

Bhaskaran Raman

Curriculum Vitae

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Current Employment

Associate Professor in the Department of Computer Science and Engineering, at the Indian Institute of Technology - Bombay, INDIA.

Research Interests

Computer networks, Wireless and mobile networks, Protocol design & evaluation, Wireless measurement studies, Computing and communication system design for the developing world, System building and protocol design for embedded sensor applications.

Teaching Interests

Graduate as well as undergraduate teaching; wireless networks, computer networks and protocols, Internet-based distributed systems, operating systems.

Education

- **Aug 1997-Dec 2002: Doctor of Philosophy (PhD) in Computer Science**
University of California at Berkeley, CA
Research advisor: Prof. Randy H. Katz
Thesis topic: An Architecture for Performance and Availability Constrained Composition of Services in the Wide-Area Internet
- **Aug 1997-May 1999: Master of Science (M.S.) in Computer Science**
University of California at Berkeley, CA
Research advisor: Prof. Randy H. Katz
Thesis topic: Personal Mobility in the ICEBERG Integrated Communication Network
- **Aug 1993-May 1997: Bachelor of Technology (B. Tech) in Computer Science & Engineering**
Indian Institute of Technology - Madras, India
Advisor: Prof. C. R. Muthukrishnan

Research Experience

- **Associate Professor, Department of CSE, Indian Institute of Technology - Bombay, INDIA, Mar 2009 to present.**
Assistant Professor, Department of CSE, Indian Institute of Technology - Bombay, INDIA, Jul 2007 to Mar 2009.
 - I am currently working on the FRACTEL project, which extends my earlier work on RuralNet, by considering a mesh network consisting of long-distance as well as short-distance links. The goal of FRACTEL is to provide scalable and predictable mesh network performance.
 - I am also working on Lo3, a low-power, low-cost, local communication system for village settings, based on a mesh network of IEEE 802.15.4 radios.
 - As part of the CARTS (Communication Assisted Road Transportation System) project, I am looking at technical issues in the use of wireless communication to improve road traffic in Indian conditions.
- **Visiting Researcher, Alcatel-Lucent Bell Labs, Bangalore, India, May-Jul 2007**
I worked on the above-mentioned FRACTEL project, in collaboration with researchers at Bell Labs, Bangalore.
- **Visiting Researcher, Microsoft Research India (MSRI), May-Jul 2008**
We identified future areas of collaboration with researchers at MSRI. Specifically, two areas of common interest are: (1) Lo3 (Low-cost, Low-power, Local voice and messaging), and (2) CARTS (Communication Assisted Road Transportation System).
- **Assistant Professor, Department of CSE, Indian Institute of Technology - Kanpur, INDIA, Jun 2003 to Jul 2007.**
I have worked on the RuralNet (Digital Gangetic Plains) project, exploring the use of IEEE 802.11 for low-cost, long-distance rural networking.
- **Visiting Researcher, CalIT2, University of California at San Diego, Jul-Dec 2004.**
I worked on exploring the use of the “claims allocation” literature in the domain of economics, to network scheduling.
- **Graduate Student Researcher, SAHARA Project, University of California at Berkeley, EECS Department, Summer 2001 to Fall 2002.**
As a senior graduate student, I played an active part in the development of the SAHARA architecture. My PhD thesis explored a specific form of *service composition* – the central theme of the SAHARA project.
- **Summer Intern, IBM T.J.Watson Research Center, New York, 1999.**
I worked on issues related to service discovery and network layering in Bluetooth scatternets. (See paper titled “Arguments for Cross-layer optimizations in Bluetooth Scatternets” below).
- **Graduate Student Researcher, ICEBERG Project, University of California at Berkeley, EECS Department, Summer 1998 to Summer 2001.**
 - I have been part of the team involved with the design of ICEBERG – an Internet-based architecture for integration of services across heterogeneous access networks and devices.
 - I have played a lead role in the two code releases of different versions of ICEBERG software.

- In Summer 1998, I worked on building a gateway to interface cell-phones on a GSM wireless network to the Internet. This was done as part of testbed development for the ICEBERG project.
 - I worked on the design and implementation of the “Universal Inbox” for my Master’s thesis.
- **Graduate Operating Systems Course, University of California at Berkeley, Fall 1997.**
I worked on a project that looked at techniques for reordering data on the fly in data processing applications. The idea was to reorder the data based on continuous user feedback so that the user has control over which data items are processed first. (See under “publications” below).

Refereed Publications

1. “PIP: A Multi-Channel, TDMA-based MAC for Efficient and Scalable Bulk Transfer in Sensor Networks”, Vijay Gabale, Kameswari Chebrolu, Bhaskaran Raman, Sagar Bijwe, *Accepted for publication in IEEE Transactions on Sensor Networks (TOSN)*
Extended version of the SenSys 2010 paper
2. “RoadSoundSense: Acoustic Sensing based Road Congestion Monitoring in Developing Regions”, Rijurekha Sen, Pankaj Siriah, Bhaskaran Raman, The 8th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON’11), Salt Lake City, Utah (USA), June 27-30, 2011. [Acceptance rate: 22.0%]
3. “The Pilot Deployment of A Low Cost, Low Power Gateway To Extend Cellular Coverage In Developing Regions”, Vijay Gabale, Ramesh Gopalakrishnan, Bhaskaran Raman, 5th ACM Workshop on Networked Systems for Developing Regions (NSDR), Washington, D.C., U.S., June 2011. [Acceptance rate: 52.4%]
4. “WirelessAcrossRoad: RF based Road Traffic Congestion Detection”, Swaroop Roy, Rijurekha Sen, Swanand Kulkarni, Purushottam Kulkarni, Bhaskaran Raman, Lokendra Singh, The 5th Annual Workshop on Wireless Systems: Advanced Research and Development (WISARD’11), Bangalore, India, Jan 4-5, 2011. [Acceptance rate: 33.3%]
5. “DelayCheck: Scheduling Voice Over Multi-hop Multi-channel Wireless Mesh Networks”, Vijay Gabale, Ashish Chiplunkar, Bhaskaran Raman, Partha Dutta, The Third International Conference on COMMunication Systems and NETworkS (COMSNETS), Bangalore, India, January 2011. [Acceptance rate: 16.0%]
6. “LiT MAC: Addressing The Challenges of Effective Voice Communication in a Low Cost, Low Power Wireless Mesh Network”, Vijay Gabale, Bhaskaran Raman, Kameswari Chebrolu, Purushottam Kulkarni, The First Annual Symposium on Computing for Development (ACM DEV 2010), London, UK, Dec 2010. [Acceptance rate: 43.6%]
7. “PIP: A Connection-Oriented, Multi-Hop, Multi-Channel TDMA-based MAC for High Throughput Bulk Transfer”, Bhaskaran Raman, Kameswari Chebrolu, Sagar Bijwe, Vijay Gabale, The 8th ACM Conference on Embedded Networked Sensor Systems (SenSys 2010), Zurich, Switzerland, Nov 2010. [Acceptance rate: 17.2%]
Extended version accepted for publication in IEEE Transactions on Sensor Networks (TOSN)
8. “Horn-Ok-Please”, Rijurekha Sen, Bhaskaran Raman, Prashima Sharma, The Eighth International Conference on Mobile Systems, Applications, and Services, ACM MobiSys 2010, Jun 2010, San Francisco, CA (USA). [Acceptance rate: 20.2%]

9. "SIR-Based Interference-Maps for TDMA-Based Outdoor Mesh Networks", Bhaskaran Raman and Rahul Jain, The 17th IEEE Workshop on Local and Metropolitan Area Networks (LANMAN'10), May 5-7, 2010, Long Branch, New Jersey, USA. *Invited paper*.
10. "Implementation and Evaluation of a TDMA MAC for WiFi-based Rural Mesh Networks", Ashutosh Dhekne, Nirav Uchat, Bhaskaran Raman, 3rd ACM Workshop on Networked Systems for Developing Regions (NSDR'09), a workshop in SOSP'09, Big Sky, Montana, USA, 11 Oct 2009.
11. "Lo3: Low-cost, Low-power, Local Voice and Messaging for Developing Regions", Bhaskaran Raman, Kameswari Chebrolu, 3rd ACM Workshop on Networked Systems for Developing Regions (NSDR'09), a workshop in SOSP'09, Big Sky, Montana, USA, 11 Oct 2009.
12. "Challenges In Communication Assisted Road Transportation Systems for Developing Regions", Rijurekha Sen, Vishal Sevani, Prashima Sharma, Zahir Koradia, Bhaskaran Raman, 3rd ACM Workshop on Networked Systems for Developing Regions (NSDR'09), a workshop in SOSP'09, Big Sky, Montana, USA, 11 Oct 2009.
13. "Link-level Measurements of Outdoor 802.11g Links", Pulkit Gupta, Bharat Jain, Bhaskaran Raman, Purushottam Kulkarni, The 4th IEEE International Workshop on Wireless Mesh Networks (WiMesh 2009), A workshop in SECON 2009, Jun 2009, Rome, Italy.
14. "On the Feasibility of the Link Abstraction in Wireless Mesh Networks", Bhaskaran Raman, Kameswari Chebrolu, Dattatraya Gokhale, and Sayandeep Sen, April 2009, Vol. 17 (2), pp. 528-541, IEEE/ACM Transactions on Networking.
Extended version of the INFOCOM 2008 paper
15. "TDMA Scheduling in Long-Distance WiFi Networks", Debmalaya Panigrahi and Bhaskaran Raman, The 26th Annual Conference on Computer Communications, IEEE INFOCOM 2009 Mini-Conference, April 2009. [Mini-Conference: top 19.7%-26.6% of INFOCOM 2009 submissions]
16. "Sensor Networks: A Critique of "Sensor Networks" from a Systems Perspective", Bhaskaran Raman and Kameswari Chebrolu, Editorial Note, Computer Communication Review (CCR), July 2008.
17. "BriMon: A Sensor Network System for Railway Bridge Monitoring", Kameswari Chebrolu, Bhaskaran Raman, Nilesh Mishra, Phani Kumar Valiveti, Raj Kumar, The Sixth International Conference on Mobile Systems, Applications, and Services, ACM MobiSys 2008, Jun 2008, Breckenridge, CO (USA). *Received an honorable mention*. [Acceptance rate: 17.9%]
18. "On the Feasibility of the Link Abstraction in (Rural) Mesh Networks", Dattatraya Gokhale, Sayandeep Sen, Kameswari Chebrolu, and Bhaskaran Raman, The 25th Annual Conference on Computer Communications (IEEE INFOCOM), Phoenix, Arizona (USA), April 2008. **Selected as one of the "Top Three Outstanding Papers"**. [Acceptance rate: 20.5%]
Extended version published in IEEE Transactions on Networking
19. "FRACTEL: A Fresh Perspective on (Rural) Mesh Networks", Kameswari Chebrolu and Bhaskaran Raman, ACM SIGCOMM Workshop on Networked Systems for Developing Regions (NSDR'07), A Workshop in SIGCOMM 2007, Aug 2007, Kyoto, Japan. [Acceptance rate: 21.3%]
20. "Long Distance Wireless Mesh Network Planning: Problem Formulation and Solution", Sayandeep Sen and Bhaskaran Raman, The 16th Annual International World Wide Web Conference (WWW 2007), May 2007, Banff, Canada. [Acceptance rate: 14.7%]

21. "Experiences in using WiFi for Rural Internet in India", Bhaskaran Raman and Kameswari Chebrolu, IEEE Communications Magazine, Vol. 45, No. 1, pp. 104-110, Jan 2007, Special Issue on New Directions In Networking Technologies In Emerging Economies.
22. "Implications of Link Range and (In)Stability on Sensor Network Architecture", Bhaskaran Raman, Kameswari Chebrolu, Naveen Madabhushi, Dattatraya Y Gokhale, Phani K Valiveti, and Dheeraj Jain, The First ACM International Workshop on Wireless Network Testbeds, Experimental evaluation and CHaracterization (WiNTECH 2006), A MOBICOM 2006 Workshop, Sep 2006, Los Angeles, USA. [Acceptance rate: 35.5%]
23. "Long-Distance 802.11b Links: Performance Measurements and Experience", Kameswari Chebrolu, Bhaskaran Raman, and Sayandeep Sen, 12th Annual International Conference on Mobile Computing and Networking (MOBICOM), Sep 2006, Los Angeles, USA. [Acceptance rate: 11.7%]
24. "Rural Telephony: A Socio-Economic Case Study", Sayandeep Sen, Sukant Kole, and Bhaskaran Raman, International Conference on Information and Communication Technologies and Development (ICTD-2006), May 2006, U.C.Berkeley.
25. "Wake-on-WLAN", Nilesh Mishra, Kameswari Chebrolu, Bhaskaran Raman, and Abhinav Pathak, The 15th Annual International World Wide Web Conference (WWW 2006), May 2006, Edinburgh, Scotland. [Acceptance rate: 11%]
26. "Channel Allocation in 802.11-based Mesh Networks", Bhaskaran Raman, The 25th Annual Conference on Computer Communications (IEEE INFOCOM), Barcelona, Spain, April 2006. [Acceptance rate: 18%]
27. "Feasibility Study of Spatial Reuse in an 802.11 Access Network", A. R. Harish, Sreekanth Garigala, Bhaskaran Raman, and Phalguni Gupta, XXVIII URSI General Assembly, New Delhi, India, Oct 2005.
28. "Design and Evaluation of a new MAC Protocol for Long-Distance 802.11 Mesh Networks", Bhaskaran Raman and Kameswari Chebrolu, 11th Annual International Conference on Mobile Computing and Networking (MOBICOM), Aug/Sep 2005, Cologne, Germany. [Acceptance rate: 10.3%]
29. "A Network Layer Approach to Enable TCP over Multiple Interfaces", Kameswari Chebrolu, Bhaskaran Raman, Ramesh Rao, Wireless Networks (WINET), Springer Science + Business Media, Volume 11, Issue 5, Sep 2005, Pages 637-650.
30. "Revisiting MAC Design for an 802.11-based Mesh Network", Bhaskaran Raman and Kameswari Chebrolu, Third Workshop on Hot Topics in Networks (HotNets-III), 15-16 Nov 2004, San Diego, CA, USA. [Acceptance rate: 19.7%]
31. "Turning 802.11 Inside-Out", Pravin Bhagwat, Bhaskaran Raman, and Dheeraj Sanghi, ACM SIGCOMM Computer Communication Review, Vol. 34, No: 1, pp. 33-38, Jan 2004. (Also appears in HotNets-II proceedings).
32. "Turning 802.11 Inside-Out", Pravin Bhagwat, Bhaskaran Raman, and Dheeraj Sanghi, Second Workshop on Hot Topics in Networks (HotNets-II), 20-21 Nov 2003, Cambridge, MA, USA. [Acceptance rate: 19.3%] (Also appears in CCR).
33. "An Architecture for Highly Available Wide-Area Service Composition", Bhaskaran Raman and Randy H. Katz, Computer Communications Journal, Vol. 26, No: 15, pp. 1727-1740, Special issue on "Recent Advances in Communication Networking", Sep 2003.

34. "Load Balancing and Stability Issues in Algorithms for Service Composition", Bhaskaran Raman and Randy H. Katz, The 22nd Annual Joint Conference of the IEEE Computer and Communications Societies, IEEE INFOCOM, Apr 2003. [Acceptance rate: 21%].
35. "Emulation-based Evaluation of an Architecture for Wide-Area Service Composition", Bhaskaran Raman and Randy H. Katz, International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS 2002), July 2002. [Acceptance rate: 60%].
36. "The SAHARA Model for Service Composition Across Multiple Providers", Bhaskaran Raman, Sharad Agarwal, Yan Chen, Matthew Caesar, Weidong Cui, Per Johansson, Kevin Lai, Tal Lavian, Sridhar Machiraju, Z. Morley Mao, George Porter, Timothy Roscoe, Mukund Seshadri, Jimmy Shih, Keith Sklower, Lakshminarayanan Subramanian, Takashi Suzuki, Shelley Zhuang, Anthony D. Joseph, Randy H. Katz, Ion Stoica, *Invited Paper*, International Conference on Pervasive Computing (Pervasive 2002), pp. 1-14, Aug 2002.
37. "Arguments for Cross-Layer Optimizations in Bluetooth Scatternets", Bhaskaran Raman, Pravin Bhagwat, and Srinivasan Seshan, Symposium on Applications and the Internet (SAINT'01), pp. 176-184, Jan 2001. [Acceptance rate: 18.5%].
38. "Universal Inbox: Providing Extensible Personal Mobility and Service Mobility in an Integrated Communication Network", Bhaskaran Raman, Randy H. Katz, and Anthony D. Joseph, Workshop on Mobile Computing Systems and Applications (WMSCA'00), pp. 95-106, Dec 2000. [Acceptance rate: 37.7%].
39. "Online Dynamic Reordering", Vijayshankar Raman, Bhaskaran Raman, and Joseph M. Hellerstein, The VLDB Journal – The International Journal on Very Large Data Bases, Vol. 9, No: 3, pp. 247-260, Dec 2000.
40. "ICEBERG: An Internet-core Network Architecture for Integrated Communications", Helen J. Wang, Bhaskaran Raman, Chen-nee Chuah, Rahul Biswas, Ramakrishna Gum-madi, Barbara Hohlt, Xia Hong, Emre Kiciman, Zhuoqing Mao, Jimmy S. Shih, Lakshminarayanan Subramanian, Ben Y. Zhao, Anthony D. Joseph, and Randy H. Katz, IEEE Personal Communications, Vol. 7, No: 4, pp. 10-19, Aug 2000: Special Issue on IP-based Mobile Telecommunication Networks.
41. "The ICEBERG Project: Defining the IP and Telecom Intersection", Bhaskaran Raman, Helen J. Wang, Jimmy S. Shih, Anthony D. Joseph, and Randy H. Katz, IT Professional, Vol. 1, No: 6, pp. 38-45, Nov/Dec 1999.
42. "Online Dynamic Reordering for Interactive Data Processing", Vijayshankar Raman, Bhaskaran Raman, and Joseph M. Hellerstein, Proc. of the 25th International Conference on Very Large Databases (VLDB), pp. 709-720, Sep 1999. **Selected one of the best papers.** [Acceptance rate: 16%].

Theses

- "An Architecture for Performance and Availability Constrained Service Composition in the Wide-Area Internet", Bhaskaran Raman, PhD Thesis, EECS Department, U.C.Berkeley, Dec 2002.
- "Personal Mobility in the ICEBERG Integrated Communication Network", Bhaskaran Raman, Master's Thesis, EECS Department, U.C.Berkeley, May 1999.

- “A Portable User-Level Thread Package”, Bhaskaran Raman, B. Tech Project Report, Indian Institute of Technology, Madras, May 1997.

Selected Presentations

- “Experience with WiFi for Rural Internet in India”, Bhaskaran Raman, Invited presentation at Australia-India Broadband and IT Workshop, Melbourne, Australia, 10-11 July 2006.
- “RuralNet (Digital Gangetic Plains): WiFi-Based Low-Cost Rural Networking”, Bhaskaran Raman, Keynote Presentation, Symposium on Wireless Networking Systems, University of Philippines, 19 Nov 2005.
- “Digital Gangetic Plains (DGP): 802.11-based Low-Cost Networking for Rural India”, Bhaskaran Raman, Invited presentation at Wireless4Development, Djursland, Denmark, Sep 2004.

Sponsored Projects and Consultancy Projects

- *Project type:* Sponsored research
Title: Mobile and Wireless Systems
Funding agency: Microsoft Research India (MSRI)
Objectives: Research Collaboration on Mobile and Wireless Systems, with Microsoft Research India (MSRI).
Duration: 1 year: Aug 2008 to Aug 2009
Approved budget: Rs. 8.4 lakhs
- *Project type:* Sponsored research
Title: FRACTEL
Funding agency: Tata Telecom Center, IIT Bombay
Objectives: To address system level issues in the design and implementation of a multi-hop TDMA-based WiFi mesh network.
Duration: 5 years: May 2008 to May 2013
Approved budget: Rs. 1.2 crores
- *Project type:* Consultancy
Title: 802.11a/g/n measurements
Funding agency: AirTight Networks
Objectives: Link-level measurement studies on 802.11a/g/n wireless technologies on a campus wireless testbed.
Duration: 5 months: Feb 2008 to Jul 2008
Approved budget: Rs. 1 lakh
- *Project type:* Sponsored research
Title: WiFiNetMon
Funding agency: Lucent Bell Labs Research, Bangalore
Objectives: To identify and address issues related to network monitoring and management in long-distance WiFi networks, and WiFi mesh networks in general.
Duration: 3 months: Feb 2007 to April 2007
Approved budget: Rs. 1.5 lakhs
- *Project type:* Sponsored research
Title: RuralNet (Digital Gangetic Plains II)
Funding agency: Media Lab Asia

Objectives: To explore mechanisms for robust, cost-effective, and high-performance operation of large (100-300 nodes) long-distance 802.11 mesh networks as well as point-to-point networks, to explore 802.11g performance, to characterize application performance on such networks.

Duration: 15 months: May 2005 to July 2006

Approved budget: Rs. 33.78 lakhs

- *Project type:* Consultancy
Title: Bharani: An Implementation of Sectorized WiFi MAC
Objectives: Implementation and testing of a sectorized WiFi-based MAC protocol, designed to operate in a point-to-multipoint (P2MP) setting.
Duration: 5 months: Sep 2005 to Jan 2006
Approved budget: Rs. 5.90 lakhs

- *Project type:* Sponsored research
Title: Turning 802.11 Inside Out: Wireless Networking for Rural India
Funding agency: Ministry of Human Resource Development (MHRD)
Objectives: To build research infrastructure, explore specific research issues geared towards making 802.11 a commercially viable option for rural networking, to improve the technological base in 802.11 wireless networking in India.
Duration: Two years: May 2004 to April 2006
Approved budget: Rs. 20.00 lakhs

PhD Theses Guided

1. Vijay Gabale, since Jul 2009 [jointly advised by Kameswari Chebrolu, IIT Bombay]
2. Rijurekha Sen, since Apr 2009
3. Vishal Sevani, since Jan 2009
4. Zahir Koradia, since Autumn 2008 [jointly advised by Aaditeshwar Seth, IIT Delhi]

Master's Theses Guided

1. Jeet Patani, June 2012 (expected)
2. Abhinav Maurya, June 2012 (expected) [jointly advised by Kameswari Chebrolu]
3. Nagamanoj Vankadhara, June 2012 (expected)
4. Mukulika Maity, June 2012 (expected) [jointly advised by Kameswari Chebrolu]
5. Kaustav Das, June 2012 (expected)
6. Mayur Deolasee, June 2012 (expected)
7. Antara De, June 2011
8. Ramesh Gopalakrishnan, June 2011
9. Piyush Joshi, June 2011
10. Kaustav Dey Biswas, June 2011
11. Pravin Chaudhury, June 2010

12. Lokendra Kumar Singh, June 2010
13. Prashima Sharma, June 2010
14. Srinadh Gunnam, Jan 2010
15. Pulkit Gupta, June 2009 [jointly advised by Purushottam Kulkarni]
16. Vijay Gabale, June 2009 [jointly advised by Kameswari Chebrolu]
17. Sagar Bijwe, June 2009 [jointly advised by Kameswari Chebrolu]
18. Ashutosh Dhekne, June 2009 [jointly advised by Kameswari Chebrolu]
19. Nirav Uchat, June 2009
20. Rahul Jain, June 2009
21. Rahul Mittal, June 2009
22. Pradeep Gopaluni, Interference Estimation and Automated Generation of Spatial Re-Use Map for Wireless Mesh Networks, IIT Kanpur, Aug 2008
23. Gaurav Chhawchharia, Framing and Schedule Dissemination for Multi-hop TDMA-based Wireless Networks, IIT Kanpur, Aug 2008
24. Dheeraj Golchha, Wi-Fi NetMon: Performance Observation, Anomaly Detection and Diagnosis in Long Distance Wi-Fi Networks, IIT Kanpur, Jul 2007
25. Akhilesh Bhadauria, WiFiNetMon: Interference Measurement in Long Distance WiFi Mesh Networks, IIT Kanpur, Jun 2007
26. Zahir Koradia, Scalable Routing for Mechanical Backhaul Networks, Jun 2007 [jointly advised by S. Keshav (U. Waterloo)]
27. Raj Kumar, A Prototype Development of Reliable Sensor Network Based Structural Health Monitoring System For Railway Bridges, IIT Kanpur, Jun 2007 [jointly advised by Kameswari Chebrolu]
28. Dattatraya Y Gokhale, The Feasibility And Usefulness Of Link Abstraction In Wireless Networks, IIT Kanpur, May 2007 [jointly advised by Kameswari Chebrolu]
29. Phani Kumar Valiveti, Routing and Time Synchronization Protocols for Low Duty Cycle Operation of a Sensor Network Based Bridge Monitoring System, IIT Kanpur, May 2007 [jointly advised by Kameswari Chebrolu]
30. Naveen Madabhushi, KMote - Design and Implementation of a low cost, low power platform for wireless sensor networks, IIT Kanpur, May 2007 [jointly advised by Kameswari Chebrolu and Rajat Moona]
31. Nilesh Mishra, Design Issues and Experiences with BRIMON Railway BRIDGE MONitoring Project, IIT Kanpur, Aug 2006 [jointly advised by Kameswari Chebrolu]
32. Narasimha Puli Reddy, The SRAWAN MAC Protocol to support Real-Time Services in Long Distance 802.11 Networks, IIT Kanpur, Aug 2006
33. VMD Jagannath, WiBeaM: Design and Implementation of Wireless Bearing Monitoring System, IIT Kanpur, Jun 2006

34. Abhishek Maheshwari, Implementation and Evaluation of a MAC scheduling algorithm for IEEE 802.16 WirelessMAN, IIT Kanpur, May 2006
35. Sayandeep Sen, Topology Planning for Long Distance Wireless Mesh Networks, IIT Kanpur, May 2006
36. Manikantah Kodali, Improving Fault Tolerance in 802.11 Wireless Long Distance Rural Networks, IIT Kanpur, May 2006 [jointly advised by A. R. Harish]
37. Hemanth Haridas, BriMon: Design and Implementation of Railway Bridge Monitoring Application, IIT Kanpur, May 2006 [jointly advised by Kameswari Chebrolu]
38. Pavan Kumar, Design, Implementation, and Evaluation of new MAC Protocols for Long Distance 802.11 Networks, IIT Kanpur, May 2006, **Cadence Silver Medal - 2006**, *Best M.Tech. Thesis in the Departments of Computer Science & Engineering and Electrical Engineering for Good Academic Performance, Innovation in Thesis, Development of New Technology and/or Substantial Betterment of Existing Technology*
39. Prashant Sharma, Radio Placement Algorithm and Dynamic Channel Allocation for Large Area Community Networks, IIT Kanpur, Aug 2005
40. Venkata Rao Chimata, Implementation and Performance Issues of VoIP in Long Distance 802.11b Networks, IIT Kanpur, June 2005
41. Sridhar Kumar Kotturu, ScaleNet: A Platform for Scalable Network Emulation, IIT Kanpur, June 2005
42. Mohit Choudhury, Three Beacon Sensor Network Localization through Self Propagation, IIT Kanpur, May 2005, **Cadence Silver Medal - 2005**, *Best M.Tech. Thesis in the Departments of Computer Science & Engineering and Electrical Engineering for Good Academic Performance, Innovation in Thesis, Development of New Technology and/or Substantial Betterment of Existing Technology*
43. Sreekanth Garigala, Experimental Validation of Simultaneous Operation in an 802.11 Multi-hop Mesh Network, IIT Kanpur, July 2004 [jointly advised by Phalguni Gupta]

BTech Projects Guided

1. Abhinav Pathak, IPv4 Support for HIP, May 2006
2. Ayush Ghai and Nihit Purwar, Evaluation of IEEE 802.16 Broadband Wireless Access MAC, May 2006
3. Abhimanyu Singh Shekhawat, Measurement And Analysis Of Packet Delivery Performance For The Tmote Sky Mote In Wireless Sensor Networks, May 2006 [jointly advised by Kameswari Chebrolu]
4. Deepak Jorwal and Gaurav Singh, Analysis of Throughput Gain using Directional Antennae in Community Networks, May 2006 [jointly advised by Dheeraj Sanghi]
5. Sabyasachi Roy and Ashwini Kumar, Realistic Support For IEEE802.11b MAC in NS, IIT Kanpur, May 2004
6. Paul Ipe, Power Allocation Issues in a Wireless Mesh Network, IIT Kanpur, May 2004
7. Santosh Kumar and Abhay Gupta, Modeling of Web User Behaviour and User Perceived Website Availability, IIT Kanpur, May 2004

Teaching Experience

1. Autumn 2007 to present: Assistant/Associate Professor in the Department of Computer Science and Engineering, at Indian Institute of Technology - Bombay, INDIA.
 - (a) Autumn 2011: "CS305: Computer Architecture"
 - (b) Autumn 2011: "CS341: Computer Architecture Lab"
 - (c) Autumn 2011: "CS699: Software Lab"
 - (d) Autumn 2010: "CS305: Computer Architecture", Student evaluation: 83.35%
 - (e) Autumn 2010: "CS341: Computer Architecture Lab"
 - (f) Autumn 2010: "CS641: Advanced Computer Networks", Student evaluation: 84.41%
 - (g) Spring 2010: "CS647: Advanced Wireless Networks", Student evaluation: 88.37%
 - (h) Autumn 2009: "CS305: Computer Architecture", Student evaluation: 72.04%
 - (i) Autumn 2009: "CS341: Computer Architecture Lab"
 - (j) Spring 2009: "IC211: Experimentation and Measurement Lab"
 - (k) Spring 2009: "CS296: Software Systems Lab"
 - (l) Autumn 2008: "CS641: Advanced Computer Networks", Student evaluation: 81.61%
 - (m) Spring 2008: "CS348: Computer Networks", Student evaluation: 69.71%
 - (n) Spring 2008: "CS378: Computer Networks Lab"
 - (o) Autumn 2007: "CS620: New Trends in Information Technology", Student evaluation: 85.45%
2. Fall 2003 to Fall 2007: Assistant Professor in the Department of Computer Science and Engineering, at Indian Institute of Technology - Kanpur, INDIA.
 - (a) Jan-Apr 2007: "CS698t: Wireless Networks, Principles and Practice", Student evaluation: 3.41/4.00 [Institute average: 3.12/4.00].
 - (b) Aug-Nov 2006: "CS425: Computer Networks", Student evaluation: 3.38/4.00 [Institute average: 3.11/4.00].
 - (c) Jan-Apr 2006: "CS725: Topics in Networking", Student evaluation: 3.71/4.00 [Institute average: 3.01/4.00], **Recognized in the Academic Senate meeting.**
 - (d) Aug-Nov 2005: "CS698t: Wireless Networks, Principles and Practice", Student evaluation: 3.41/4.00 [Institute average: 3.12/4.00].
 - (e) Aug-Nov 2005: "CS355: Programming Tools and Techniques" (course coordinator).
 - (f) May 9-13 2005: "Fundamentals of Wired and Wireless Networks", QIP short term course (jointly taught with Kameswari Chebrolu)
 - (g) Jan-Apr 2005: "Esc101N: Fundamentals of Computing", Student evaluation: 3.28/4.00 [Institute average: 2.76/4.00].
 - (h) Jan-Apr 2004: "CS422: Computer Architecture", Student evaluation: 3.41/4.00 [Institute average: 3.07/4.00].
 - (i) Aug-Nov 2003: "CS625: Advanced Computer Networks", Student evaluation: 3.60/4.00 [Institute average: 3.11/4.00], **Recognized in the Academic Senate meeting.**
3. Fall 1997, Spring 1998: Teaching Assistant for CS61a - "Structure and Interpretation of Computer Programs", U.C.Berkeley.
Fall 1996, Spring 1997: Teaching Assistant for CS110 - "Introduction to Computing", Indian Institute of Technology, Madras.

Professional Activities

- **Area Editor:** Computer Communication Review (CCR), since Jun 2010
- **Associate Editor:** IEEE Transactions on Mobile Computing, since Feb 2008
- **Technical Program Committee Chair:**
 - COMSNETS 2012 TPC Co-Chair, Jan 2012, Bangalore, India
 - COMSNETS 2011 PhD Forum, Jan 2011, Bangalore, India.
 - SIGCOMM 2010 Poster/Demo session, Aug/Sep 2010, New Delhi, India.
 - NSDR 2010: The 4th ACM Workshop on Networked Systems for Developing Regions, A workshop in MobiSys 2010, 15 Jun 2010, San Francisco, CA, USA.
 - WISARD 2008: WIREless Systems: Advanced Research and Development, A workshop in COMSWARE 2008, 05-06 Jan 2008, Bangalore, INDIA.
 - WiNTECH 2007: The Second ACM International Workshop on Wireless Network Testbeds, Experimental evaluation and CHaracterization, A workshop in MobiCom 2007, 10 Sep 2007, Montreal, QC, Canada.
 - WISARD 2007: WIREless Systems: Advanced Research and Development, A workshop in COMSWARE 2007, 07-08 Jan 2007, Bangalore, INDIA.
- **Technical Program Committee Member:**
 - 2012: ACM DEV, SIGCOMM, SECON
 - 2011: MobiCom, NSDR, ICDCN, COMSNETS, WISARD, NSDR, PhoneSense
 - 2010: INFOCOM, SIGCOMM, COMSNETS, WISARD, ACM DEV, INFOCOM-WIP
 - 2009: INFOCOM, SIGCOMM, COMSNETS
 - 2008: INFOCOM, MobiCom, COMSWARE, HotMobile, NCC, NSDR, WWW, ANTS, WiMesh, WiNS-DR
 - 2007: SIGCOMM, NSDR, NCC, WiNTECH, WWW mobility track
 - 2006: IWDC, COMSWARE, WMCSA, ICDCS, WWW mobility track, WWW developing regions track
 - 2005: MSWiM
- Member of ACM.
- Member of IEEE Communications Society.

Awards won by students working with me

- Vijay Gabale (Ph.D student): IBM PhD Fellowship award in 2011.
- Rijurekha Sen (Ph.D student): among the five MSR India PhD Fellows for 2010.
- “Horn-Ok-Please”, Rijurekha Sen and Prashima Sharma, 4th Prize, Techvista 2010, Microsoft Research India’s annual research symposium.
- “WiFiDump - A Wireless Network Debugging Tool”, Madhuresh Agrawal and Bhaskaran Raman, Best Poster Award, WISARD 2008.
- “Wake-on-WLAN”, Nilesh Mishra, Best Poster Award, Techvista 2007, Microsoft Research India’s annual research symposium.

- “BRIMON: Railway BRIdge MONitoring”, Nilesh Mishra, Raj Kumar, Phani Kumar, Hemant Haridas, Best Poster Award, WISARD 2007.
- “Design, Implementation, and Evaluation of new MAC Protocols for Long Distance 802.11 Networks”, M.Tech thesis, IIT Kanpur, May 2006, Cadence Silver Medal - 2006.
- “Three Beacon Sensor Network Localization through Self Propagation”, Mohit Choudhury, M.Tech thesis, IIT Kanpur, May 2005, Cadence Silver Medal - 2005.

Awards and Honours

- IBM Faculty Award, 2008
- Ranked 12th (100,000 total candidates) in the Joint Entrance Examination for admission to the Indian Institute of Technology - 1993
- Recipient of National Talent Scholarship (1991-1997)
- Placed among top 0.1% of students in Mathematics in All India Senior School Certificate Examination - 1991