Networks Research Lab
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Narendra (Naren) Singhal

Skills

Extensive experience with network modeling, TCP/IP programming, discrete-event simulation models, queuing theory, client-server programming, Integer Linear Programming, multicast communications, network survivability, Quality of Service (QoS), WDM networks.

Strong understanding of IP routing, MPLS, MPλS, MBONE, OBS, EPON.

Languages: C++, C, Java, Basic, FORTRAN, Pascal, Perl, Scheme, Lisp.

Operating Systems: HP-UX, SunOS, Solaris, Linux, Win 9x/2000/XP.

Misc: CPLEX, Opnet, ns-2, Verilog, UML, XML, SQL, PL/SQL, Flex, Yacc/Bison, Matlab X-Windows/X-Motif, Assembly (x85, MIPS), Microprogramming (Mic-1/Mac-1).

Education

PhD in Computer Science **University of California, Davis** **Expected: June 2004**
GPA: 3.93 / 4.00
Dissertation: *Survivable Multicast Communications in Next-Generation High-Capacity Networks*.
Advisor: Professor Biswanath Mukherjee

MS in Computer Science **University of California, Davis** **Dec. 2000**

BTech. (Honors) in Computer Science and Engg. **Indian Institute of Technology (IIT) Kharagpur, India** **April 1998**
Thesis: *Slicing Object-Oriented Programs*.

Professional Experience

Associate Instructor **Computer Science Department, UCDavis** **Summer 2003 – Present**

- Taught courses on upper-division "Computer Architecture" (ECS 154B) and "Software Development and Object-Oriented Programming" (ECS 40). Currently teaching two classes on "Software Development and Object-Oriented Design" (120 students) and will be teaching it again in Summer 2004.

Research Assistant **Networks Research Lab, UCDavis** **Summer 2000 – Present**

- Published a book chapter, four IEEE journal articles, and nine conference articles.
- Designed novel switch architectures to support multicasting in optical WDM networks.
- Developed optimization formulations and algorithms for establishing multiple light-trees in WDM networks.
- Developed and investigated novel schemes for protecting multicast sessions from failures using self-sharing tree approaches for single-tree and cross-sharing tree approaches for multiple trees.
- Currently exploring methods for efficient grooming of traffic on multicast trees and use of light-tree for network control and management (for low-delay and low-jitter control signals).

Teaching Assistant **Computer Science Department, UCDavis** **Fall 1999 – Spring 2000**

- Served as TA for courses on "Programming and Problem Solving", undergraduate and graduate level "Computer Networks", and "Optical Communication Networks".
- TA evaluation median score 9.33/10 for Optical Communication Networks class, in which 30 out of 34 students filled out the survey rating the TA on a scale of 1 to 10.

Narendra (Naren) Singhal

Software Engineer **Verifone India Ltd (subsidiary of HP)** **June 1998 – Sept. 1999**

- Developed Terminal Adapter and Host Adapter components (in C++) for a plug-and-play financial transaction software called Integrated Payment Solutions (IPS). An earlier version of IPS is deployed in Bank of America's global network for financial transactions.

Software Engineer **Philips Software India, Bangalore** **Summer 1997**

- Developed software engineering tools to optimize regression testing and to track software reliability during software life cycle.

Professional Activities

Program Committee Member for UC Davis Workshop on Computing.

Graduate Student Association Representative for Computer Science.

Reviewer for IEEE/ACM Transactions on Networking, IEEE Transactions on Parallel and Distributed Systems, IEEE Journal on Selected Areas in Communications, IEEE Communications Magazine, IEEE/OSA Journal of Lightwave Technology, Photonics Technology Letters, INFOCOM, ICC, GLOBECOM.

Member of IEEE Communications Society and Optical Networking Technical Committee.

Invited as a guest lecturer for courses on "Optical Fiber Communications Systems and Networking" (EEC 239B) and "Computer Networks" (ECS 154A).

Major Publications

Ayesegul Gencata, **Narendra K. Singhal**, and Biswanath Mukherjee, "Overview of Optical Communication Networks: Current and Future Trends," The Handbook of Optical Communication Networks, CRC Press ILLC, pp. 1-28, April 2003.

Narendra K. Singhal, Laxman H. Sahasrabuddhe, and Biswanath Mukherjee, "Provisioning of Survivable Multicast Sessions Against Single Link Failures in Optical Mesh Networks," IEEE/OSA Journal of Lightwave Technology, vol. 21, no. 11, Nov. 2003.

Narendra K. Singhal and Biswanath Mukherjee, "Protecting Multicast Sessions in WDM Optical Mesh Networks," IEEE/OSA Journal of Lightwave Technology, vol. 21, no. 4, April 2003.

Narendra K. Singhal, Laxman H. Sahasrabuddhe, and Biswanath Mukherjee, "Optimal Multicasting of Multiple Light-Trees of Different Bandwidth Granularities in a WDM Mesh Network with Sparse Splitting Capabilities," Second Round of Review for IEEE/ACM Transactions on Networking.

Glen Kramer, Biswanath Mukherjee, **Narendra K. Singhal**, Amitabha Banerjee, Sudhir Dixit, and Yinghua Ye, "Fair Queuing with Service Envelopes (FQSE): a Cousin-Fair Hierarchical Scheduler for Subscriber Access Networks," IEEE Journal on Selected Areas in Communications (JSAC) Special Issue on Metro Optical Network (to appear).

Cahui (Sam) Ou, Hui Zang, **Narendra K. Singhal**, Keyao Zhu, Laxman H. Sahasrabuddhe, Robert A. MacDonald, and Biswanath Mukherjee, "Sub-Path Protection for Scalability and Fast Recovery in Optical WDM Mesh Networks," IEEE Journal on Selected Areas in Communications (to appear).

Complete list available at http://networks.cs.ucdavis.edu/~singhaln/publications/pub.html

Awards

Professors for the Future (PFTF) Fellow[1]	UC Davis	2002 – 2003
Dean's Summer Research Fellowship Award	UC Davis	Summer 2002
Non Resident Tuition Fellowship Award	UC Davis	Fall 1999 – Present

References

Available on request.

[1] The PFTF program is a year long competitive fellowship program at UC Davis designed to recognize and develop the leadership skills of outstanding graduate students and postdoctoral scholars who have demonstrated their commitment to professionalism, integrity, and academic service. For 2002-2003, I was one of eleven PFTF fellows selected campus-wide.