietro, "**Decentralization using Quantum Blockchain: A Theoretical Analysis**," IEEE Transactions on Quantum Engineering, September 2022, 16 pp., http://www.cse.wustl.edu/~jain/qbif.htm
6. L. Gupta, T. Salman, A. Ghubaish, D. Unal, A. K. Al-Ali, R. Jain, "**Cybersecurity of multi-cloud healthcare systems: A hierarchical deep learning approach**," Applied Soft Computing (2022), 5 January 2022
7. M Zolanvari, Z Yang, K Khan, R Jain, N Meskin, "**TRUST XAI: Model-Agnostic Explanations for AI With a Case Study on IIoT Security**," IEEE Internet of Things Journal, 2021
8. Tara Salman, Ali Ghubaish, Devrim Unal, Raj Jain, "**Safety Score as an Evaluation Metric for Machine Learning Models of Security Applications**," IEEE Networking Letters, Vol. 2, Issue 4, December 2020, pp. 207-211
9. Xin Li, Mohammed Samaka, H. Anthony Chan, Deval Bhamare, Lav Gupta, Chengcheng Guo, and Raj Jain, "**Network Slicing for 5G: Challenges and Opportunities**," IEEE Internet Computing, Vol. 21, Issue 5, September 18, 2017, pp. 20-27 [265+ Citations]
10. Lav Gupta, Raj Jain, and Gabor Vaszkun, "**Survey of Important Issues in UAV Communication Networks**," IEEE Communications Surveys and Tutorials, Volume PP, Issue 99, November 2015, pp. 1123-1152 [1740+ Citations]
11. Raj Jain and Subharthi Paul, "**Network Virtualization and Software Defined Networking for Cloud Computing - A Survey**," IEEE Communications Magazine, Nov 2013, pp. 24-31 [775+ Citations]
12. 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 [346+ 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 [550+ citations]
14. M. Hassan and Raj Jain, "**High-Performance TCP/IP Networking**," Prentice-Hall, November 2003, [345+ citations]
15. Raj Jain, "**The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling**," Wiley- Interscience, New York, NY, April 1991 [8026+ citations]
16. 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 [553+ citations]
17. 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, [2792+ citations]
18. 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, [862+ citations]

19. 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 [5666+ citations]

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