Prashant Shenoy

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Research Interests

Operating and Distributed systems, Sensing and Cyber-physical systems, Mobile and Multimedia systems, Computational Sustainability

Education

August 1998	Doctor of Philosophy (Ph.D.), Department of Computer Sciences, The University of Texas of Austin. Dissertation title: *Symphony: An Integrated Multimedia File System* Advisor: *Prof. Harrick M. Vin*.
December 1994	Master of Science (M.S) in Computer Sciences The University of Texas of Austin.
July 1993	Bachelor of Technology (B.Tech), Department of Computer Science and Engineering The Indian Institute of Technology, Bombay, India.

Work Experience

- 7/2020-present: Distinguished Professor, College of Information and Computer Sciences, University of Massachusetts Amherst
- 9/2016 - present: Associate Dean, College of Information and Computer Sciences, University of Massachusetts Amherst
- 9/2017 - present, Director, Center for Smart and Connected Society
- 11/2018 - 8/2019, Director, IALS Center for Personal Health Monitoring
- 9/2009-present: Professor, College of Information and Computer Sciences, University of Massachusetts Amherst
- 2017-2018: Visiting Faculty, IIT Bombay, India.
- Fall 2011: Visiting Researcher, NICTA, Sydney, Australia
- 9/2004-8/2009: Associate Professor, Department of Computer Science, University of Massachusetts Amherst.
- 9/1998-8/2004: Assistant Professor, Department of Computer Science, University of Massachusetts Amherst.
- 8/1995-8/1998: Graduate Research Assistant, Department of Computer Sciences, University of Texas at Austin.
- 5/1995-8/1995: Summer Intern, AT&T Bell Laboratories, Murray Hill, NJ.
- 8/1994-5/1995: Teaching Assistant, Department of Computer Sciences, University of Texas at Austin.
- 5/1994-8/1994: Summer Intern, Microsoft Research, Redmond, WA.

Ex.1004
FORTINET, INC. / Page 1 of 44

Honors and Awards

- ACM SIGEnergy Test of Time Award, 2024.
- Fellow of Asia-Pacific Artificial Intelligence Association (AAIA), 2022.
- Fellow of the ACM, 2019.
- Fellow of the AAAS, 2018.
- Fulbright Specialist Scholar, 2017-2018
- ACM Sigmetrics 2016 Test of Time Award.
- Fellow of the IEEE, 2013
- Distinguished member of the ACM, 2009.
- Best Paper Awards or Finalists:
  - Best student paper award, *ACM Sigmetrics conference*, 2024
  - Best paper runner-up award, *ACM e-Energy conference*, 2024
  - Best paper runner-up award, *ACM/IEEE Intl Conference on Green and Sustainable Computing conference*, 2023
  - Best paper *runner-up award, ACM Buildsys conference*, 2021
  - Best paper, *IEEE International Green and Sustainable Computing Conference (IGSC)*, 2020
  - Best paper finalist, *ACM/IEEE Conference on High Performance Computing, Networking, Storage and Analysis*(SC20)
  - Best poster award, *ACM Sensys* 2020 Conference
  - Best paper runner-up award, *ACM e-Energy* 2020 Conference
  - Best paper award, *ACM e-Energy* 2019 Conference
  - Best paper finalist, *ACM HPDC* 2019 Conference
  - Best paper finalist, *ACM Buildsys* 2017.
  - Best paper Finalist, *ACM Buildsys* 2014.
  - Best paper, *ACM/IEEE IWQOS* symposium, Montreal, 2013
  - Best paper runner-up, *ACM eEnergy* conference, Berkeley, CA, 2013
  - Best papers of *IEEE PerCom 2012* conference (one of three papers chosen for this honor).
  - Best paper, *IEEE COMSNETS 2012* conference, India.
  - Best paper, *ACM Sigcomm GreenNets 2011* workshop, Toronto, Canada.
  - Best papers of ACM VEE 2009 conference (one of four papers chosen for this honor)
  - Best paper, *Usenix 2007* annual technical conference.
  - Best Paper, *ACM Multimedia 2005*, Singapore.
  - Best Student Paper Finalist, *ACM Multimedia 2005*.
  - Best Student Paper award, *IEEE Autonomic Computing conference (ICAC) 2005*.

Ex.1004
FORTINET, INC. / Page 2 of 44

- Best Paper, *IEEE Web Information Systems Engineering Conference*, 2002.
- Best Paper in Performance/Systems Category *World Wide Web Conference*, May 2002.

- Keynote Talks and Distinguished Lecture Talks
  - Distinguished Lecturer, Univ of Maryland Baltimore Country (May 2019), Colorado State University (March 2018)
  - Juniper Distinguished Lecture 2022
  - Keynote speaker, ACM FateSys 2021
  - Keynote speaker, Aspen Tech Summit 2021
  - Keynote Speaker, Asplos Edge Computing Workshop 2019
  - Keynote Speaker, CPSWeek Fog Computing Workshop 2019
  - Keynote Speaker, Cloud Control 2018
  - Keynote Speaker, ACM ICPE 2013 conference
  - Keynote Speaker, ACM GreenMetrics 2013
  - Keynote Speaker, IEEE E6 Energy Workshop, 2012.
  - Keynote speaker, TCS Excellence in Computer Science (TECS) Week, January 2012.

- Other honors and awards:
  - Conti Research Fellowship, 2020-2021.
  - NASA JSC Director's Innovation Group Achievement Award, Oct 2017 (given to NASA REALM project that we are part of)
  - NASA AES Innovation Award 2017 (given to NASA REALM project that we are part of)
  - UMass President Science and Technology Award, 2017, 2012 and 2007
  - Google Faculty Award, 2016 and 2013
  - IBM Faculty Partnership Award, June 2000, June 2001 and June 2003.
  - AT&T VURI Award
  - Lilly Foundation Teaching Fellowship, 2001-2002
  - National Science Foundation (NSF) CAREER Award, April 2000.
  - Best Doctoral Dissertation of 1998-99, Department of Computer Sciences, University of Texas at Austin.
  - MCD Fellow, University of Texas at Austin, 1993-95.
  - Institute Medal recipient for being the top ranking graduating student, Department of Computer Science and Engineering, Indian Institute of Technology, Bombay, July, 1993.
  - JN Tata Scholarship, 1993.

Books and Book Chapters

B1. K. Ramamritham, G. Karmarkar,and P. Shenoy, "Energy Informatics: A Computational Perspective," World Scientific Press, 2022.

B2. Michael Zink and Prashant Shenoy, "Caching and Distribution Issues for Streaming Content Distribution Networks," X. Tang, J. Xu, and S T. Chanson (eds), Springer, 2005.

B3. Harrick Vin and Prashant Shenoy, "Storage Architectures for Digital Imagery," *Image Databases: Search and Retrieval of Digital Imagery*, V. Castelli and L. Bergman (eds), John Wiley, 2002.

B4. Prashant Shenoy and Harrick Vin, "Media Servers," *Readings in Multimedia Computing*, K Jeffay and H. Zhang (eds), Morgan Kaufman Publishers, August 2001.

Journal Publications

J1. Bhawana Chhaglani, Camellia Zakaria, Richard Peltier, Jeremy Gummeson, and Prashant Shenoy, "AeroSense: Sensing Aerosol Emissions from Indoor Human Activities," Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2024.

J2. Akanksha Atrey, Camellia Zakaria, Prashant Shenoy, and Rajesh Balan, "W4-Groups: Modeling the Who, What, When and Where of Group Behavior via Mobility Sensing," Proceedings of the ACM on Human-Computer Interaction (PACM HCI) 2024.

J3. Walid A. Hanafy, Qianlin Liang, Noman Bashir, David Irwin, and Prashant Shenoy, "CarbonScaler: Leveraging Cloud Workload Elasticity for Optimizing Carbon-Efficiency," Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS), Dec 2023.

J4. Adam Lechowicz, Nicolas Christianson, Jinhang Zuo, Noman Bashir, Mohammad H. Hajiesmaili, Adam Wierman, and Prashant J. Shenoy, "The Online Pause and Resume Problem: Optimal Algorithms and An Application to Carbon-Aware Load Shifting," Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS), Dec 2023.

J5. Priyanka Mary Mammen, Camellia Zakaria, and Prashant Shenoy, "SleepLess: personalized sleep monitoring using smartphones and semi-supervised learning," Springer-CSI Transactions on ICT, 2023.

J6. Phuthipong Bovornkeeratiroj, Stephen Lee, Srinivasan Iyengar, David Irwin, and Prashant Shenoy, "Distributed Rate Control of Smart Solar Arrays with Batteries," Frontiers in Internet of Things Jun 2023.

J7. Samuel Kounev, Nikolas Herbst, Cristina L. Abad, Alexandru Iosup, Ian Foster, Prashant Shenoy, Omer Rana, and Andrew A. Chien, "Serverless Computing: What It Is, and What It Is Not?" Communications of the ACM (CACM) 2023.

J8. Diptyaroop Maji, Prashant Shenoy, and Ramesh K. Sitaraman, "Multi-day Forecasting of Electric Grid Carbon Intensity using Machine Learning," ACM Energy Informatics Review (EIR) Jun 2023.

J9. John Wamburu, Noman Bashir, Prashant Shenoy, and David Irwin, "Analyzing the Impact of Decarbonizing Residential Heating Systems on the Electric Distribution Grid," ACM Energy Informatics Review (EIR) Jun 2023.

J10. Qianlin Liang, Walid A. Hanafy, Ahmed Ali-Eldin, and Prashant Shenoy, " Model-driven Cluster Resource Management for AI Workloads in Edge Clouds," ACM Transactions on Adaptive and Autonomous Systems (TAAS) Jan 2023

J11. Camellia Zakaria, Yilmaz Gizem, Priyanka Mammen, Michael Chee, Prashant Shenoy, Rajesh Balan, "SleepMore: Inferring Sleep Duration at Scale with Multi-Device WiFi Sensing," Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), March 2023.

J12. John Wamburu, Noman Bashir, Emma Grazier, David Irwin, Christine Crago, and Prashant Shenoy, "Equity-aware Decarbonization of Residential Heating Systems," ACM Energy Informatics Review (EIR) 2022.

J13. Bhawana, Chhaglani, Camellia Zakaria, Adam Leochowicz, Jeremy Gummeson, Prashant Shenoy, "FlowSense: Monitoring Airflow in Building Ventilation Systems Using Audio Sensing," Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2022.

J14. Camellia Zakaria, Amee Trivedi, Emmanuel Cecchet, Michael Chee, Prashant Shenoy, Rajesh Balan, "Analyzing the Impact of Covid-19 Control Policies on Campus Occupancy and Mobility via Passive WiFi Sensing," ACM Transactions on Spatial Algorithms and Systems (TSAS), Volume 8, Issue 3, Article 22, pages 1-26, September 2022

J15. Pradeep Ambati, Noman Bashir, David Irwin, Prashant Shenoy "Modeling and Analyzing Waiting Policies for Cloud-Enabled Schedulers," IEEE Transactions on Parallel and Distributed Systems (TPDS), 32(12), 3081-3100, December 2021

J16. Menghong Feng, Noman Bashir, David Irwin, Prashant Shenoy and Dragoljub Kosanovic, "Model-driven Per-Panel Solar Anomaly Detection for Residential Arrays," ACM Transactions on Cyber-Physical Systems (TCPS), 5(40), pp 1-20, October 2021.

J17. Stephen Lee, Prashant Shenoy, Krithi Ramamritham, David Irwin, "AutoShare: Virtual Community Solar and Storage for Energy Sharing," Energy Informatics, 4(1), 1-24, July 2021

J18. John Wamburu, Stephen Lee, Mohammad H. Hajiesmaili, David Irwin, and Prashant Shenoy "Ride Substitution Using Electric Bike Sharing: Feasibility, Cost, and Carbon Analysis," Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 5(1), 1-28, March 2022.

J19. Amee Trivedi, Camellia Zakaria, Rajesh Balan, Ann Becker, George Corey, Prashant Shenoy "WiFi-Trace: Network-based Contact Tracing for Infectious Diseases Using Passive WiFi Sensing," Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 5(1), March 2022.

J20. Srini Iyengar, Stephen Lee, David Irwin, Prashant Shenoy, Ben Weil, "WattScale: A Data-driven Approach for Energy Efficiency Analytics of Buildings at Scale," ACM Transactions on Data Science, 2(1), 1-25, January 2021.

J21. Saurabh Bagchi, Tarek F. Abdelzaher, Ramesh Govindan, Prashant Shenoy, Akanksha Atrey, Pradipta Ghosh, and Ran Xu, "New Frontiers in IoT: Networking, Systems, Reliability, and Security Challenges," IEEE IoT Journal 2020.

J22. Muhammad Aftab, Sid Chi-Kin Chau and Prashant Shenoy, "Efficient Online Classification and Tracking on Resource-constrained IoT Devices," ACM Transactions on Intenet of Things (ACM TIOT), 2020.

J23. Khaled Zaouk, Fei Song, Chenghao Lyu, Arnab Sinha, Yanlei Diao, Prashant Shenoy, "UDAO: A Next-Generation Unified Data Analytics Optimizer," PVLDB, vol 12, no 12, pp 1934-1937, 2019.

J24. Sean Barker, Sandeep Kalra, David Irwin, and Prashant Shenoy, "Building Virtual Power Meters for Online Load Tracking," ACM Transactions on Cyber-Physical Systems (ACM TCPS), vol 3, no 2, March 2019.

J25. T. Abdelazer, P. Shenoy, et. al. "Towards an Internet of Battlefield Things: A Resilience Perspective," IEEE Computer, Special Issue of Cyber-physiscal Systems Resilience, 2018.

J26. N. Bashir, D. Irwin, P. Shenoy, and J. Taneja, "Mechanisms and Policies for Controlling Distributed Solar Capacity," ACM Transactions on Sensor Networks (ACM TOSN), 2018

J27. Srinivasan Iyengar, Sandeep Kalra, Anushree Ghosh,David Irwin, Prashant Shenoy, and Benjamin Marlin "Inferring Smart Schedules for Dumb Thermostats," *ACM Transactions on Cyber-Physical Systems (ACM TCPS)*, 2018

J28. Tian Guo and Prashant Shenoy, "Providing Geo-Elasticity in Geographically Distributed Clouds," *ACM Transactions on Internet Technology (TOIT)*, 2018

J29. Tian Guo and Prashant Shenoy, "Performance and Cost Considerations for Providing Geo-Elasticity in Database Clouds," *ACM Transactions on Adaptive and Autonomous System (TAAS)*, 2018

J30. Tian Guo, Prashant Shenoy, K. K. Ramakrishnan, and Vijay Gopalakrishnan, "Latency-aware Virtual Desktops Optimization in Distributed Clouds," *Multimedia Systems Journal (MMSJ)*, 2018

J31. P. Sharma, S. Lee, T. Guo, D. Irwin and P. Shenoy, "Managing Risk in a Derivative IaaS Cloud,", *IEEE Trans on Parallel and Distributed Systems (TPDS)*, 2017.

J32. Sean Barker, David Irwin, and Prashant Shenoy, "Pervasive Energy Monitoring and Control through Low-Bandwidth Power Line Communication," *IEEE Internet of Things Journal*, 2017.

J33. David Irwin, Srinivasan Iyengar, Stephen Lee, Aditya Mishra, Prashant Shenoy, Ye Xu, "Enabling Distributed Energy Storage by Incentivizing Small Load Shifts," *ACM Transactions on Cyber-Physical Systems (ACM TCPS)*, 2017.

J34. Srinivasan Iyengar, Navin Sharma, David Irwin, Prashant Shenoy, Krithi Ramamritham, "A Cloud-based Black Box Solar Predictor for Smart Homes," *ACM Transactions on Cyber- Physical Systems - Special Issue on Smart Homes, Buildings, and Infrastructures*, 2017.

J35. Zhichuan Huang, Ting Zhu, Yu Gu, David Irwin, Aditya Mishra, Daniel Menasche, Prashant Shenoy, "Minimizing Transmission Loss in Smart Microgrids by Sharing Renewable Energy," *ACM Trans on Cyber-Physical Systems*, vol 1, number 2, 2017.

J36. Prateek Sharma, Patrick Pegus, David Irwin, and Prashant Shenoy, "Design and Operational Analysis of a Green Data Center," *IEEE Internet Computing*, Special Issue on Energy-efficient Data Centers, vol 21, no 4, July 2017.

J37. Prateek Sharma, David Irwin, and Prashant Shenoy, "Keep it Simple: Bidding for Servers in Today?s Cloud Platforms," *IEEE Internet Computing*, vol 21, no 3, May 2017.

J38. Navin Sharma, Dilip Krishnappa, Sean Barker, David Irwin, and Prashant Shenoy, "Managing server clusters on intermittent power," *PeerJ Computer Science Journal*, December 2015.

J39. Boduo Li, Yanlei Diao, Prashant Shenoy, "Supporting Scalable Analytics with Latency Constraints," *PVLDB Journal*, 8(11), 2015. Also presented at the VLDB conference, Hawaii, Aug 2015.

J40. Dong Chen, Sandeep Kalra, David Irwin, Prashant Shenoy, and Jeannie Albrecht, "Preventing Occupancy Detection from Smart Meter Data," *IEEE Transactions on Smart Grid*, 2015.

J41. T. Wood, K K. Ramakrishnan, P. Shenoy, J. van der Merwe, J. Hwang, G. Liu and L. Chaufournier, "CloudNet: Dynamic Pooling of Cloud Resources by Live WAN Migration of Virtual Machines," *IEEE/ACM Transactions on Networking (TON)*, 2014.

J42. Navin Sharma, Jeremy Gummeson, David Irwin, Ting Zhu and Prashant Shenoy "Leveraging weather forecasts in renewable energy systems," *Sustainable Computing: Informatics and Systems*, Volume 4, Issue 3, pages 160-171, September 2014.

J43. Vimal Mathew, Ramesh K. Sitaraman and Prashant Shenoy "Energy-efficient content delivery networks using cluster shutdown," *Sustainable Computing: Informatics and Systems (SUSCOM)*, Special Issue of Invited Papers from IGCC 2013, 2014.

J44. Navin Sharma, David Irwin, and Prashant Shenoy, "BlinkFS: A Distributed File System for Intermittent Power," *Sustainable Computing (SUSCOM)*, 2014.

J45. Rahul Singh, Prateek Sharma, David Irwin, Prashant Shenoy, and K.K. Ramakrishnan, "Here Today, Gone Tomorrow: Exploiting Transient Servers in Data Centers," *IEEE Internet Computing*, 18(4):22-29 2014.

J46. Sean Barker, Sandeep Kalra, David Irwin, and Prashant Shenoy, "Empirical Characterization, Modeling, and Analysis of Smart Meter Data," *IEEE Journal on Selected Areas in Communications (JSAC)*, Special Series on Smart Grid Communications, 32(7):1312-1327, July 2014.

J47. Tian Guo, Upendra Sharma, Prashant Shenoy, Timothy Wood, Sambit Sahu, "Cost-aware Cloud Bursting for Enterprise Applications," *ACM Transactions on Internet Technology (TOIT)*, vol 13, no 3, May 2014.

J48. Prashant Shenoy, "Multimedia Systems Research: The First Twenty Years and Lessons for the Next Twenty," *ACM Transactions on Multimedia Computing, Communications and Applications (ACM TOMCCAP),* Special Issue on 20 Years of ACM Multimedia, vol 9, no 1s, October 2013.

J49. R. Singh, P. Shenoy, M. Natu, V. Sadaphal and H. Vin, "Analytical Modeling for What-if Analysis in Complex Cloud Computing Applications," *ACM Sigmetrics Performance Evaluation Review, Special Issue on Cloud Computing*, Vol 40, no 4, pages 53-62, March 2013

J50. A. Mishra, D. Irwin, P. Shenoy, J. Kurose, T. Zhu, "GreenCharge: Managing Renewable Energy in Smart Buildings," *IEEE Journal on Selected Areas in Communications (JSAC), Special Series on Smart Grid Communications*, 31(7): 1281-1293, July 2013.

J51. B. Li, E. Mazur, Y. Diao, A. McGregor and P. Shenoy, "SCALLA: A Platform for Scalable One-Pass Analytics using MapReduce," *ACM Transactions on Database Systems (TODS)*, 37:4, December 2012. Special Issue of Best Papers of Sigmod 2011.

J52. Peter Desnoyers, Timothy Wood, Prashant Shenoy, Rahul Singh, Sangameshwar Patil, and Harrick Vin, "Modellus: Automated Modeling of Complex Internet Data Center Applications," *ACM Transactions on the Web (TWEB)*, 6(2), 1-19, May 2012.

J53. T. Wood, K K Ramakrishnan, P. Shenoy, K Van der Merwe, "Enterprise Ready Virtual Cloud Pools: Vision, Oppurtunities and Challenges," *The Computer Journal, Oxford Univ. Press*, vol 55, number 8, pages 1-10, October 2012.

J54. Navin Sharma, David Irwin, Prashant Shenoy and Michael Zink, "MultiSense: Proportional-Share for Mechanically Steerable Sensor Networks," Multimedia Systems Journal (MMSJ), vol 18, pages 425-444, October 2012.

J55. Y. Nie, R. Cocci, Z. Cao, Y. Diao, and P. Shenoy "SPIRE: Efficient Data Interpretation and Compression over RFID Streams," *IEEE Trans. on Knowledge and Data Engineering (TKDE)*, vol 24, number 1, pages 141-155, 2012.

J56. Zhao Cao, Charles Sutton, Yanlei Diao, and Prashant Shenoy,"Distributed Inference and Query Processing for RFID Tracking and Monitoring" *PVLDB Journal*, vol 4, number 5, pages 326-337, March 2011.

J57. Xiaotao Liu, Mark D. Corner, Prashant Shenoy, "Ferret: An RFID-enabled pervasive multimedia application," Ad Hoc Networks, 9(4), 2011.

J58. Jeremy Gummeson, Deepak Ganesan, Prashant Shenoy and Mark Corner, "An Adaptive Link Layer for Heterogeneous Multi-radio Mobile Sensor Networks," *IEEE Journal on Selected Areas in Communications (JSAC), Special Issue on Simple Wireless Sensor Networking Solutions*, vol 28, no 7, pages 1094-1104 Sept 2010.

J59. Gaurav Mathur, Peter Desnoyers, Paul Chukiu, Deepak Ganesan and Prashant Shenoy, "Ultra Low Power Data Storage for Sensor Networks," *ACM Transaction on Sensor Networks (TOSN)*, 2009.

J60. David Yates, Erich Nahum, James F. Kurose, Prashant Shenoy, "Data Quality and Query Cost in Pervasive Sensing Systems", *Elsevier Pervasive and Mobile Computing Journal*, Special Issue of Selected Papers from IEEE Percom'08, 2009.

J61. Ming Li, Deepak Ganesan and Prashant Shenoy, "PRESTO: Feedback-driven Data Management in Sensor Networks," *IEEE/ACM Transactions on Networking (TON)*, October 2009.

J62. Xiaotao Liu, Mark D. Corner, and Prashant Shenoy, "SEVA: Sensor Enhanced Video Annotation," *ACM Transactions on Multimedia Computing, Communications and Applications (ACM TOMCCAP)*, August 2009.

J63. Bhuvan Urgaonkar, Prashant Shenoy, and Timothy Roscoe. "Resource Overbooking and Application Profiling in a Shared Internet Hosting Platform," *ACM Transactions on Internet Technologies (TOIT)*, 2008.

J64. Xiaotao Liu, Prashant Shenoy, and Mark D. Corner, "Chameleon: Application Level Power Management," *IEEE Transactions on Mobile Computing*, 7(8):995-1010, August 2008.

J65. Bhuvan Urgaonkar and Prashant Shenoy "Cataclysm: Scalable Overload Policing for Internet Applications," *Elsevier Journal of Network and Computer Applications (JNCA)*, vol 31, pages 891-920, July 2008.

J66. B. Wang, J. Kurose, P. Shenoy and D. Towsley, "Multimedia Streaming via TCP: An Analytic Performance Study," *ACM Transactions on Multimedia Computing, Communications and Applications (TOMCCAP)*, 4(2), April 2008.

J67. A. Chandra and P. Shenoy. "Hierarchical Scheduling for Symmetric Multiprocessors," *IEEE Trans. On Parallel and Distributed Systems (TPDS)*, 19(3), pp 418-431, March 2008.

J68. Bhuvan Urgaonkar, Prashant Shenoy, Abhishek Chandra, Pawan Goyal, and Timothy Wood, "Agile Dynamic Provisioning of Multi-tier Internet Applications", *ACM Transactions on Adaptive and Autonomous Systems (TAAS)*, Vol. 3, No. 1, pages 1-39, March 2008.

J69. B. Urgaonkar, A. Rosenberg and P. Shenoy, "Application Placement on a Cluster of Servers", *International Journal of Foundations of Computer Science*, Vol. 18, No. 5, pages 1023-1041, October 2007

J70. Z. Ge, P. Ji and P. Shenoy, "Design and Analysis of a Demand Adaptive and Locality Aware Streaming Media Server Cluster" *ACM/Springer Multimedia Systems Journal*, 13(3), pages 235-249, September 2007

J71. B. Urgaonkar, G. Pacifici, P. Shenoy, M. Spreitzer and A. Tantawi, "Analytic Modeling of Multi-tier Internet Applications," *ACM Transactions on the Web (TWEB)*, 1(1):1–25, May 2007.

J72. H. Li, K. Ramamritham, P. Shenoy, R. Grupen, J. Sweeney, "Resource Management for Real-time Tasks in Mobile Robotics," Special Issue on Dynamic Resource Management in Distributed Real-Time Systems, *Journal of Systems and Software*, 80:962-971, May 2007

J73. X. Liu, J. Lan, P. Shenoy and K. Ramamritham, "Consistency Maintenance in Dynamic Overlay Networks," *Computer Networks*, Special Issue on Overlay Distribution Structures and their Applications, 50(6), pp 859-876, April 2006.

J74. A. Chandra, P. Pradhan, R. Tewari, S. Sahu and P. Shenoy, "An Observation-based Approach Towards Self-managing Web Servers" *Computer Communications*, 2006.

J75. Y. Guo, Z. Ge, B. Urgaonkar, P. Shenoy and D. Towsley, "Dynamic Cache Reconfiguration Strategies for Cluster-based Streaming Proxies," *Computer Communications*, 29(8), pp 1174-1188, May 2006.

J76. J. Arnold, B.N. Levine, R. Manmatha, F. Lee, P. Shenoy, M.-C. Tsai, T.K. Ibrahim, D. OBrien, D.A. Walsh, "Information Sharing in Out-of-Hospital Disaster Response: The future role of information technology", *Journal of Pre-Hospital and Disaster Medicine*, 19(2):201-207, Sept 2004.

J77. Sheetal Shah, Krithi Ramamritham and Prashant Shenoy, "Resilient and Coherency Preserving Dissemination of Dynamic Data Using Cooperating Peers," *IEEE Trans. on Knowledge and Data Engineering, Special Issue on Peer-to-Peer Data Management*, 16(7):799-812 July 2004.

J78. Aameek Singh, Abhishek Trivedi, Krithi Ramamritham and Prashant Shenoy, "PTC : Proxies that Transcode and Cache in Heterogeneous Web Client Environments," *World Wide Web Journal, Special Issue on WISE 2002 papers*, 7(1):2-28 2004.

J79. Bhuvan Urgaonkar and Prashant Shenoy, "Sharc: Managing CPU and Network Bandwidth in Shared Clusters," *IEEE Trans. on Parallel and Distributed Systems (TPDS)*, 15(1):2-17, January 2004.

J80. P Shenoy, P Goyal, S Rao and H Vin, "Design Considerations for the Symphony Integrated File System", *ACM/Springer Multimedia Systems Journal*, volume 9, no 4, November 2003

J81. M. Bradshaw, B. Wang, S. Sen, L. Gao, J. Kurose, P. Shenoy, and D. Towsley, "Periodic Broadcast and Patching Services: Implementation, Measurement and Analysis in an Internet Streaming Media Testbed," *ACM/Springer Multimedia Systems Journal, Special Issue on Multimedia Distribution,* 9(1), pages 78-93, July 2003.

J82. Prashant Shenoy, Pawan Goyal, Sriram Rao and Harick Vin, "Design Considerations for the Symphony Integrated Multimedia File System," *ACM/Springer Multimedia Systems Journal*, 9(4), pages 337- 352, October 2003.

J83. Venkata Duvvuri, Prashant Shenoy and Renu Tewari, "Adaptive Leases: A Strong Consistency Mechanism for the World Wide Web," *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 15(5), pages 1266-1276, September 2003.

J84. Anoop Ninan, Purushottam Kulkarni, Prashant Shenoy, Krithi Ramamritham and Renu Tewari, "Scalable Consistency Maintenance in Content Distribution Networks using Cooperative Leases," *IEEE Transactions of Knowledge and Data Engineering*, 15(4), pages 813-828, July/August 2003.

J85. Pavan Deolasee, Amol Katkar, Ankur Panchbudhe, Krithi Ramamritham and Prashant Shenoy "Adaptive Push-Pull of Dynamic Web Data," *IEEE Transactions on Computers*, 51(6) pages 652-668, June 2002.

J86. Mohammad S. Raunak, Prashant Shenoy, Pawan Goyal, Krithi Ramamritham and Puru Kulkarni, "Implications of Proxy Caching for Provisioning Servers and Networks," *IEEE Journal on Selected Areas in Communications (JSAC)*, Special Issue on Internet Proxy Services, 20(7), pages 1276-1289, September 2002.

J87. Prashant Shenoy, Pawan Goyal and Harrick M. Vin, "Architectural Considerations for Next Generation File Systems", *ACM/Springer Multimedia Systems Journal*, 8(4), pages 270-283, July 2002

J88. Prashant Shenoy and Harrick M. Vin, "Cello: A Disk Scheduling Framework for Next Generation Operating Systems," *Real Time Systems Journal: Special Issue on Flexible Scheduling of Real-Time Systems*, 22(1) pages 9-47, January 2002.

J89. Prashant J. Shenoy and Harrick M. Vin, "Failure Recovery Algorithms for Multimedia Servers," *ACM/Springer Multimedia Systems Journal*, 8(1) pages 1-19, January 2000.

J90. Prashant J. Shenoy and Harrick M. Vin, "Efficient Striping Techniques for Variable Bit-rate Continuous Media File Servers," *Performance Evaluation Journal*, 38:(3), pages 175-200, December 1999.

J91. Prashant J. Shenoy and Harrick M. Vin, "Efficient Support for Interactive Operations in Multi-resolution Video Servers," *ACM/Springer Multimedia Systems Journal*, 7(3), pages 241–251, July 1999.

J92. Prashant J. Shenoy, Pawan Goyal, and Harrick M. Vin, "Issues in Multimedia Server Design," *ACM Computing Surveys (Special Issue : Symposium on Multimedia Systems)*, 27(4), pages 636–639, December 1995.

Refereed Conference and Workshop Publications

C1. Bin Wang, David Irwin, Prashant Shenoy, and Don Towsley, "INVAR: Inversion Aware Resource Provisioning and Workload Scheduling for Edge Computing," Proceedings of IEEE Infocom, Vancouver, Canada May 2024

C2. Bhawana Chhaglani, Camellia Zakaria, Jeremy Gummeson, and Prashant Shenoy, ”BreathEasy: Exploring the Potential of Acoustic Sensing for Healthy Indoor Environments,” Proceedings of the 1st International Workshop on Advances in Environmental Sensing Systems for Smart Cities 2023

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C125. A. Mishra, D. Irwin, P. Shenoy, T. Zhu, ”Scaling Distributed Energy Storage for Grid Peak Reduction,” *Proceedings of the 4th ACM Intl. Conference on Future Energy Systems (ACM e-Energy)*, Berkeley, CA, May 2013 (Best Paper Runner-up)

C126. Rahul Singh, David Irwin, Prashant Shenoy, and K.K. Ramakrishnan, ”Yank: Enabling Green Data Centers to Pull the Plug,” *Proceedings of NSDI 2013*, Lombard, IL, April 2013

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C133. S. Barker, T. Wood, P. Shenoy, and R. Sitaraman, “An Empirical Study of Memory Sharing in Virtual Machines,” *Proceedings of the 2012 USENIX Annual Technical Conference (USENIX ATC)*, Boston, MA, June 2012.

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C138. Andres Molina-Markham, George Danezis, Kevin Fu, Prashant Shenoy and David Irwin, "Designing Privacy-preserving Smart Meters with Low-cost Microcontrollers," *Proceedings of Financial Cryptography and Data Security*, Bonaire, March 2012

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C159. D. Agrawal, B. Li, Z. Cao, D. Ganesan, Y. Diao and P. Shenoy, "Exploiting the Interplay Between Memory and Flash Storage In Embedded Sensor Devices," *Proceedings of the 16th IEEE Conference on Embedded and Real-time Computing Systems (RTCSA)*, Macau, China, Aug 2010

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C161. Rahul Singh, Upendra Sharma, Emmanuel Cecchet and Prashant Shenoy, "Autonomic Mix-Aware Provisioning for Non-Stationary Data Center Workloads," *Proceedings of the 7th IEEE International Conference on Autonomic Computing and Communications (ICAC)*, Washington, DC, USA, June 7-11, 2010.

C162. Navin Sharma, Jeremy Gummeson, David Irwin, and Prashant Shenoy, "Cloudy Computing: Leveraging Weather Forecasts in Energy Harvesting Sensor Systems," *Proceedings of the Seventh IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)*, Boston, MA, June 2010

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C165. Thanh Tran, Charles Sutton, Richard Cocci, Yanming Nie, Yanlei Diao and Prashant Shenoy, "Probabilistic Inference over RFID Streams in Mobile Environments," *Proceedings of the 25th International Conference on Data Engineering (ICDE)*, April 2009, Shanghai, China (to appear)

C166. Timothy Wood, Ludmila Cherkasova, Kivan Ozonat, and Prashant Shenoy, Profiling and Modeling Resource Usage of Virtualized Applications *Proceedings of the 9th ACM/Usenix conference on Middleware*, Lueven Belgium, December 2008. (18% acceptance rate).

C167. A. Nemmaluri, M. Corner, and P. Shenoy, "Sherlock: Automatically Locating Objects for Humans," *Proceedings of ACM Mobisys, Breckenridge, CO*, June 2008. (18% acceptance rate)

C168. R. Cocci, T. Tran, Y. Diao, and P. Shenoy, "Efficient Data Interpretation and Compression over RFID Streams," *Proceedings of the IEEE 24th Intl. Conference on Data Engineering (ICDE)*, April 2008, Cancun, Mexico (short paper). (31% acceptance rate)

C169. David Yates, Erich Nahum, James F. Kurose, and Prashant Shenoy, "Data Quality and Query Cost in Wireless Sensor Networks," *Proceedings of the IEEE Intl. Conference on Pervasive Computing and Communications (PerCom 2008)*, Kowloon, Hong Kong, March 2008. Invited to a fast-track special issue of Pervasive and Mobile Computing journal (11.9% acceptance rate).

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C171. M. Li, T. Yan, D. Ganesan, E. Lyons, P. Shenoy, A. Venkataramani and M. Zink, "Multi-user Data Sharing in Radar Sensor Networks," *Proceedings of the 5th ACM Conference on Embedded Networked Sensor Systems (Sensys 2007),* Sydney, Australia, Nov 2007 (16.8% acceptance rate).

C172. K K. Ramakrishnan, P. Shenoy and Jacobus van der Merwe, "Live Data Center Migration across WANs: A Robust Cooperative Context-aware Approach," *Proceedings of the ACM SIGCOMM Workshop on Internet Network Management (INM)*, Kyoto, Japan, August 2007 (30% acceptance rate).

C173. Peter J. Desnoyers and Prashant Shenoy, "Hyperion: High Volume Stream Archival for Retrospective Querying," *Proceedings of the 2007 USENIX Annual Technical Conference, Santa Clara CA*, June 17-22 2007 (**Best Paper Award**, 19% acceptance rate).

C174. T. Wood, P. Shenoy, A. Venkataramani and M. Yousif, "Black-box and Gray-box Strategies for Virtual Machine Migration," *Proceedings of the Fourth Symposium on Networked Systems Design and Implementation (NSDI)*, Cambridge, MA, April 2007 (23.8% acceptance rate).

C175. P. Kulkarni, D. Ganesan and P. Shenoy, "Approximate Initialization of Camera Sensor Networks," *Proceedings of the 4th European Conference on Wireless Sensor Networks (EWSN 2007)*, Delft, Netherlands, January, 2007 (13.4% acceptance rate).

C176. Y. Diao, D. Ganesan, G. Mathur and P. Shenoy, "Re-thinking Data Management for Storage-centric Sensor Networks," *Proceedings of the Third Biennial Conference on Innovative Data Systems Research (CIDR)*, Asilomar, CA, January 2007 (45% acceptance rate).

C177. X. Liu, G. Niv, K. K. Ramakrishnan, P. Shenoy and J. Van der Merwe, "The Case for Semantic Aware Remote Replication," *Proc. 2nd International Workshop on Storage Security and Survivability (StorageSS 2006)*, Alexandria, VA, October 2006.

C178. X. Liu, P. Kulkarni, P. Shenoy and D. Ganesan, "Snapshot: A Self-Calibration Protocol for Camera Sensor Networks," *Proc. IEEE Workshop on Broadband Advanced Sensor Networks (BASENETS 2006)*, San Jose, CA, October 2006.

C179. G. Mathur, P. Desnoyers, D. Ganesan and P. Shenoy, "CAPSULE: An Energy-Optimized Object Storage System for Memory-Constrained Sensor Devices," *Proceedings of the Fourth ACM Conference on Embedded Networked Sensor Systems (SenSys), Boulder, CO*, November 2006 (19% acceptance rate).

C180. Xiaotao Liu, Mark Corner and Prashant Shenoy, "Ferret: RFID Localization for Pervasive Multimedia," *Proceedings of the Eight International Conference on Ubiquitous Computing (Ubicomp)*, Orange County, CA, September 2006 (13% acceptance rate).

C181. V. Sundaram, T. Wood and P. Shenoy, "Efficient Data Migration for Load Balancing in Self-managing Storage Systems," *Proceedings of the Third IEEE Intl. Conference on Autonomic Computing, Dublin*, June 2006 (21% acceptance rate).

C182. M. Li, D. Ganesan and P. Shenoy, "PRESTO: Feedback-driven Data Management in Sensor Networks," *Proceedings of the Third Symposium on Networked Systems Design and Implementation (NSDI)*, San Jose, CA, May 2006 (25.4% acceptance rate).

C183. G. Mathur, P. Desnoyers, D. Ganesan, P. Shenoy, "Ultra-Low Power Storage for Sensor Networks," *Proceedings of the IEEE/ACM Conference on Information Processing in Sensor Networks - SPOTS Track*, Nashville, TN, April 2006 (25.8% acceptance rate).

C184. X. Liu, M. Corner and P. Shenoy, "SEVA: Sensor Enhanced Video Annotation," *Proceedings of ACM Multimedia*, Singapore, November 2005 (**Best Paper Award**, 16% acceptance rate).

C185. P. Kulkarni, P. Shenoy and D. Ganesan, "SensEye: A Multi-tier Camera Sensor Network," *Proceedings of ACM Multimedia*, Singapore, November 2005 (**Best Student Paper Finalist**, 16% acceptance rate).

C186. X. Liu, P. Shenoy and M. Corner, "Chameloen: Application Controlled Power Management with Performance Isolation," *Proceedings of ACM Multimedia*, Singapore, November 2005 (16% acceptance rate).

C187. P. Desnoyers, D. Ganesan and P. Shenoy, "TSAR: A Two Tier Sensor Storage Architecture Using Interval Skip Graphs," *Proceedings of ACM SenSys*, San Diego, CA, November 2005 (17% acceptance rate).

C188. P. Desnoyers, D. Ganesan, H. Li and P. Shenoy, "PRESTO: A Predictive Storage Architecture for Sensor Networks," *Proceedings of Tenth Workshop on Hot Topics in Operating Systems (HotOS-X)*, Santa Fe, NM, June 2005 (19.8% acceptance rate).

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C190. M. Bradshaw, J. Kurose, P. Shenoy and D. Towsley, "Online Scheduling in Modular Multimedia Systems with Stream Reuse," *Proceedings of ACM Nossdav*, Skamania, WA, June 2005 (37% acceptance rate).

C191. B. Urgaonkar, P. Shenoy, A. Chandra and P. Goyal, "Dynamic Provisioning for Multi-tier Internet Applications," *Proceedings of the 2nd IEEE Intl. Conference on Autonomic Computing (ICAC-05)*, Seattle, WA, June 2005 (**Best student paper award**, 16% acceptance rate).

C192. B. Urgaonkar, G. Pacifici, P. Shenoy, M. Spreitzer and A Tantawi, "An Analytical Model for Multi-tier Internet Services and Its Applications," *Proceedings of the ACM Sigmetrics Conference*, Banff, Canada, June 2005 (13% acceptance rate).

C193. B. Urgaonkar and P. Shenoy, "Cataclysm: Handling Extreme Overloads in Internet Applications," *Proceedings of the Fourteenth International World Wide Web Conference (WWW 2005)*, Chiba, Japan, May 2005 (12% acceptance rate).

C194. H Li, P Shenoy and K Ramamritham, "Scheduling Messages with Deadlines in Multi-hop Real-time Sensor Networks," *Proceedings of the Eleventh IEEE Real-time and Embedded Technology and Applications Symposium (RTAS)*, San Francisco, CA, March 2005 (33% acceptance rate).

C195. M. Bradshaw, J. Kurose, L. Page, P. Shenoy and D. Towsley, "A Reconfigurable on-the-Fly Resource-aware Streaming Pipeline Scheduler," *Proceedings of the 12th Multimedia Computing and Networking Conference (MMCN)*, San Jose, CA, January 2005 (22% acceptance rate).

C196. Bhuvan Urgaonkar, Arnold Rosenberg and Prashant Shenoy, "Application Placement on a Cluster of Servers," *Proceedings of the 17th Intl. Conference of Parallel and Distributed Computing Systems*, San Francisco, CA, September 2004 (33.5% acceptance rate).

C197. Bing Wang, Jim Kurose, Prashant Shenoy and Don Towsley, "Multimedia Streaming via TCP: An Analytic Performance Study," *Proceedings of ACM Sigmetrics*, New York, NY, June 2004 (short paper). Full version appears in the *Proceedings of ACM Multimedia, New York, NY*, October 2004 (16.6% acceptance rate).

C198. John Sweeney, Rod Grupen and Prashant Shenoy, "Active QoS Flow Maintenance in Controlled Mobile Networks," *Proceedings of the Fourth IEEE International Symposium on Robotics and Automation (ISRA)*, Queretaro, Mexico, August 2004.

C199. Bhuvan Urgaonkar and Prashant Shenoy, "Cataclysm: Handling Extreme Overloads in Internet Services (brief announcement)" *Proceedings of ACM Principles of Distributed Computing (PODC)*, St Johns, New Foundland, Canada, July 2004 (23% acceptance rate).

C200. Xiaotao Liu, Prashant Shenoy and Weibo Gong, "A Time Series-based Approach for Power Management in Mobile Processors and Disks," *Proceedings of the 14th ACM Workshop on Network and Operating System Support for Audio and Video (NOSSDAV)*, Kinsale, Ireland, pages 74-81, June 2004 (25.2% acceptance rate).

C201. Xiaolan Zhang, Michael K. Bradshaw, Yang Guo, Bing Wang, Jim Kurose, Prashant Shenoy, Don Towsley, "AMPS: A Flexible, Scalable Proxy Testbed for Implementing Streaming Services," *Proceedings of the 14th ACM Workshop on Network and Operating System Support for Audio and Video (NOSSDAV)*, Kinsale, Ireland, pages 116-121, June 2004 (25.2% acceptance rate).

C202. Huan Li, Prashant Shenoy and Krithi Ramamritham, "Scheduling Communication in Real-Time Sensor Applications," *Proceedings of the Tenth IEEE Real-Time/Embedded Technology and Applications Symposium (RTAS04)*, Toronto, Canada, May 2004 (30.2% acceptance rate).

C203. Peter Radkov, Li Yin, Pawan Goyal, Prasenjit Sarkar and Prashant Shenoy "A Performance Comparison of NFS and iSCSI for IP-Networked Storage," *Proceedings of the Usenix Conference on File and Storage Technologies (FAST 04)*, San Francisco, CA, March 2004 (20.6% acceptance rate).

C204. Yang Guo, Zihui Ge, Bhuvan Urgaonkar, Prashant Shenoy, Don Towsley, "Dynamic Cache Reconfiguration Strategies for Cluster-Based Streaming Proxies," *Proceedings of the Eighth International Workshop on Web Content Caching and Distribution (WCW 2003), Hawthorne, NY*, September 2003 (32% acceptance rate).

C205. Abhishek Chandra, Pawan Goyal and Prashant Shenoy, "Quantifying the Benefits of Resource Multiplexing in On-Demand Data Centers," *Proceedings of the First ACM Workshop on Algorithms and Architectures for Self-Managing Systems (Self-Manage 2003), San Diego, CA*, June 2003 *(acceptance rate: 27%)*.

C206. Jiang Lan, Xiatao Liu, Prashant Shenoy and Krithi Ramamritham, "Consistency Maintenance in Peer-to-Peer File Sharing Networks," *Proceedings of IEEE Workshop on Internet Applications (WIAPP), San Jose, CA*, pages 90-94, June 2003 *(acceptance rate: 20%)*.

C207. Vijay Sundaram and Prashant Shenoy, "A Practical Learning-based Approach for Dynamic Storage Bandwidth Allocation," *Proceedings of ACM/IEEE Intl Workshop on Quality of Service (IWQoS), Monterey, CA*, Springer LNCS volume 2707, pages 479-497, June 2003 *(acceptance rate: 30%)*.

C208. Abhishek Chandra, Weibo Gong and Prashant Shenoy, "Dynamic Resource Allocation for Shared Data Centers Using Online Measurements," *Proceedings of ACM Sigmetrics 2003*, San Diego, CA, pages 300-301, June 2003 *(acceptance rate: 18%)*. A longer version version appeared in the *Proceedings of ACM/IEEE Intl Workshop on Quality of Service (IWQoS), Monterey, CA*, Springer LNCS, volume 2707, pages 381-400, June 2003 *(acceptance rate: 30%)*.

C209. Huan Li, John Sweeney, Krithi Ramamritham, Roderic Grupen and Prashant Shenoy, "Real-Time Support for Mobile Robotics," *Proceedings of the Ninth IEEE Real-Time/Embedded Technology and Applications Symposium (RTAS03), Toronto, Canada*, pages 10-18, May 2003 *(acceptance rate: 38%)*.

C210. Purushottam Kulkarni, Weibo Gong and Prashant Shenoy, "Scalable Techniques for Memory-efficient CDN Simulations," *Proceedings of the Twelfth World Wide Web Conference (WWW-03), Budapest, Hungary*, pages 609-618, May 2003 *(acceptance rate: 12.8%)*.

C211. Purushottam Kulkarni, Prashant Shenoy and Krithi Ramamritham, "Handling Client Mobility and Intermittent Connectivity in Mobile Web Accesses," *Proceedings of the ACM Conference on Mobile Data Management (MDM 2003), Melbourne, Australia*, Springer LNCS vol 2574, pages 401-407, January 2003 *(acceptance rate: 41%)*.

C212. Prashant Shenoy and Peter Radkov, "Proxy-assisted Power-friendly Streaming to Mobile Devices," *Proceedings of the 2003 Multimedia Computing and Networking (MMCN) Conference, Santa Clara, CA*, pages 177-191, January 2003 *(acceptance rate: 42%)*.

C213. Bhuvan Urgaonkar, Prashant Shenoy and Timothy Roscoe, "Resource Overbooking and Application Profiling in Shared Hosting Platforms," *Proceedings of the Fifth Symposium on Operating Systems Design and Implementation (OSDI), Boston, MA*, pages 239-254, December 2002 *(acceptance rate:18%)*.

C214. Shetal Shah, Krithi Ramamritham and Prashant Shenoy, "Maintaining Coherency of Dynamic Data in Cooperating Repositories," *Proceedings of the 28th Conference on Very Large Data Bases (VLDB), Hong Kong*, pages 526-537, August 2002 *(acceptance rate: 15%)*

C215. Aameek Singh, Abhishek Trivedi, Krithi Ramamritham and Prashant Shenoy, "PTC : Proxies that Transcode and Cache in Heterogeneous Web Client Environments," *Proceedings of the Third IEEE International Conference on Web Information Systems Engineering, Singapore*, pages 11-20, December 2002 (**Award Paper**, 27% acceptance rate).

C216. Prashant Shenoy, Saif Hasan, Purushottam Kulkarni and Krithi Ramamritham, "Middleware versus Native OS Support: Architectural Considerations for Supporting Multimedia Applications," *Proceedings of the IEEE Real-time Technology and Applications Symposium (RTAS'02), San Jose, CA*, pages 23-34, September 2002 *(acceptance rate: 30%)*.

C217. Anoop Ninan, Purushottam Kulkarni, Prashant Shenoy, Krithi Ramamritham and Renu Tewari, "Cooperative Leases: Scalable Consistency Maintenance in Content Distribution Networks," *Proceedings of the Eleventh World Wide Web Conference (WWW 2002), Honolulu, Hawaii*, pages 1-12, May 2002 (**Award Paper**, 16% acceptance rate).

C218. Prashant Pradhan, Renu Tewari, Sambit Sahu, Abhishek Chandra, and Prashant Shenoy, "An Observation-based Approach Towards Self-managing Web Servers," *Proceedings of ACM/IEEE Intl Workshop on Quality of Service (IWQoS), Miami Beach, FL*, pages 13-22, May 2002 *(acceptance rate: 18%)*.

C219. Zihui Ge, Ping Ji and Prashant Shenoy, "A Demand Adaptive and Locality Aware (DALA) Streaming Media Cluster Architecture," *Proceedings of ACM Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV), Miami Beach, FL*, pages 139-146, May 2002 *(acceptance rate: 31%)*.

C220. Manish Bhide, Krithi Ramamritham and Prashant Shenoy, "Maintaining Stock Portfolios Up-to-date on the Web," *Proceedings of the 12th IEEE Workshop on Research Issues in Data Engineering (RIDE '02), San Jose, CA*, pages 60-68, February 2002 *(acceptance rate: 24%)*.

C221. Anuj Maheshwari, Aashish Sharma, Krithi Ramamritham and Prashant Shenoy, "TranSquid: Transcoding and Caching Proxy for Heterogeneous E-Commerce Environments," *Proceedings of the 12th IEEE Workshop on Research Issues in Data Engineering (RIDE '02), San Jose, CA*, pages 50-59, February 2002 *(acceptance rate: 24%)*.

C222. Vijay Sundaram and Prashant Shenoy, "Bandwidth Allocation in a Self-Managing Multimedia File Server," *Proceedings of the Ninth ACM Conference on Multimedia, Ottawa, Canada*, pages 291-301, October 2001 *(acceptance rate: 15%)*.

C223. M. Bradshaw, B. Wang, S. Sen, L. Gao, J. Kurose, P. Shenoy, and D. Towsley, "Periodic Broadcast and Patching Services: Implementation, Measurement and Analysis in an Internet Streaming Media Testbed," *Proceedings of the Ninth ACM Conference on Multimedia, Ottawa, Canada*, pages 280-290, October 2001 *(acceptance rate: 15%)*.

C224. Timothy Roscoe and Prashant Shenoy, "New Resource Control Issues in Shared Clusters," *Proceedings of the Eight International Workshop on Interactive Distributed Multimedia Systems (IDMS'01), Lancaster, UK*, Springer LNCS vol 2158, pages 2-9, September 2001.

C225. Deepak Karuppiah, Zhigang Zhu, Prashant Shenoy and Ed Riseman, "A Fault-tolerant Distributed Vision System for Object Tracking in a Smart Room," *Proceedings of the IEEE Workshop on Computer Vision Systems (ICVS'01), Vancouver, Canada*, Springer LNCS vol 2095, pages 201-219, July 2001.

C226. Abhishek Chandra, Micah Adler and Prashant Shenoy, "Deadline Fair Scheduling: Bridging the Theory and Practice of Proportionate-Fair Scheduling in Multiprocessor Servers," *Proceedings of IEEE Real-time Technology and Applications Symposium (RTAS'01), Taipei, Taiwan*, pages 3-14, June 2001 *(acceptance rate: 31%)*.

C227. Pavan Deolasee, Amol Katkar, Ankur Panchbudhe, Krithi Ramamritham and Prashant Shenoy, "Adaptive Push-Pull of Dynamic Web Data: Better Resiliency, Scalability and Coherency," *Proceedings of the Tenth World Wide Web Conference (WWW-10), Hong Kong*, pages 265-274, May 2001 *(acceptance rate: 19%)*.

C228. Bhuvan Urgaonkar, Anoop Ninan, Mohammad Raunak, Prashant Shenoy and Krithi Ramamritham, "Maintaining Mutual Consistency for Cached Web Objects," *Proceedings of the 21st International Conference on Distributed Computing Systems (ICDCS-21), Phoenix, AZ*, pages 371-380, April 2001 *(acceptance rate: 31%)*.

C229. Krithi Ramamritham, Pavan Deolasee, Amol Katkar, Ankur Panchbudhe and Prashant Shenoy, "Dissemination of Dynamic Data on the Internet," *Proceedings of DNIS 2000: International Workshop on Databases in Networked Information Systems, University of Aizu, Japan*, December 2000 *(invited paper)*.

C230. Vijay Sundaram, Abhishek Chandra, Pawan Goyal, Prashant Shenoy, Jasleen Sahni and Harrick Vin, "Application Performance in the QLinux Multimedia Operating System," *Proceedings of the Eighth ACM Conference on Multimedia, Los Angeles*, CA, pages 127-136, November 2000 *(acceptance rate: 17%)*.

C231. Abhishek Chandra, Micah Adler, Pawan Goyal and Prashant Shenoy "Surplus Fair Scheduling: A Proportional-Share CPU Scheduling Algorithm for Symmetric Multiprocessors," *Proceedings of the Fourth Symposium on Operating System Design and Implementation (OSDI 2000), San Diego, CA*, pages 45-59, October 2000 *(acceptance rate: 21%)*.

C232. Prashant Shenoy, "The Case for Reexamining Integrated File System Design," *Proceedings of the Tenth International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV'00), Chapel Hill, NC*, pages 51-54, June 2000 *(acceptance rate: 41%)*.

C233. Mohammad S. Raunak, Prashant Shenoy, Pawan Goyal and Krithi Ramamritham, "Implications of Proxy Caching for Provisioning Servers and Networks," *Proceedings of ACM SIGMETRICS'2000 Conference, Santa Clara, CA*, pages 66-77, June 2000 *(acceptance rate: 17%)*.

C234. Venkata Duvvuri, Prashant Shenoy and Renu Tewari, "Adaptive Leases: A Strong Consistency Mechanism for the World Wide Web," *Proceedings of IEEE INFOCOM'2000, Tel Aviv, Israel*, pages 834-843, March 2000 *(acceptance rate: 27%)*.

C235. Jim Gray and Prashant Shenoy, "Rules of Thumb in Data Engineering", *Proceedings of the 16th IEEE International Conference on Data Engineering (ICDE'2000), San Diego CA*, pages 3-12, March 2000 *(invited paper)*.

C236. Prashant Shenoy, Pawan Goyal and Harrick M. Vin, "Architectural Considerations for Next Generation File Systems," *Proceedings of the Seventh ACM Conference on Multimedia, Orlando, FL*, pages 457-467, October 1999 *(acceptance rate: 18%)*.

C237. Sambit Sahu, Prashant Shenoy and Donald Towsley, "Design Considerations for Integrated Proxy Servers," *Proceedings of the Ninth IEEE International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV'99), Basking Ridge, NJ*, pages 247–250, June 1999 *(acceptance rate: 36%)*.

C238. Prashant J. Shenoy and Harrick M. Vin, "Cello: A Disk Scheduling Framework for Next Generation Operating Systems," *Proceedings of the ACM SIGMETRICS Conference, Madison, WI*, pages 44–55, June 1998 *(acceptance rate: 17%)*.

C239. Prashant J. Shenoy, Pawan Goyal, Sriram S. Rao and Harrick M. Vin, "Symphony: An Integrated Multimedia File System," *Proceedings of the SPIE/ACM Conference on Multimedia Computing and Networking (MMCN'98), San Jose, CA*, pages 124–138, January 1998.

C240. Prashant J. Shenoy and Harrick M. Vin, "Efficient Striping Techniques for Multimedia File Servers," *Proceedings of the Seventh IEEE International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV'97), St. Louis, MO*, pages 25–36, May 1997 *(acceptance rate: 25%)*.

C241. Banu Özden, Rajeev Rastogi, Prashant J. Shenoy, and Avi Silberschatz, "Fault-tolerant Architectures for Continuous Media Servers," *Proceedings of the ACM SIGMOD Conference, Montreal, Canada*, pages 79–90, June 1996 *(acceptance rate: 16%)*.

C242. Pawan Goyal, Harrick M. Vin, Chia Shen and Prashant J. Shenoy, "A Reliable, Adaptive Network Protocol for Video Transport," *Proceedings of IEEE INFOCOM'96, San Francisco, CA*, pages 1080–1091, March 1996 *(acceptance rate: 29.8%)*.

C243. Prashant J. Shenoy and Harrick M. Vin, "Efficient Support for Scan Operations in Video Servers," *Proceedings of the Third ACM Conference on Multimedia, San Francisco, CA*, pages 131–140, November 1995 *(acceptance rate: 22%)*

C244. Harrick M. Vin, Prashant J. Shenoy and Sriram Rao, "Efficient Failure Recovery in Multi-Disk Multimedia Servers," *Proceedings of the Twenty-Fifth Fault Tolerant Computing Symposium (FTCS), Pasadena, CA*, pages 12–21, June 1995 *(acceptance rate: 18.9%)*.

C245. Harrick M. Vin, Prashant J. Shenoy and Sriram Rao, "Analyzing the Performance of Asynchronous Disk Arrays for Multimedia Retrieval," *Proceedings of the First ISMM International Conference on Distributed Multimedia Systems and Applications, Honolulu, Hawaii*, Pages 14–17, August 1994.

Patents

P1. Pipelined data replication for disaster recovery, US Patent no 2014/0040206, Feb 6, 2014.

P2. System And Methods For Run Time Detection And Correction Of Memory Corruption, US Patent no 8,510,596, August 13, 2013

P3. Methods and Apparatus to Migrate Virtual Machines Between Distributive Computing Networks Across a Wide Area Network, US Pantent no 8,473,557, June 2013

P4. Fault tolerant Architectures for Continuous Media Servers US Patent no 6,079,028, June 2000.

Post-doctoral Fellows

1. Ahmed Ali-Eldin ost-doctoral Fellow, (Fall 2020) *Assistant Professor, Chalmers University, Sweden*
2. Jeremy Gummeson, Research Fellow (2017-19, co-supervised with Deepak Ganesan), *Asst Professor, UMass Electrical and Computer Engineering*.
3. David Irwin, Post-doctoral Fellow (2007-12), *Asst Professor, UMass Electrical and Computer Engineering*.
4. Michael Zink, Post-doctoral Fellow (2004-08, co-supervised with Jim Kurose), *Asst Professor, UMass Electrical and Computer Engineering*.

Graduate Students

Ph.D Advisees:

1. John Wamburu (Ph.D. Fall 2022), *Research Staff Member, IBM Research Kenya* Thesis: Data-Driven Modeling and Analytics for Greening the Energy Ecosystem
2. Amee Trivedi (Ph.D. Summer 2021), *Postdoctoral Scholar at University of British Columbia, Canada* , Thesis: Human Mobility Monitoring using WiFi: Analysis, Modeling, and Applications
3. Stephen Lee (Ph.D. Summer 2019), *Assistant Professor, University of Pittsburgh* Thesis: Software-defined Infrastructure For IOT-Based Energy Systems
4. Vani Gupta (Ph.D. Summer 2019), *Assistant Professor, Providence College* Thesis: Energy-aware Algorithms for Greening Internet-scale Distributed Systems Using Renewables.
5. Stephen Lee (Ph.D. Summer 2019), *Assistant Professor, University of Pittsburgh* Thesis: Software-defined Infrastructure for IoT-based Energy Systems,
6. Srinivasan Iyengar (Ph.D. Fall 2018), *Post-doctoral Researcher, Microsoft Research Bangalore* Thesis: Scalable data-driven modeling and analytics for smart buildings.
7. Prateek Sharma (Ph.D. Summer 2018), *Assistant Professor, Indiana University* Thesis: Transiency-Driven Resource Management For Cloud Computing Platforms.
8. Tian Guo (Ph.D., Summer 2016), *Assistant Professor, WPI*
   Thesis title: Elastic Resource Management in Distributed Clouds.

9. Xin He (Ph.D., Summer 2016), *Technical Staff Member, Oracle*
   Thesis title: Application Aware Resource Management for Cloud Platforms.

10. Vimal Mathew (Ph.D., Summer 2016), *Independent*
    Thesis title: Energy-efficient Content Delivery Networks.

11. Aditya Mishra (Ph.D, Summer 2015), *Assistant Professor, Seattle U*
    Thesis title: Energy Optimizations for Smart Buildings and Smart Grids.

12. Sean Barker (Ph.D, Summer 2014), *Assistant Professor, Bowdoin College*
    Thesis title: Model-driven Analytics of Energy Meter Data in Smart Homes.

13. Navin Sharma (Ph.D, Spring 2013), *Cofounder and CEO, Heystack Inc*
    Thesis title: Designing Distributed Systems for Intermittent Power

14. Rahul Singh (Ph.D, Spring 2013), *Research Staff Member, IBM T. J. Watson Research Center.*
    Thesis title: Resource Management for Enterprise Data center Applications.

15. Upendra Sharma (Ph.D, Spring 2013), *Research Staff Member, IBM T. J. Watson Research Center.*
    Thesis Title: Elastic Resource Management in Cloud Computing Platforms.

16. Timothy Wood (Ph.D, Fall 2011), *Assistant Professor, George Washington University.*
    Thesis Title: Improving Data Center Resource Management, Deployment and Availability With Virtualization.

17. Peter Desnoyers (Ph.D., Fall 2007), *Assistant Professor, Northeastern University.*
    Thesis Title: Distributed Sensing Networks: Archiving, Indexing, and Analysis

18. Purushottam Kulkarni (Ph.D., Fall 2006; co-advised) *Assistant Professor, Indian Institute of Technology Bombay, India*
    Thesis title: Design Issues in Multi-tier Heterogeneous Sensor Networks

19. Huan Li, (Ph.D., Summer 2006; co-advised), *Associate Professor, Beihang University , Beijing China*
    Thesis title: Resource Management for Distributed Real-Time Sensor Systems

20. Xiaotao Liu (Ph.D., Summer 2006; co-advised), *Senior Research Scientist, EMC*
    Thesis title: System Support for Pervasive Multimedia Systems

21. Vijay Sundaram (Ph.D., Fall 2005), *Software Engineer, Windows Division, Microsoft*
    Thesis: Self-managing Techniques for Storage Resource Management

22. Bhuvan Urgaonkar (Ph.D., Summer 2005) *Assistant Professor, Pennsylvania State University*
    Thesis title: Dynamic Resource Management in Internet Hosting Platforms

23. Abhishek Chandra (Ph.D.,Fall 2004) *Assistant Professor, University of Minnesota*,
    Thesis title: Resource Allocation for Self-Managing Servers

M.S Advisees:

1. Assan Toleuov (MS, Spring 2019)

2. Rishikesh Jha (MS, Spring 2019)

3. Ritesh Kumar (MS, Spring 2019)
4. Ishita Dasgupta (MS, Spring 2017),
5. Roopa Shenoy (MS, Spring 2017), Employer: Cisco
6. Puja Mishra, (MS, Summer 2016), Employer: Lutron
7. Nikita Mehra (MS, Summar 2016), Employer: Twitter
8. Seem Guggari (MS, Summer 2016), Employer: Microsoft
9. Anushree Ghosh (MS, Summer 2016), Employer: Microsoft
10. Sneha Narayan, (MS Summer 2015), Employer: Twilio
11. Sandeep Kalra (MS, Summer 2015) Employer: Amazon
12. Sippakorn Tansutthiwess, (M.S (ECE), Fall 2012), Employer: Amazon
13. Veena Udayabhanu, (M.S., Spring 2012), Employer: Microsoft
14. Aditya Nemmuluri, (M.S., Spring 2008; co-advised), Employer: Cisco Corporation
15. Rick Cocci, (M.S., Spring 2008; co-advised), Employer: State Street Corporation
16. Srinath Gaddam (M.S., Summer 2004), Employer: EMC
17. Peter Radkov (M.S., Summer 03), Employer: Sirma Corporation, Bulgaria
18. Jiang Lan (M.S., Summer 02), Employer: Verizon Corporation
19. Saif Hasan (M.S., Summer 01) Employer: Microsoft Corporation
20. Anoop Ninan(M.S., Summer 01) Employer: EMC Corporation
21. M S. Raunak (M.S., Summer00)
22. Venkata Duvvuri (M.S.,Summer 99) Inital Employer: Goldman Sachs

University and State-level Service

- *Associate Dean*, College of Information and Computer Sciences, 2016-present.
- Director, Center for Personalized Health Monitoring, 2018-19.
- Director, Center for Smart and Connected Society, 2017-present.
- Member, Information and Communication Technology Council, UMass Faculty Senate, 2015-present.
- Member, Campus Physical Planning Council, UMass Faculty Senate, 2017-present.
- Co-Chair, UMass Research IT Strategic Planning committee. 2014-15.
- Member, University CIO Search Committee, 2013
- Member, CVIP director search committee, 2012.
- *Chair, Informatics Program Committee* 2012-14 to create a new undergraduate degree program in Informatics.
- Member ECE Faculty Search committee, 2010-11
- Member of the Research and Education subgroup to set future directions for the Massachusetts Green High Performance Computing Center (MGHPCC), 2009-11. The MGHPCC is a collaboration between five Universities in partnership with the Commonwealth of Massachusetts, Cisco, and EMC to build a state of the art, environmentally responsible computing center.
- Worked to define the research vision for the MGHPCC; conducted workshops for Holyoke K-12 teachers and local community college faculty to incorporate sustainability and green computing concepts in the classroom; Working with HG&E to gather and analyze energy usage data from Holyoke residential and business consumers to enhance energy efficiency.
- Member of ad-hoc committee on " Moving CS to the College of Engineering", 2009-10.
- Member, CS Department Chair Search Committee, 2006-07.
- PEEAS/VIP Distance Education Advisory Committee, 2003-04 and 2004-05.

Departmental Service

Note: Chair responsibilities are italicized.

- *Chair, AFR Personnel Committee*, 2016-16 and 2016-17.
- *Chair, Space Task Force* 2015-2017
- *Chair, Strategic Planning Committee, 2008-09*, 2009-2010, *2010-2011*.
- *Chair, Computing Committee, 2008-09, 2009-10, 2010-11*
- Member, Executive Committee, 2008-09, 2010-11.
- Member, Personnel Committee, and *Co-Chair Annual Faculty Report (AFR) Evaluation Committee, 2007-08*.
- Member, Strategic Planning Committee, 2007-08 and 2006-07.

- Member, Personnel Committee, 2006-07.
- *Chair, Special Events Committee, 2006-07.*
- Member, Website Redesign Committee, 2006-08.
- Member, Space committee, Fall 2006.
- *Chair, Faculty Recruiting, 2004-05.*
- Member, Diversity Committee, 2004-05.
- Member, Library Committee, 2004-05 and 2003-04.
- *Chair, Ad-hoc Committee on Strategic Planning, 2003-04.*
- Member, Computing Committee, 2003-04, 2015-2017.
- Member, Faculty Recruiting Committee, 2001-02 and 2002-03.
- *Chair, Computing Committee, 2000-01 and 2001-02.*
- Member, Personal Committee, 2000-01.
- Member, Executive Committee, 1999-2000.
- Member, Computing Committee, 1999-2000.
- Member, Graduate Admissions Committee, 1998-99.

National, International and Professional Service

- **National-level and International Service**
  - Cofounder and Chair, ACM Special Interest Group in Energy (ACM SIGEnergy)
  - Cofounder and Chair, ACM Emerging Interest Group in Energy.
  - Co-organiser of a NSF workshop on Energy Efficiency in Data Centers.
  - Co-organiser of a CRA's CCC workshop to develop a vision and the research agenda for the "Role of Information Technology in Sustainability." 2011.
  - Member of an ad-hoc IUCEE committee to improve the quality of Computer Science Ph.D programs in emerging economies such as India (2010-11).
  - Organizer of a week-long IUCEE workshop to enhance graduate-level curriculum in Computer Science, and in the area of Distributed Computing Systems, New Delhi, India, 2010.
- **Steering Committees**
  - IEEE Trans. on Mobile Computing Steering Committee (2014-2016)
  - ACM e-Energy Conference Steering Committee (2014-2017, chair)
  - ACM BuildSys Conference Steering Committee (2014-2016)
- **Journal Editorial Boards** and **Guest Editor for Special Issues**

- Editorial board member,*ACM Transaction on Internet of Things (TIOT)*, 2018-present.
- Editorial board member,*ACM Transaction on Modeling and Performance Evaluation of Computing Systems*, 2015-2016.
- Editorial board member, *ACM Transaction on the Web (TWEB)*, 2008-2016.
- Editorial board member, *Sustainable Energy, Grids and Networks Journal*, 2014-2016.
- Editorial board member, *Springer/ACM Multimedia Systems Journal*, 2006-present.
- Editorial board member, *PeerJ Computer Science*, 2014-present.
- Guest Editor, *IEEE Internet Computing*, Special Issues on Internet Data Dissemination 2007.
- Guest Editor, *Multimedia Tools and Applications*, 2005.
- Guest Editor, *ACM Transcaction on Multimedia Communication and Applications (TOMCAP)*, February 2005.
- Guest Editor, *IEEE Communications Maganize*, Special Issue on Proxy Services for the Internet, August 2004.
- Guest Editor, *ACM/Springer Multimedia Systems Journal*, Special Issue on Multimedia Computing and Networking, 2003.

• **Program Chair, General Chair and Other conference organization:**

- Program Co-chair, ACM SIGEnergy WeCan Workshop 2022
- Program Co-chair, ACM SIGEnergy Workshop on Climate, Sustainability, and Society 2021
- General Chair, *ACM/IEEE IotDI 2020*
- Program Chair, *ACM/IEEE IotDI 2019*
- Program Chair, *ACM APSys 2017*
- Program Chair, *IEEE Intl Conference on Network Protocols 2016*
- Program Chair, *IEEE Cloud and Autonomic Computing 2015*
- Program Chair, *ACM eEnergy 2014*
- Program Chair, *ACM Buildsys 2013*.
- Program Chair, *IEEE COMSNETS 2013* conference.
- Co-founded the HotCloud Workshop series in the Cloud Computing Area. Program Chair, *USENIX HotCloud* 2009;
- Program Chair, *ACM Sigmetrics* 2008
- Program Chair, *Performance 2007* conference.
- Program Chair, *World Wide Web 2007* conference.
- Program Chair, *Multimedia Information Systems* Workshop, College Park, MD, August 2004.
- Program Chair, *ACM Multimedia Conference*, Berkeley CA, November 2003.
- Program Chair, *ACM SIGMultimedia/SPIE Multimedia Computing and Networking (MMCN) Conferer-ence*, January 2002.
- Program Vice Chair, *World Wide Web Conference*, Japan 2005.
- Deputy Chair, *World Wide Web Conference*, New York, 2004.

- General Chair, *ACM SIGMultimedia/SPIE Multimedia Computing and Networking (MMCN) Conference*, January 2003.
- Associate Chair, *ACM Multimedia Conference*, December 2002.
- Student Posters Chair, *ACM SIGCOMM 2004*.
- Tutorials Chair, *ACM SIGMETRICS* 2002.

- **Program Committee and Referee activities**
  - Program Committee Member, *ACM MMSys 2013, ICDCS 2103, NOSSDAV 2012, ACM CoNext 2102, MMSys 2012, E6 2012, GreenNEts 2012, ACM Buildsys 2012, SOCC 2011, Sigmetrics 2011, MMSys 2011, Sensys 2010, USENIX 2009, ACM Sigmetrics 2009, COMSNET 2009, MMCN 2009, ICNP 2008, ACM Multimedia 2008, ACM NOSSDAV 2008, IEEE LANMAN 2008, ACM HotMetrics 2008, ACM Multimedia 2007, ACM NOSSDAV 2007, ACM Multimedia 2006, ACM NOSSDAV 2006, IEEE Infocom 2006, IEEE Infocom 2005, ACM Multimedia 2005, ACM Nossdav 2005, COMAD 2005, Sigmetrics 2004, Global Internet 2004, ACM MDM 2004, MMCN 2004, IEEE WIAPP 2003, IEEE ICDE 2003, IEEE RTSS 2002, ACM NOSSDAV 2002, WWW 2002, Packet Video Workshop 2002, ACM Multimedia 2001, ACM/SPIE MMCN'2001, NOSSDAV'2000, ACM SIGMETRICS 2000, ACM SIGMETRICS Workshop on Internet Server Performance (WISP'99), IEEE ICDCS'99*.
  - Referee for numerous journals: *ACM TOCS, ACM TIOT, IEEE TOC, IEEE TSE, IEEE TPDS, IEEE TKDE, IEEE/ACM TON, IEEE TMM, Journal of Parallel and Distributed Computing, ACM/Springer Multimedia Systems Journal, Kluwer Telecommunication Systems Journal, IEEE Multimedia Magazine, and IEEE Internet Magazine*.

- Panelist for various National Science Foundation (NSF) panels

Federal and State Funding for Research and Education

G1. DOD Army Research Lab: Internet of Battlefield Things Collaborative Research Alliance (UMass PI and Area Lead), 2017-2022, $4.5M for the first five 5 years.

G2. NSF SCH grant: Enhancing Context-Awareness and Personalization for Intensively Adaptive Smoking Cessation Messaging Interventions (co-PI), $1M, 2017-20.

G3. NSF CPS grant: Software Defined Solar Systems, $500K 2017-20

G4. NASA Contract: Integrating Inference and Complex Event Processing for RFID Logistics Management (PI), $1.2M, 2014-2019

G5. DOD Army Research Lab, Improved Systems for Real- World Pervasive Human Sensing (co-PI), 2015-2016.

G6. NSF PFI:BIC grant- Utility-driven Smart Energy Services (PI), $1M, 9/2015-8/2018.

G7. EPA grant: WINNS: Water Innovation Network for Sustainable Small Systems (UMass co-PI), 2015-2018.

G8. NSF: CPS-Security: Enhancing Privacy in Smart Buildings and Homes (co-PI), $500K, 2015-2018

G9. NSF CSR grant: System Support for Transiency in Data Center and Cloud Computing (PI) $500K, 2015-18

G10. NSF Computing Research Infrastructure Award (PI), A Programmable Data-Driven Testbed for Sustainable Buildings Research, $587K, 2014-17.

G11. NSF FIA-NP: Collaborative Research: The Next-Phase MobilityFirst Project - From Architecture and Protocol Design to Advanced Services and Trial Deployments, $1.3M, 2013-15.

G12. MA DOER grant, UMASS Amherst Energy Extension Initiative (PI), $6M, 2014-2017.

G13. Mass Life Science Center award: MHGPCC Life science cluster, $4.5M, July 2013-16.

G14. NSF MRI award for the MGHPCC, $2.3M, October 2012-2015

G15. National Science Foundation OCI-1032765 (UMass PI), "Collaborative Research: SDCI The Missing Link: Connecting Eucalyptus Clouds with Multi-Layer Networks", (UMass share of award $115K), Sept 2010-Aug 2013.

G16. National Science Foundation Computer Systems Research Award CNS-0916972 (Co-PI), " High Assurance at Low Cost in Data Centers Using Virtualization," $500K, (Sept 2009-Aug 2012).

G17. NSF CNS-0916577 Computer Systems Research Award (Co-PI) "System and Network Support for Harvesting-aware Solar Sensor Networks," $500K, (Sept 2009- Aug 2012).

G18. NSF Global Environment for Network Innovation (GENI) Grant (Co-PI), "DiCloud: A Data-intensive Cloud Testbed," $500K, (Duration Oct 2009 - Sept 2012). All GENI grants are administered by BBN Technologies via subcontract.

G19. National Science Foundation Computing Research Infrastructure award CNS-0855128 "Design of a Solar-powered River Sensor Network Tested," $662K, (Sept 2009-Aug 2012).

G20. UMass President's Science and Technology Award (Co-PI), "The Massachusetts Green High Performance Computing Center," $200K, Sept 2009-Aug 2011.

G21. NSF Global Environment for Network Innovation (GENI) Grant (PI), "Sensor Virtualization and Slivering in an Outdoor Wide-area Wireless Sensor/Actuator Network Testbed," $490K, (Duration Oct 2008 - Sept 2011). All GENI grants are administered by BBN Technologies via subcontract.

G22. UMass President's Science and Technology Grant, "The Massachusetts Center for Water and Environmental Sensing Technologies (MassWEST)," Co-directors: B. Levine and P. Shenoy, $175K, Sept 2007.

G23. NSF Computer Systems Research Award CNS-0720616 (PI), "Measurement, modeling and Analysis of Large Complex Data Centers", $200K, (Duration 9/07-8/10).

G24. NSF Computer Systems Research Award CNS-0720271 (PI), "Dynamic recofiguration in Virtualized Data Centers", $330K, (Duration 9/07-8/09).

G25. NSF Embedded Systems Research Award CNS-0615075 (Co-PI), "ASPIRE: Antipodal Staged Processing for Role-adaptive Embedded Systems", Joint grant with UCLA and Yale, $650K, (Duration: Sept 2006 – Aug 2009).

G26. NSF Network of Sensor Systems (NOSS) Award CNS-0626873 (Co-PI), "STONES: Storage-centric Network Embedded Systems," $500,000 (Duration: Sept 2006 – Aug 2009).

G27. NSF Major Research Instrumentation Award (MRI), CNS-052072 (PI), "Acquisition of a Laboratory Testbed for Networked Embedded Systems and Sensor Research," $300,000, (Sept 2005-August 2009). Joint with Amherst College and Mount Holyoke; submitted through Five Colleges, Inc.

G28. NSF Information Technology Research Award ANI-0325868 (Co-PI), "Hyperion - Next Generation Measurement Infrastructure and Application Use," $2,700,000, September 2003 (Duration: 9/03-8/09).

G29. NSF Engineering Research Center (ERC), (Affiliated Faculty), "Center For Collaborative Adaptive Sensing of the Atmosphere (CASA)," $17,000,000 (and $13,428,929 in cost-sharing), September 2003 (Duration: 9/03-8/09, with a planned extension through 2013).

G30. NSF Research Resources Award EIA-0323597, (PI), "Instrumenting and Measuring Distributed Internet Applications," $444,000 (including cost-sharing), September 2003 (Duration: 9/03-8/06).

G31. NSF Information Technology Research Award, CCR-0219520 (PI), "System Support for Mobile Multimedia and Web Applications," $350,000, September 2002 (Duration: 9/02-8/05).

G32. NSF Distributed Systems Program Award CCR-0098060 (PI), "Proxy-based Dissemination of Dynamic Web Data," $140,000, April 2001 (Duration: 9/01-8/04).

G33. NSF Combined Research and Curriculum Development (CRCD) Award EIA-0087945 (Co-PI), "Curriculum Development and Infrastructure for an Advanced Systems Laboratory," $496,000, September 2000 (Duration: 9/00-8/04).

G34. NSF Research Infrastructure Award EIA-0080119 (Co-PI), "Infrastructure to Support Mixed Wired/Wireless Information Systems," $992,585, September 2000 (Duration: 9/00-8/05).

G35. NSF Career Award CCR-9984030 (PI), "Scalable High-Performance Information Servers for Internet-based Multimedia Applications," $200,000, April 2000 (Duration: 4/00-3/04).

G36. NSF Special Projects in Networking Award ANI 9977635 (Co-PI), "Proxy Services in Wide Area Networks," $1,010,263, September 1999 (Duration: 9/99-8/03).

Industrial Funding for Research and Education

G37. Holyoke Gas and Electric award, $60,000 2019

G38. Veea Labs, gift, $20,000, 2018.

G39. Uptycs gift, $15,000, 2018

G40. Cisco Research award, 2015.

G41. Google Faculty Research Award, 2015.

G42. Embue Unrestricted Grant, 2015.

G43. NEC Labs Gift (PI), "Cloud Bursting and Disaster Recovery for Cloud-based Database Applications", $60,000, Jan 2011.

G44. IBM Gift (PI), "Research on Cloud-based Smarter Planet Services," $50K, 2011

G45. Google Gift (Co-PI), "Scalable One Pass Analytics for Stream Processing", $50K, 2010.

G46. IBM Faculty Award (PI), "Research on Cloud Computing," 2009.

G47. Intel Corporation Gift (PI), "Resource Management in Virtualized Data Centers ," $180,000. November 2005, 2006 and 2007.

G48. AT&T VURI Award (PI), "Resource management in Data Centers," $35,000. Sept 2007.

G49. Intel Corporation, Research Gift (Co-PI), "An IXP-Based Measurement Node for Data-Center Traffic Analysis," $75,000, July 2003.

G50. Microsoft Corporation, Research Gift (PI), "Consistent Data Dissemination and Updates in PDA-based Adhoc Networks," $15,000, August 2003.

G51. IBM University Partnership Award (PI), "Design of Large Self-Managing Storage Systems," $30,000, July 2003.

G52. Microsoft Corporation, Hardware and Software Donation (PI), "Course on .NET Technologies," $40,000, June 2003.

G53. Microsoft Corporation, Hardware and Software donation of 35 workstations and a server (PI), "A Teaching Laboratory for Multimedia and Networking Courses," $75,000, June 2002.

G54. IBM Faculty Partnership Award (PI), " Proxy Services for the Internet," $40,000, May 2001.

G55. Sprint Corporation, Research Gift (PI), "Operating Systems Support for Server Clusters," $40,000, May 2001.

G56. Intel Corporation, Equipment Donation (PI), "A Teaching Laboratory for Systems Courses," $30,000, May 2001.

G57. Microsoft Corporation, Equipment Donation (PI), "Research in Proxy-based Mobile Information Access," $10,000 (approximate value), February 2001.

G58. EMC Corporation, Research Gift (PI), "Design of a Storage and Delivery Architecture for Multimedia Data," $50,375, September 2000.

G59. CAIDA Internet Teaching Laboratory (ITL) Award (PI), "An Educational Laboratory for the Study of Multimedia, Networks, and Security," September 2000.

G60. Sprint Corporation, Research Gift (PI), "OS Resources Management for Server Clusters," $20,000, June 2000.

G61. IBM Faculty Partnership Award (PI), "Web Proxy Services for Wide Area Networks," $30,000, May 2000.

G62. Intel equipment donation (PI), "Infrastructure for a Multimedia Teaching Laboratory", $15,000, April 2000.

G63. Intel Corporation, Research Gift (Co-PI), "Measurement, Adaptation and Coordinated Resource Use in Distributed Multimedia Applications," $120,000, July 1999.

G64. Intel Corporation, Equipment donation (Co-PI), $16,000 (approximate value), December 1999.

G65. Microsoft Corporation, Software donation (PI), $2000 (approximate value), March 1999.

Appendix A. Expert Witness Experience

- Veeam v. Symantec, *Inter Partes Review* Case IPR2013-00141 for US Patent 6,931,558, "Computer Restoration Systems and Methods" Deposition October 2013 and March 2014.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2013-00142 for US Patent 6,931,558, "Computer Restoration Systems and Methods," Deposition October 2013 and March 2014.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2013-00143 for US Patent 7,191,299, "Method and System of Providing Periodic Replication," Deposition November 2013 and March 2014.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2013-00144 for US Patent 7,254,682, "Selective File and Folder Snapshot Image Creation," Written testimony February 2013.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2013-00145 for US Patent 7,254,682, "Selective File and Folder Snapshot Image Creation," Written testimony February 2013.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2013-00150 for US Patent 7,093,086, "Disaster Recover and Backup Using Virtual Machines," Deposed November 2013 and March 2014.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2014-00088 for US Patent 7,480,822, "Recover and Operation of Captured Running States from Multiple Computing Systems On a Single Computing System," Deposition June 2014.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2014-00089 for US Patent 7,831,861, "Techniques for Efficient Restoration of Granular Application Data" Deposition June 2014.
- Veeam v. Symantec, *Inter Partes Review* Case IPR2014-00091 for US Patent 8,117,168, "Methods and Systems for Creating and Managing Backups Using Virtual Disks," Deposition July 2014.
- SAP and Riverbed v. Parallel Networks, *Inter Partes Review*, Case IPR2014-01398 for US Patent 8,352,570 "Method and System for Uniform System Locator Transformation," Written testimony August 2014.
- SAP and Riverbed v. Parallel Networks, *Inter Partes Review*, Case IPR2014-01399 for US Patent 7,571,217 "Method and System for Uniform System Locator Transformation," Written testimony August 2014.
- Delphix v. Actifio, *Inter Partes Review* Case IPR2015-00100 for US Patent 8,566,361, "Datacenter Workflow Automation Scenarios Using Virtual Databases," August 2015. Deposed.
- Delphix v. Actifio, *Inter Partes Review Case* IPR2015-00108 for US Patent 8,566,361, "Datacenter Workflow Automation Scenarios Using Virtual Databases," August 2015. Deposed.
- Delphix v. Actifio, *Inter Partes Review Case* IPR2015-01678 for US Patent 8,299,944, "System and Method for Creating Deduplicated Copies of Data Storing Non-lossy Encodings of Data Directly in a Content Addressable Store," August 2015. Deposed.
- Delphix v. Actifio, *Inter Partes Review* Case IPR2015-01689 for US Patent 8,788,769, "System and method for performing backup or restore operations utilizing difference information and timeline state information," August 2015. Deposed.
- Cisco v. Egenera, *Inter Partes Review* Case IPR2017-01341 for U.S. Patent No. 7,231,430, "Reconfigurable Virtual Processing System, Cluster, Network and Method," Deposed, January 2018.

- Cisco v. Egenera, *Inter Partes Review* Case IPR2017-01340 for U.S. Patent No. 6,971,044, "Service Clusters and Method in a Processing System with Failover Capability," Deposed January 2018.
- Cisco v. HP Enterprise, *Inter Partes Review* Case IPR2017-01933 for U.S. Patent No. 8,478,799, "Namepsace File System Accessing An Object Store," Written testimony, August 2017
- EMC, Lenovo and NetApp v. IV, *Inter Partes Review* Case IPR2017-00374 for U.S. Patent no 8,275,827, "Software-based Network Attached Storage Services Hosted On Massively Distributed Parallel Computing Networks." January 2018, Deposed.
- EMC, Lenovo and NetApp v. IV, *Inter Partes Review* Case IPR2017-00439 for U.S. Patent no 8,275,827, "Software-based Network Attached Storage Services Hosted On Massively Distributed Parallel Computing Networks." January 2018, Deposed.
- Lenovo and EMC v. IV, *Inter Partes Review* Case IPR2017-00477 for U.S. Patent no 8,387,132, " Information Packet Communication With Virtual Objects" February 2018, Deposed.
- Amazon and Amazon Web Services v. Personal Web Technologies and Level 3 Communications, *US District Court Patent Litigation*, Invalidity expert, US Patent nos 6,928,442; 7,802,310; 7,945,544; and 8,099,420. December 2018.
- Veeam v. Hybir, *Inter Partes Review* Case IPR2020-01037 for U.S. Patent no 8,051,043, "Group Based Complete and Incremental Computer Field Backup System, Process and Apparatus," May 2020, Deposed.
- Veeam v. Hybir, *Inter Partes Review* Case IPR2020-01038 for U.S. Patent no 8,051,043, "Group Based Complete and Incremental Computer Field Backup System, Process and Apparatus," May 2020, Deposed.
- Veeam v. Hybir, *Inter Partes Review* IPR2020-01039 for U.S. Patent no 9,037,545, "Group Based Complete and Incremental Computer Field Backup System, Process and Apparatus," May 2020, Deposed.
- Veeam v. Hybir, *Inter Partes Review* Case IPR2020-01040 for U.S. Patent no 9,679,146, "Group Based Complete and Incremental Computer Field Backup System, Process and Apparatus," May 2020, Deposed.
- Hybir v. Veeam, *US District Court Patent Litigation*, Expert for Veeam, U.S Patents 8,051,043; 9,037,545; 9,679,146, November 2020 - ongoing litigation.
- Netflix v. Avago Technologies, *Inter Partes Review* Case No. IPR2020-01582 for U.S. Patent 8,572,138 "Distributed computing System Having Autonomic Deployment of Virtual Machine Disk Images," September 2020 Deposed.
- Netflix v. Avago Technologies, *Inter Partes Review* Case No IPR2021-00098 for U.S. Patent 8,365,183, "System and Method for Dynamic Resource Provisioning for Job Placement," Written testimony, October 2020.
- Netflix v. Avago Technologies, *Inter Partes Review*, Case No. IPR2021-00045 for U.S. Patent 7,457,722, "Correlation of Application Instance Life Cycle Events In Performance Monitoring," October 2020 Deposed.
- VMware v. Intellectual Ventures, *Inter Partes Review* Case IPR2020-00470 Patent 7,949,752 "Network System Extensible by Users," Written testimony November 2020.
- Netflix v. Avago Technologies, *Inter Partes Review*, Case No. IPR2021-00431 for U.S. Patent 7,457,722, "Correlation of Application Instance Life Cycle Events In Performance Monitoring," January 2021 Deposed.

- Netflix v. Avago Technologies, *Inter Partes Review* Case No. IPR2021-00542 for U.S. Patent 8,572,138 ”Distributed computing System Having Autonomic Deployment of Virtual Machine Disk Images,” February 2021 Desposed.
- Palo Alto Networks v. Proven Networks, *Inter Partes Review* Case IPR2021-00596 for U.S. Patent no 8,018,852, ”Equal-cost source- resolved routing system and method, March 2021.
- HP Enterprise v. Intellectual Ventures, *Inter Partes Review* Case IPR2021-01378 for U.S Patent no 6,816,464, ”Method, system, and computer program product for route quality checking and management,” June 2022 Deposed.
- HP Enterprise v. Intellectual Ventures, *Inter Partes Review* Case IPR2022-00211 for U.S Patent no 7,783,788, ”Virtual input/output server Method,” Written testimony, June 2022 Deposed.
- Palo Alto Networks v. British Telecom, *Inter Partes Review* for U.S. Patent no 7,289,857, ”Data analysis system and method,” Sept 2022.
- Palo Alto Networks v. British Telecom, *Inter Partes Review* for U.S. Patent no 7,370,358, ”Agent-based intrusion detection system,” December 2022.
- Correct Transmission LLC., *Ex-parte Patent Reexamination* for U.S Patent no 7,768,928, ”Connectivity fault management (CFM) in networks with link aggregation group connections,” Written testimony, Dec 2022.
- Egnyte v. Topia *US District Court Patent Litigation*, Expert for plaintiff, U.S Patents 9,143,561 and 10,067,942, Jan 2023 - ongoing litigation.
- Unified Patents v. Topia, *Inter Partes Review* Case IPR2022-00782 for U.S Patent no 10,067,942, ”Architecture for management of digital files across distributed network,” Feb 2023. Written testimony.
- Correct Transmission LLC., *Ex-parte Patent Reexamination* for U.S Patent no 6,876,669, ”Packet fragmentation with nested interruptions,” Written testimony, March 2023.
- Meta, Inc., *Ex-parte Patent Reexamination* for U.S Patent no 10,142,270, ”Telecommunication and multimedia management method and apparatus,” Written testimony, April 2023.
- Meta, Inc., *Ex-parte Patent Reexamination* for U.S Patent no 10,511,557, ”Telecommunication and multimedia management method and apparatus,” Written testimony, May 2023.
- Draftkings v. WinView, *Inter Partes Review* Case IPR2022-01351 for U.S Patent no 9,878,243, ”Methodology for equalizing systemic latencies in television reception in connection with games of skill played in connection with live television programming,” May 2023. Deposed.
- FanDuel v. WinView, *Inter Partes Review* Case IPR2022-01306 for U.S Patent no 9,993,730, ”Methodology for equalizing systemic latencies in television reception in connection with games of skill played in connection with live television programming,” May 2023. Deposed.
- FanDuel v. WinView, *Inter Partes Review* Case IPR2022-01307 for U.S Patent no 10,721,543, ”Method of and system for managing client resources and assets for activities on computing devices,” May 2023. Deposed.
- Box and Dropbox v. Topia, *Inter Partes Review* Case IPR2023-00427 for U.S Patent no 9,143,561 ”Architecture for management of digital files across distributed network,” June 2023. Deposed.

- Box and Dropbox v. Topia, *Inter Partes Review* Case IPR2023-00429 for U.S Patent no 10,289,607 ”Architecture for management of digital files across distributed network,” June 2023. Written testimony.
- Box and Dropbox v. Topia, *Inter Partes Review* Case IPR2023-00430 for U.S Patent no 11,003,622 ”Architecture for management of digital files across distributed network,” June 2023. Written Testimony.
- Box and Dropbox v. Topia, *Inter Partes Review* Case IPR2023-00431 for U.S Patent no 10,642,787 ”Pre-file-transfer update based on prioritized metadata,” June 2023. Written Testimony.
- Box and Dropbox v. Topia, *Inter Partes Review* Case IPR2023-00432 for U.S Patent no 10,754,823 ”Pre-file-transfer availability indication based on prioritized metadata,” June 2023. Written Testimony.
- Box and Dropbox v. Topia, *Inter Partes Review* Case IPR2023-00433 for U.S Patent no 10,067,942 ”Architecture for management of digital files across distributed network,” June 2023. Deposed.
- Cisco v. Croga, *Inter Partes Review* Case IPR2024-01196 for U.S Patent no 10,601,780, ”Internet Isolation for Avoiding Internet Security Threats,” July 2024. Written testimony.
- Cisco v. Croga, *Inter Partes Review* Case IPR2024-01283 for U.S Patent no 11,223,601, ”Network Isolation for Collaboration Software,” August 2024. Written testimony.