

FARNAM JAHANIAN

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Farnam Jahanian is Professor and Interim Chair for [Computer Science and Engineering](#) at the [University of Michigan](#), and co-founder of [Arbor Networks, Inc.](#) Prior to joining academia, he was a Research Staff Member at the IBM T.J. Watson Research Center in New York. Farnam's research is aimed at the study of scalability, dependability and security of networked systems and applications. His interests include distributed computing, network security, and network protocols and architectures. Farnam's research at the University of Michigan has been funded by the National Science Foundation, US Department of Homeland Security, DARPA, ONR, Cisco, Intel, Hitachi and IBM.

Farnam has led several research efforts aimed at developing new protocols and architectures for ensuring dependability of network infrastructures in the presence of security attacks, hardware and software failures, and operational faults. In the mid 90's, Farnam launched the Internet Performance Measurement and Analysis (IPMA) project, a joint research effort of the University of Michigan and Merit Network, aimed at studying the growth and scalability of the Internet backbone routing infrastructure. This work was motivated by the explosive growth in size and topological complexity of the Internet and the increasing strain on the underlying infrastructure. The project deployed the first backbone routing probes across the major Internet public exchange points in 1996. The analysis of inter-domain routing behavior based on this data has led to the discovery of BGP routing instability and inter-domain delayed convergence, which served as a catalyst for significant changes in commercial Internet routing software.

In early 2000, Farnam led a research effort (the Lighthouse Project) aimed at developing a flow-based system for detecting, backtracing and resolving network-wide anomalies such as distributed denial-of-service (DDoS) attacks and routing exploits. This research project, sponsored in part by DARPA and Cisco Systems, has formed the basis for [Arbor Networks'](#) commercial technology, Peakflow. This solution has been widely deployed by more than 100 Internet Service Providers and numerous mission-critical government and enterprise networks around the globe. As Chairman of Arbor Networks, he is responsible for setting strategic direction of the company, leading corporate development and partnership discussions and working with strategic investors on the board.

Farnam is currently leading the Internet Motion Sensor Project, a collaborative research project (with Merit Network) aimed at observing and characterizing security threats on a global scale. The key idea is that by monitoring unused IP addresses (dark spaces), one could gain a network-wide understanding of cyber threats and their impact globally. The current IMS deployment consists of more than 60 distinct monitored blocks at 25+ organizations across the Internet, monitoring over 17 million unique IP addresses corresponding to more than 1.25% of all routed IPv4 space. The IMS system is being used by the ISP operational community as a reconnaissance tool, serving as an early warning system for brewing attacks. The data from the IMS project has been used to gain new insights into subtle characteristics of several recent Internet attacks and their impact on the underlying global infrastructure.

The author of over 80 published research papers, Farnam has served on dozens of advisory boards and government panels in recent years, including Internet2's External Relations Advisory Council, co-chair of NSF GENI Industry Relations Committee, and National Advisory Board for UM Office of Technology Transfer. He was the 2005 recipient of the Governor's University Award for Commercialization Excellence. He is also the recipient of a National Science Foundation CAREER Award, the Amoco Teaching Award, the University of Michigan College of Engineering Teaching Excellence Award, the Eta Kappa Nu Professor of the Year Award, and an IBM Outstanding Technical Innovation Award. He was an associate editor of IEEE Transactions on Computers from 1995-99, and is serving on the editorial board of the International Journal of Time-Critical Computing Systems. Farnam holds a master's degree and a Ph.D. in Computer Science from the University of Texas at Austin.

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TECHNICAL INTERESTS

Distributed Computing; Network Security; Network Protocols and Architectures.

EDUCATION

UNIVERSITY OF TEXAS AT AUSTIN
Doctor of Philosophy degree in Computer Science, 1989.
Master of Science in Computer Science, Minor in Electrical Engineering, 1987.

UNIVERSITY OF TEXAS AT SAN ANTONIO
Bachelor of Science in Mathematics, Computer Science, and System Design, May 1982,
Summa cum Laude.

PROFESSIONAL EXPERIENCE

UNIVERSITY OF MICHIGAN
Professor, EECS Department (Sept. 2001 - Present)
Associate Professor, EECS Department (Sept. 1995 – August 2001)
Assistant Professor, EECS Department (Sept. 1993 – August 1995)

ARBOR NETWORKS
Founder and Chairman (January 2001 – Present)

IBM T.J. WATSON RESEARCH CENTER (March 1989 - July 1993)
Research Staff Member, Cluster Software Architecture Group.

UNIVERSITY OF TEXAS AT AUSTIN (August 1984 - February 1989)
Research assistant with the Real-Time Systems Group on the SARTOR project.

MICROSOFTWARE DEVELOPMENT ASSOCIATES, INC. (June 1982 - 1983)
Systems analyst responsible for design & development of business application software.

HONORS AND AWARDS

Governor's University Award for Commercialization Excellence (U-ACE), 2005.
EECS Outstanding Faculty Achievement Award, 2005.
Ernst & Young Entrepreneur of the Year Finalist, 2003.
Amoco Faculty Teaching Award, University of Michigan, 2000.
National Science Foundation CAREER Award, 1995.

College of Engineering Teaching Excellence Award, University of Michigan, 1997-98.
EECS Department Teaching Excellence Award, University of Michigan, 1995-96.
Eta Kappa Nu Honor Society EECS Professor of the Year, University of Michigan, 1995.
IEEE Service Award for serving as Program Chair of Real-Time Sys. Symposium, 1993.
IBM Research Division Award, 1992.
IBM Outstanding Technical Innovation Group Award, 1992.
Elected vice president of UTSA chapter of Upsilon Pi Epsilon honor society, 1981-82.
Elected to Eta Kappa Nu, Phi Kappa Phi and Alpha Chi honor societies.

R&D PROJECTS DIRECTED or CO-DIRECTED

“Topology-Aware Internet Threat Detection Using Pervasive Darknets” Sponsored by the National Science Foundation. (PI)

“Detecting and Dismantling Botnet Command and Control Infrastructure using Behavioral Profilers and Bot Informants” Sponsored by the Department of Homeland Security. (PI)

“Internet Motion Sensor” Sponsored Intel, Cisco, and DHS. (PI)

“Virtual Center for Network and Security Data” Sponsored by the Department of Homeland Security. (PI)

“Multi-Tiered Distributed Indication, Warning and Defense System” Sponsored by NSA.

“Lighthouse Project: Detecting and Surviving Large-Scale Network Infrastructure Attacks” Sponsored by DARPA, Cisco and Intel. (PI)

“IPMA Project: Internet Performance Measurement & Analysis” Sponsored by the National Science Foundation. (Co-PI)

“Experimentation with Multi-Threaded, Distributed Routing Technology in the Internet,” Sponsored by the National Science Foundation. (PI)

“Development of Ultra High Speed Next Generation Internet Technology,” Sponsored by Hitachi Corporation. (Co-PI)

“Middleware Services for Collaboratories on Wide-Area Networks,” Sponsored by Intel and IBM. (PI)

“The SPARC Project: Collaborative Knowledge-Work Environments for Team Science,” Sponsored by the National Science Foundation. (Co-PI)

“End-to-End Performance Studies of Web-Based Groupware and Collaborative Applications over the Internet,” Sponsored by Hewlett-Packard Company. (PI)

“Enabling Multimedia-Based Collaboration over Computer networks,” Sponsored by the AT&T Foundation. (PI)

“Probing and Fault Injection of Distributed Protocols,” Sponsored by the National Science Foundation and the Office of Naval Research. (PI)

REPRESENTATIVE PROFESSIONAL ACTIVITIES AND SERVICES

Recent Broad Memberships and Advisory Committees:

Arbor Networks, Chairman of the Board, 2001 – present.
Internet2 External Relations Advisory Council (ERAC), Member, 2007 – present.
NSF GENI, Co-chair, Industry Relations Committee, 2007 – present.
UM Office of Technology Transfer, National Advisory Board, 2006-present.
Ann Arbor IT Zone, Board Member, 2004 – present.
Dartmouth Institute of Security Technology Studies, Advisory Committee, 2004 –2006.
WSU, Computer Science Department Advisory Committee, 2005-present.

Editorship and Technical Committees:

Program Chair, ACM Workshop on Recurring Malcode (WORM) 2006.
Chair, IFIP Workshop on "Infrastructure Security and Operational Challenges of Service Provider Networks" June 2006.
Program Chair, IEEE Distributed Systems and Networks (DSN), FTCS-30, 2000.
General Chair - 15th IEEE Real-Time Systems Symposium, 1994.
Program Chair - 14th IEEE Real-Time Systems Symposium, 1993.
Editor, IEEE Transactions on Computer, 1995-99.
Associate Editor, Real-Time Systems Journal, 1997-present.
Program Committee Vice Chair, Fault-Tolerance Track, 21st ICDCS, 2000.
Program Committee Vice-Chair, Distributed Real-Time Systems, 16th ICDCS, 1996.
Over 20 program committees of technical conferences and symposia, 2000-present.

National Science Foundation Review Panels, 2000-2007:

- CAREER Panel, NSF CISE Directorate.
- Site Visit Panel, Research Infrastructure, CISE Directorate.
- SBIR Panel, CISE Directorate.
- NSF Infrastructure Panel, CISE Directorate.
- Combined Research-Curriculum Development Panel, Engineering Directorate.
- Operating Systems and Compiler Panel, CISE Directorate.
- ITR, CISE Directorate.
- NeTS Networking of Sensor Systems, CISE Directorate.
- CyberTrust Program, CISE Directorate.
- FIND Panel, NSF CISE Directorate.

External Review Panel, Office of Naval Research, Info. Tech. Division, July 2007.

External Review Panel, Office of Naval Research, Info. Tech. Division, August 2000.

Member of NSF Working Group on "Future Scenarios for Networking Research and Associated Infrastructure Support" March 1999.

Member of the IEEE Computer Society and the Association for Computing Machinery.

Member of IFIP Working Group 10.4 on Dependability.

MAJOR COMMITTEE ASSIGNMENTS AT THE UNIVERSITY OF MICHIGAN

Interim Chair, Computer Science and Engineering, 2007.

UM Office of Technology Transfer National Advisory Board, 2006-present.

OVRP Task Force on Enhancing Industry Relationships, 2006-2007.

Computer Science and Engineering Faculty Search Committee, 2005-present.

Computer Science and Engineer Executive Committee, 2003-05.
Faculty Advisor, Eta Kappa Nu EE Undergraduate Honor Society, 2005-present.
EECS Internal Review Committee, Chair, 2004.
CAEN/CoE IT Advisory Committee, 2003 – present.
University IT Security Council, 2004 – present.
President's Commission on Information Revolution, 2000-2001.
 Subcommittee on Network Infrastructure, Chair.
 Subcommittee on Research, Co-chair.
Faculty Advisory Board, CoE Technology Transfer and Commercialization, 2002-2004.
Faculty Associate to OVPR, IBM Relationship.
CSE Faculty Search Committee, Computer Science & Engineering Division, 1997-2000.
Faculty Advisor, Eta Kappa Nu EE Undergraduate Honor Society, 1995-1999.
Fellowships and Financial-aid Chair, Computer Science & Engineering, 1994-98.
Computer Science & Engineering Graduate Admissions Committee, 1994-98.
EECS Department Graduate Affairs Committee, 1994-98.
College of Engineering Information Technology Advisory Committee, 1996-97.
EECS Departmental Review Committee, 1996.

DOCTORAL COMMITTEES CHAIRED

Wu-chi Feng – August 96

“Video-on-Demand services: Efficient Transportation and Decompression of Variable Bit Rate Video”

Scott Dawson – December 97

“Message Level Fault Injection in Distributed Systems”

Monica Brockmeyer – May 99

“Monitoring, Testing, and Abstractions of Real-Time Specifications”

Craig Labovitz – August 99

“Scalability of Internet Backbone Routing Infrastructure”

Hengming Zou – December 99

“Dynamic Active-Passive Replication”

G. Robert Malan – December 99

“Transparent Measurement and Manipulation of Internet Protocols”

Scott Johnson – December 2001

“Scalable Group Composition”

David Watson – May 2004

“Measurement and Analysis of Routing Protocol Behavior on Production Networks”

Junghee Han – December 2004

“Enhancing End-to-end Availability and Performance by Leveraging Internet Redundancy”

Michael D. Bailey – May 2006

“A Scalable Hybrid Network Monitoring Architecture for Measuring, Characterizing, and Tracking Internet Threat Dynamics”

Evan Cooke – May 2007

“Exposing Internet Address Use to Enhance Network Security”

SELECTED REFEREED PUBLICATIONS 1994-2007

- Michael Bailey, Jon Oberheide, Jon Andersen, Z. Morley Mao, Farnam Jahanian, and Jose Nazario, "[Automated Classification and Analysis of Internet Malware.](#)" 10th International Symposium Recent Advances in Intrusion Detection (RAID), Queensland, Australia, Sept. 2007.
- Jon Oberheide, Evan Cooke, and Farnam Jahanian, "Rethinking Antivirus: Executable Analysis in the Network Cloud," [2nd USENIX Workshop on Hot Topics in Security](#) (HotSec), Boston, MA, August 2007.
- Sushant Sinha, Michael Bailey, and Farnam Jahanian, "[Shedding Light on the Configuration of Dark Addresses.](#)" Network and Distributed System Security Symposium (NDSS), San Diego, California, February 28-March 2, 2007.
- Evan Cooke, Andrew Myrick, David Rusek, and Farnam Jahanian, "[Resource-Aware Multi-Format Network Security Data Storage.](#)" Proc. of the SIGCOMM Workshop on Large Scale Attack Defense (LSAD'06), September 2006.
- Sushant Sinha, Farnam Jahanian, and Jignesh Patel, "WIND: Workload-aware Intrusion Detection," 9th International Symposium on Recent Advances in Intrusion Detection (RAID), Hamburg, Germany, Sept. 2006.
- Evan Cooke, Z. Morley Mao, and Farnam Jahanian, "[Hotspots: The Root Causes of Non-Uniformity in Self-Propagating Malware.](#)" International Conference on Dependable Systems and Networks (DSN 2006), Philadelphia, PA, pp. 179-188, June 2006.
- By Junghee Han, David Watson, Farnam Jahanian, "[An Experimental Study of Internet Path Diversity.](#)" [IEEE Transactions on Dependable and Secure Computing](#), vol. 3, no. 4, pp. 273-288, Oct-Dec, 2006.
- Evan Cooke, Michael Bailey, Farnam Jahanian, and Richard Mortier, "[The Dark Oracle: Perspective-Aware Unused and Unreachable Address Discovery.](#)" 3rd Symposium on Networked Systems Design and Implementation (NSDI06), San Jose, CA, May 2006.
- Michael Bailey, Evan Cooke, Farnam Jahanian, Niels Provos, Karl Rosaen, and David Watson, "[Data Reduction for the Scalable Automated Analysis of Distributed Darknet Traffic.](#)" Internet Measurement Conference (IMC 2005), Oct. 2005.
- Michael Bailey, Evan Cooke, Farnam Jahanian, Jose Nazario, and David Watson, "[The Blaster Worm: Then and Now.](#)" IEEE Security & Privacy Magazine, volume 3, issue 4, pp. 26- 31, July-Aug. 2005.
- Evan Cooke, Farnam Jahanian, and Danny McPherson, "[The Zombie Roundup: Understanding, Detecting, and Disrupting Botnets.](#)" Usenix Workshop on Steps to Reducing Unwanted Traffic on the Internet (SRUTI 2005), Cambridge, MA, July 2005.
- Junghee Han, David Watson, and Farnam Jahanian, "[Topology Aware Overlay Networks.](#)" IEEE Infocom, Miami, FL, March 2005.
- Michael Bailey, Evan Cooke, Farnam Jahanian, Jose Nazario, and David Watson, "[The Internet Motion Sensor: A Distributed Blackhole Monitoring System.](#)" Proceedings of the 12th Annual Network and Distributed System Security Symposium (NDSS), San Diego, CA, Feb. 2005.
- Evan Cooke, Michael Bailey, Z. Morley Mao, David Watson, Farnam Jahanian, and Danny McPherson, "[Toward Understanding Distributed Blackhole Placement.](#)" WORM'04, Washington, DC, pp. 56-64, October 2004.
- Junghee Han and Farnam Jahanian, "[Impact of Path Diversity on Multi-homed and Overlay Networks.](#)" IEEE International Conference on Dependable Systems and Networks (DSN-2004), Florence, Italy, pp. 22-31, June 2004.
- David Watson, Matthew Smart, G. Robert Malan, and Farnam Jahanian, "[Protocol Scrubbing: Network Security through Transparent Flow Modification.](#)" IEEE/ACM Transactions on Networking, Vol. 12, no. 2, pp. 261-73, April 2004.
- David Watson, G. Robert Malan, and Farnam Jahanian, "[An extensible probe architecture for network protocol performance measurement.](#)" vol. 34, Software Practice & Experience, 2004.
- David Watson, Farnam Jahanian, and Craig Labovitz, "[Experiences with Monitoring OSPF on a Regional Service Provider Network.](#)" 23rd IEEE International Conference on Distributed Computing Systems (ICDCS), pp. 204-213, May 2003.

- Junghee Han, G. Robert Malan, and Farnam Jahanian, "[Fault-tolerant virtual private networks within an autonomous system.](#)" Proceedings of 21st IEEE Symposium on Reliable Distributed Systems, pp. 13-16, Oct. 2002.
- C. Labovitz, A. Ahuja, A. Bose, and F. Jahanian, "[Delayed internet routing convergence.](#)" IEEE/ACM Transactions on Networking, vol. 9, no. 3, pp. 293-306, June 2001.
- D. Stuart, M. Brockmeyer, F. Jahanian, and A. Mok, "[Simulation and Verification: Biting at the State Explosion Problem.](#)" vol. 27, no. 7, pp. 599-617, IEEE Transactions on Software Engineering, July 2001.
- D. Watson, M. Smart, G.R. Malan, and F. Jahanian, "[Protocol scrubbing: network security through transparent flow modification.](#)" Proceedings of DISCEX'01: DARPA Information Survivability Conference & Exposition II, Vol. 2, pp. 108-118, June 2001.
- M. Brockmeyer, F. Jahanlan, C. Heitmeyer, and E. Winner, "[A flexible, extensible simulation environment for testing real-time specifications](#)" IEEE Transactions on Computers, Vol. 49, no. 11, pp. 1184-2001, Nov. 2000.
- S. Johnson, F. Jahanian, A. Miyoshi, D. de Niz, R. Rajkumar, "[Constructing real-time group communication middleware using the Resource Kernel.](#)" 21st IEEE Real-Time Systems Symposium, pp. 3-12, Nov. 2000.
- C. Labovitz, A. Ahuja, A. Bose, and F. Jahanian, "An Experimental Study of BGP Convergence," in Proceedings of ACM SIGCOMM 2000, Stockholm, Sweden, pp. 175-87, August 2000.
- M.C. Smart, R.G. Malan, and F. Jahanian, "Defeating TCP/IP Stack Fingerprinting," 9th USENIX Security Symposium, Denver, CO, pp. 229-39, August 2000.
- S. Johnson, F. Jahanian, S. Ghosh, B. VanVoorst, N. Weininger, "[Experiences with Group Communication Middleware.](#)" Practical Experience Report, Int. Conference on Dependable Systems and Networks (DSN-2000), New York, NY, pp. 37-42, June 2000.
- R. Malan, D. Watson, F. Jahanian, and Paul Howell, "[Transport and Application Protocol Scrubbing.](#)" Proceeding of INFOCOM2000, Israel, Vol. 3, pp. 1381-90, March 2000.
- H. Zou, N. Soparkar, F. Jahanian, "[Probabilistic Data Consistency for Wide-Area Applications.](#)" Abstract in 16th International Conference on Data Engineering, pp. 85, Feb-March 2000.
- S. Subramanian, G.R. Malan, H.S. Shim, J.H. Lee, P. Knoop, T. Weymouth, F. Jahanian, A. Prakash, and J. Hardin, "The UARC Web-Based Collaboratory: Software Architecture and Experiences," Chapter 1 in Handbook of Internet Computing, 2000.
- G. Olson, D. Atkins, B. Clauer, T. Weymouth, A. Prakash, T. Finholt, F. Jahanian, C. Rassmussen, "The Upper Atmospheric Research Collaboratory (UARC)," in Coordination Theory and Collaboration Technology, ed. by T. Malone, and J. Smith, Lawrence Erlbaum Associates, 2000.
- H. Zou and F. Jahanian, "[Real-Time Primary-Backup Replication with Temporal Consistency Guarantees.](#)" IEEE Transactions on Parallel & Distributed Systems, vol. 10, no. 6, pp. 533-48, June 1999.
- S. Subramanian, G.R. Malan, H.S. Shim, P. Knoop, T. Weymouth, F. Jahanian, and A. Prakash, "[Software Architecture for the UARC Web-based Collaboratory.](#)" IEEE Internet Computing, vol. 3, no. 2, pp. 46-54, March-April 1999.
- S. Johnson and F. Jahanian, and J. Shah, "[The Inter-Group Router Approach to Scalable Group Composition.](#)" in Proceedings of 19th International Conference on Distributed Computing Systems, ICDCS-99, Austin, TX, pp. 4-14, June 1999.
- C. Labovitz, A. Ahuja, and F. Jahanian, "[Experimental Study of Internet Stability and Wide-Area Backbone Failures.](#)" in Proceedings of FTCS-29, the 29th International Symposium on Fault-Tolerant Computing Madison, Wisconsin, pp. 278-285, June 1999.
- T. Abdelzaher, S. Dawson, W.-C. Feng, F. Jahanian, S. Johnson, A. Mehra, T. Mitton, A. Shaikh, K. Shin, Z. Wang, and H. Zou, "ARMADA Middleware and Communication Services," Real-Time Systems Journal, vol. 16, no. 2-3, pp. 127-53, May 1999.
- C. Labovitz, G.R. Malan, and F. Jahanian, "[Origins of Internet Routing Instability.](#)" in Proceedings of INFOCOM99, New York, NY, vol. 1, pp. 218-26, March 1999.
- Craig Labovitz, G. Robert Malan, and Farnam Jahanian, "[Internet Routing Instability.](#)" ACM/IEEE Trans. on Networking, vol. 6, no. 5, pp. 515-528, Oct. 1998.

- Hengmin Zou and Farnam Jahanian, "[Optimization of a Real-Time Primary-Backup Replication Service.](#)" Proceedings of the IEEE Symposium on Reliable Distributed Systems, Oct. 1998.
- G. Robert Malan and Farnam Jahanian, "[An Extensible Probe Architecture for Network Protocol Performance Measurement](#)" Proceedings of the ACM SIGCOMM '98 Conference, Vancouver, British Columbia, Sept. 1998.
- Hengmin Zou and Farnam Jahanian, "[Real-Time Primary-Backup Replication with Temporal Consistency Guarantees.](#)" Proceedings of the IEEE International Conference on Distributed Computing Systems, Amsterdam, The Netherlands, June 1998.
- G. R. Malan, F. Jahanian, and S. Subramanian, "Attribute-Based Data Dissemination for Internet Applications," Journal of High-Speed Networking Special Issue Multimedia Networking, Vol. 7, Number 3-4, pp. 319-337, 1998.
- G. Olson, D. Atkins, R. Clauer, T. Finholt, F. Jahanian, T. Killeen, A. Prakash, T. Weymouth, "The Upper Atmospheric Research Collaboratory," ACM Interactions Magazine, v. 3, pp. 48-55, May-June 1998.
- Scott Dawson, Farnam Jahanian, and Todd Mitton, "Experiments on Six Commercial TCP Implementations Using a Software Fault Injection Tool," Software Practice and Experience, vol. 27, no. 12, pp. 1385-1410, December 1997.
- G. Robert Malan, Farnam Jahanian, and Sushila Subramanian, "[Salamander: A Push-based Distribution Substrate for Internet Applications](#)" Proceedings of the USENIX Symposium on Internet Technologies and Systems, December 1997; Monterey, California.
- C. Labovitz, G.R. Malan, and F. Jahanian, "Internet Routing Instability," Proceedings of ACM SIGCOMM, Best Student Paper Award, Sept. 1997. ([Extended version](#) in ACM/IEEE Transaction on Networking, Oct. 1998.)
- Mehra, J. Rexford, and F. Jahanian, "[Design and Evaluation of a Window-Consistent Replication Service.](#)" IEEE Transactions on Computer, vol. 46, no. 9, Sept. 1997.
- H.-S. Shim, R. Hall, A. Prakash, and F. Jahanian, "[Providing Flexible Services for Managing Shared State in Collaborative Systems.](#)" in Proceedings of the European Conference on Computer Supported Cooperative Work (ECSCW 97)}, Lancaster, UK, September 1997.
- W. Feng, F. Jahanian, and S. Sechrest, "[An Optimal Bandwidth Allocation Algorithm for the Delivery of Compressed Video.](#)" ACM/Springer Verlag Multimedia Systems Journal, pp. 297-309, Sept. 1997.
- M. Brockmeyer, F. Jahanian, C. Heitmeyer, B. Labaw, "[A Flexible, Extensible Simulation Environment for Testing Real-Time Specifications.](#)" in Proceedings of IEEE Real-Time Technology & Applications Symposium, Montreal, pp. 125-35, June 1997.
- G. Robert Malan, Farnam Jahanian, and Peter Knoop, "[Comparison of Two Middleware Data Dissemination Services in a Wide-Area Distributed System.](#)" Proceedings of the 17th IEEE International Conference on Distributed Computing Systems, Baltimore, MD, pp. 411-419, May 1997.
- R. W. Hall, A. G. Mathur, F. Jahanian, A. Prakash, and C. Rasmussen, "Corona: A Communication Service for Scalable, Reliable Group Collaboration Systems," Proceedings of the ACM Conf. on Computer Supported Cooperative Work (CSCW '96), 1996.
- Scott Dawson, Farnam Jahanian, and Todd Mitton, "[ORCHESTRA: a probing and fault injection environment for testing protocol implementations.](#)" Proceedings of IEEE International Computer Performance and Dependability Symposium, Sept. 1996.
- W. Feng, F. Jahanian, S. Sechrest, "[Providing VCR Functionality in a Constant Quality Video-On-Demand Transportation Service.](#)" IEEE Multimedia Computing Systems, Hiroshima, Japan, pp. 127-135, June 1996.
- T. Abdelzaher, A. Shaikh, F. Jahanian, and K. Shin, "[RTCAST: Lightweight Multicast for Real-Time Process Groups.](#)" (Best Student Paper Award) IEEE Real-Time Technology and Applications Symposium, pp. 250-259, June 1996.
- Scott Dawson, Farnam Jahanian, Todd Mitton, and Teck-Lee Tung, "[Testing of Fault-Tolerant and Real-Time Distributed Systems via Protocol Fault Injection.](#)" Int. Symposium on Fault Tolerant Computing (FTCS-26), pp.404-414, June 1996.
- Scott Dawson and Farnam Jahanian, "Probing and Fault Injection of Dependable Distributed Protocols," The Computer Journal, Vol. 38, No. 4, 1995.

- Scott Dawson, Farnam Jahanian, and Todd Mitton, "[A Software Fault Injection Tool on Real-Time Mach.](#)" in Proc. IEEE Real-Time Systems Symposium, pp. 130-140, December 1995.
- Scott Dawson and Farnam Jahanian, "[Probing and Fault Injection of Protocol Implementations.](#)" Proceedings of Int. Conf. on Distributed Computer Systems, pp. 351-359, May 1995.
- Farnam Jahanian and Al Mok, "[Modechart: A Specification Language for Real-Time Systems.](#)" IEEE Transactions on Software Engineering, vol. 20, no. 12, pp. 933-947, Dec. 1994.