Kishor S. Trivedi
Curriculum Vitae

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EDUCATION

Ph.D. in Computer Science, University of Illinois, Urbana, 1974.

M.S. in Computer Science, University of Illinois, Urbana, 1972.

B. Tech. in Electrical Engineering, Indian Institute of Technology, Bombay, India, 1968.

POSITIONS HELD

- Fitzgerald S. Hudson Professor of Electrical and Computer Engineering, Duke University, Durham, NC, 2000 - present.
- Fulbright Visiting Lecturer to India, Nov. 2002-May 2003.
- Professor of Electrical and Computer Engineering, Duke University, Durham, NC, 1991 - 2000.
- Professor of Computer Science, Duke University, Durham, NC, 1983 - present.
- Site Director, Center for Advanced Computing and Communication, a joint NSF IUCRC between North Carolina State University and Duke University, 1994- present.
- Poonam and Prabhu Goel Professor of Computer Science and Engineering, Indian Institute of Technology, Kanpur, Aug. 2002- May 2003.
- Visiting Fellow, Computing Laboratory, Univ. of Newcastle upon Tyne, England, summer 1989.
- Consultant, Digital Equipment Corporation, Sept. 1988- May 1989.
- Associate Professor of Comp. Science and Elec. Eng., Duke Univ., NC, 1979 - 1983.
- Visiting Scientist, IBM Watson Research Center, July 1981 - Dec. 1981.
- Visiting Professor, IISc, Banglore, India, Jan. - Feb. 1982.
- Visiting Scientist, National Aeronautics Laboratory, Banglore, India, Jan. - Feb. 1982.
- Visiting Professor, Technical University of Graz, Austria, Mar. - Apr. 1982.
- Visiting Professor, University of Paris-Sud, France, May - July 1982.
- Assistant Professor of Computer Science, Duke University, Durham, NC, 1975 - 1979.
- Consultant to various industries and research laboratories.
- Visiting Scientist, ICASE, NASA Langley Research Center, VA, Summers, 1976, 1993, 1994, 1995, 1996.
- Research Associate, Department of Computer Science at the University of Illinois, 1974 - 1975.
- Research Assistant, Department of Computer Science, University of Illinois, 1970 - 1974.
- Associate Customer Engineer, IBM World Trade Corporation, Bombay, India, 1968 - 1970.

RESEARCH INTERESTS

Fault-tolerant computing, Markov chains, Modeling tools, Performance modeling, Performability modeling, Reliability modeling, Software reliability.

HONORS

- Panel member, US Nuclear Regulatory Commission, Expert Panel on Digital System Research, Sept. 1999.
- IEEE Computer Society Golden Core Award

- Distinguished Lecturer at the Johns Hopkins University, Case Western Reserve University, University of Wisconsin, University Southern California, Purdue University, Penn State University and University of Central Florida.
- IEEE Computer Society Meritorious Service Award for dedicated service as an Editor of Transactions on Computers.
- Panel member, NSF CER Review panel, 1984. Member of the Academic Assessment Committee for the Autonomous Spacecraft Study Group, JPL, 1981.
- A principal speaker at NASA Working Group II Meeting on Validation Methods Research for Fault Tolerant Avionics and Control Systems, 1980.
- Distinguished Visitor of the *IEEE Computer Society* for 1978-1981.
- *ACM National Lecturer,*1981-1983.
- Best paper award at the ACM SIGMETRICS, IFIP PERFORMANCE '86 joint conference.
- Best paper award at the ACM/NBS Symposium on Pathways to System Integrity, Washington, DC, June 1980.
- Certificate of appreciation from IEEE Computer Society for dedicated service as a distinguished visitor, 1978 - 1981.
- 2008 IEEE Computer Society Technical Achievement Award.
- **Undergraduate Awards:**
  National Merit Scholar (1963-68). Institute Merit Scholar (1964-68)
- **Graduate Honors:**
  Cumulative Grade Point (GPA) - 5.00.

MEMBERSHIPS

Fellow of IEEE and IEEE Computer Society.
IFIP Working Group 10.4 on Fault-Tolerant Computing.
IFIP Working Group 7.3 on Performance Modeling.

EDITORSHIPS

Area Editor (Performance Modeling), *IEEE Transactions on Computers (1983- 1987).*
Area Editor (Performance Modeling), *Journal of Parallel and Distributed Computing (1986-1989).*
Area Editor (Reliability Modeling), *Journal of Electronic Testing (JETTA) (1990-1998).*
Guest Editor, *IEEE Transactions on Parallel and Distributed Systems*, Sept. 1992 issue.
Chair, IEEE Computer Society Transactions Operations Committee (1993-1994).
Voting Member, IEEE Computer Society Publications Board (1993-1994).
Guest Editor, *IEEE Trans. on Computers* , Jan 1995 special issue on Fault-tolerant systems. On the Editorial Board of *IEEE Transactions on Dependable and Secure Computing (2004-).*

CONFERENCE CHAIRMANSHIPS

Program Chair, *IEEE Symposium on Computer Arithmetic,* Ann Arbor, MI, 1981.
General Chair, *First International Workshop on Timed Petri Nets*, Torino, Italy, 1985.
Program Co-Chair, *IFIP PERF'86 and ACM SIGMETRICS Joint Conf.*, Raleigh, NC, 1986.
Program Co-Chair, *Eleventh Symposium on Reliable Distributed Systems*, Houston, TX, 1992.
Chair, *Workshop on the Evaluation of CARE III, Computer-Aided Reliability Estimator*, 1980.
Chair, *Workshop on HARP, Hybrid Automated Reliability Predictor*, 1990.
General Chair, *Petri Nets and Performance Models '95.*
Program Co-Chair, *Inter. Computer Perf. and Dependability Symp. (IPDS'96).*
Vice-General Chair, *FTCS 97*, Seattle, June 1997.
General Chair, *Symposium on Reliable Distributed Systems (SRDS 97)*, Durham , NC, Oct. 1997.

General Chair, *Inter. Computer Perf. and Dependability Symp. (IPDS'98)*, Durham NC, Sept. 1998.

PROGRAM COMMITTEE MEMBERSHIPS

Major conferences on Computer Arithmetic, Computer Performance, Distributed Computer Systems, Fault-Tolerant Computing, Markov Chains, Performance-Reliability Models of Computer-Communication Systems, Petri Nets and Performance Models, Software Reliability Engineering, Reliability/Availability Modeling.

UNIVERSITY SERVICE

- Undergraduate Admissions Committee (1 year)
- Appointment, Promotion and Tenure Committee (3 years)
- UFCAS (2 years)
- Science and Engineering Task Force (1 year)
- Patent Policy Committe (1 year)
- SRC Planning Committee (1 year).

PH.D. DISSERTATIONS SUPERVISED

1. Lt. Col. R. L. Leech, EQN Models for the Analysis and Design of a Computer Network of Functionalized Processors Department of Electrical Engineering, Duke University, July 1977. Currently with IBM Communications Division.

2. R. E. Kinicki, Queuing Models for Computer Configuration Planning, Department of Computer Science, Duke University, Apr. 1978. Currently Professor in the Comp. Sc. Dept., WPI.

3. Timothy M. Sigmon, Performance-Oriented Design Models of Computer Systems, Department of Computer Science, Duke University, Aug. 1979. Currently at Univ. of Virginia.

4. Anna von Mayrhauser, Performance-Oriented Design of Interactive Computer Systems, Department of Computer Science, Duke University, Dec. 1979. Currently chaired Professor at Washington State University.

5. Joseph G. Rusnak, Performance Synthesis Techniques to Minimize the Turnaround Time of Batch-Oriented Multiprogrammed Computer Systems, Dept. of Comp. Sc., Duke University, Sept. 1980. Currently with IBM Communications Products Division.

6. M. Smotherman, Parametric Error Analysis and Coverage Approximations in Reliability Modeling, Dept. of Comp. Sci., Univ. of North Carolina, Chapel Hill, May 1984. Currently Professor at Clemson University.

7. J. Bechta Dugan, Extended Stochastic Petri Nets: Applications and Analysis, Dept. of Electrical Engineering, Duke University, Durham, July 1984. Currently Full Professor (and an IEEE Fellow) at the University of Virginia.

8. R. A. Sahner, A Hybrid, Combinatorial-Markov Method of Solving Performance and Reliability Models, Dept. of Comp. Sc., Duke University, Dec. 1985. Currently with Motorola.

9. V. F. Nicola, Performance, Reliability and Queueing Analysis of Fault-Tolerant Computer Systems, Dept. of Comp. Sc., Duke University, Apr. 1986. Currently with Univ. of Twente, the Netherlands.

10. Roger M. Smith, Markov Reward Models: Application Domains and Solution Methods, Dept. of Comp. Sc., Duke University, Sept. 1987. Currently with Yale University.

11. A. Reibman, Transient Analysis of Large, Stiff Markov Models: Numerical and Approximate Solution Techniques, Dept. of Comp. Sc., Duke University, Oct. 1987. Currently with Syncsort, Woodcliff Lake, NJ.

12. J. Blake, Comparative Analysis of Multistage Interconnection Networks, Dept. of Comp. Sc., Duke University, Dec. 1987. Currently with Resource Consultants, Inc.

13. M. Veeraraghavan, Modelling and Evaluation of Fault-Tolerant Multiple Processor Systems, Dept. of Electrical Engineering, Duke University, Aug. 1988. Currently Director of Computer Engineering, Joint Associate Professor of Compute r Science and Electrical and Computer Engineering at University of Virginia.

14. P. Chimento, System Performance in a Failure-Prone Environment, Dept. of Comp. Sc., Duke University, Nov. 1988. Currently with Ericsson, Maryland.

15. P. Thambidurai, Critical Issues in the Design of Distributed, Fault-Tolerant, Hard Real-Time Systems, Dept. of Electrical Engineering, Duke University, Dec. 1988. Currently with Martin Marietta.

16. Gianfranco Ciardo, Analysis of Large Stochastic Petri Net Models. Dept. of Comp. Sc., Duke University, Apr. 1989. Currently Full Professor at the University of California, Riverside.

17. W. E. Smith, Dependability Evaluation and Comparison of Ring Network Architectures, Dept. of Electrical Engineering, Duke University, Apr. 1989. Currently with IBM PC Division.

18. Ray Houghton, Performance Evaluation of Task Graphs on Parallel Architectures, Dept. of Comp. Sc., Duke University, Dec. 1990. Currently with Skidmore College Saratoga Springs, NY.

19. Jogesh Muppala, Performance and Dependability Modeling Using Stochastic Reward Nets, Dept. of Electrical Engineering, Duke University, Apr. 1991. Currently with Hong Kong Institute of Science and Technology.

20. Manish Malhotra, Specification and Solution of Dependability Models of Fault-Tolerant Systems, Dept. of Comp. Sc., Duke University, Apr. 1993. Currently with AT & T, Holmdel, NJ.

21. Hoon Choi, Performance and Reliability Modeling using Markov Regenerative Stochastic Petri Nets, Dept. of Comp. Sc., Duke University, Apr. 1993. Currently with Chungnam National University, Korea.

22. Steve Woolet, Performance Analysis of Computer Networks, Dept. of Electrical Engineering, Duke University, Apr. 1993. Currently with IBM Communications Products Division.

23. Varsha Mainkar, Solutions of Large and Non-Markovian Performance Models, Dept. of Comp. Sc., Duke University, August 1994. Currently an Associate Professor at IIT Bombay, India.

24. Dimitris Logothetis, Transient Analysis of Communication Networks, Dept. of Elect. Eng., Duke University, Oct. 1994. Currently with Atmel Corporation, Athens, Greece.

25. Chang-Yu Wang, Non-Markovian Models for the Analysis of Computers and Networks, Dept. of Computer Science, Duke University, Oct. 1995. Currently, Cisco Systems, CA.

26. Lorrie Tomek, Modeling Hardware and Software Fault Tolerant Systems, Dept. of Computer Science, Duke University, April 1996. Currently with IBM Communications Products Division.

27. Steve Hunter, Performance and Dependability Modeling of Some Switched Network Applications, Dept. of Electrical and Computer Engineering, Duke University, March 1997. Currently with IBM PC Division.

28. Sachin Garg, Proactive Fault Management in Operational Software Systems, Dept. of Elect. and Comp. Eng., Duke University, May 1997. Currently with Bell Labs, Avaya Technologies.

29. Ricardo Fricks, Process Control Systems: Dependability and Performance Modeling, Dept. of Electrical and Computer Engineering, Duke University, May 1997. Currently with Motorola, Fort Worth, Texas.

30. Swapna Gokhale, Software Reliability, Dept. of Electrical and Computer Engineering, Duke University, June 1998. Currently with University of Connecticut.

31. Yue Ma, Composite Performance and Availability Analysis in Wireless Communications Systems, Dept. of Computer Science, Duke University, Aug. 1999. Currently with Motorola, Schaumburg, IL.

32. Xinyu Zang, Dependability Modeling of Computer Systems and Networks, Dept. of Electrical and Computer Engineering, Duke University, Sept. 1999. Currently with Cisco Systems, San Jose, CA.

33. Tong Luo, Design and Analysis of Reliable CORBA-based Software Systems, Dept. of Computer Science, Duke University, March 2000. Currently with Ciena, Cupertino, CA.

34. Yonghuan Cao, Performability Analysis of Wireless Mobile Communication Systems, Dept. of Electrical and Computer Engineering, Duke University, May 2001. Currently with Opnet Technologies, NC.

35. Srinivasan Ramani, Performance and Reliability Analysis of the CORBA Event and Notification Services, Dept. of Electrical and Computer Engineering, Duke University, August 2001. Currently wih IBM, RTP, NC.

36. Kalyanraman Vaidyanathan, Proactive Management of Software Systems: Analysis and Implementation, Dept. of Electrical and Computer Engineering, Duke University, September 2002. Currently with SUN Microsystems, San Diego.

37. Dongyan Chen, Analysis and Mitigation of Failures in Communication System with Discrete and Fluid Models, Dept. of Electrical and Computer Engineering, Duke University, March 2003.

38. Wei Xie, Availability and Performance Evaluation of E-Business Systems, Dept. of Electrical and Computer Engineering, Duke University, Sept. 2003. Currently with AT & T, New Jersey.

39. Yujuan Bao, Adaptive Software Rejuvenation, Dept. of Computer Science, Duke University, August 2004. Currently with Microsoft.

40. Dazhi Wang, Service Reliability: Models, Algorithms and Applications, Dept. of Computer Science, Duke University, June 2007. The best dissertation award of the Computer Science Department. Currently at NetApp, California.

41. Vibhu Saujanya Sharma, Performance and Reliability Analysis of Software Architectures, Computer Science & Engineering Department, IIT, Kanpur, India, August 2007.

42. Yun Liu, Survivability of Networked Systems, Dept. of Electrical and Computer Engineering, Duke University, May 2008. Currently with Boeing Commercial Aerplane Co., Seattle.

CURRENT STUDENTS

Yun Liu, Vibhu S. Sharma, Kesari Mishra.

COURSES TAUGHT

1. Data Structures (Undergraduate)

2. Computer Organization and Assembly Language Programming (Undergraduate)

3. Introduction to Operating Systems

4. Introduction to Computer System Analysis

5. Computer Systems Organization (Graduate)

6. Operating System Theory (Graduate)

7. Computer System Analysis (Graduate)

8. Introduction to CMOS VLSI Design (Graduate)

9. Performance and Reliability of Computer Networks (Graduate)

SHORT COURSES TAUGHT

1. Analysis of Computer Performance and Reliability (one day): IEEE/ACM Tutorials for Professional Development, May 1984, Chicago.

2. Computer Systems Modeling: Mathematical Association of America, Minicourse, Aug. 1984, Eugene, OR.

3. Effectiveness Evaluation of Fault-Tolerant Multiple Processor Systems (one day): Int. Conf. on Parallel Processing, Aug. 1984, Aug. 1985.

4. Performance and Reliability Models of Computer Systems: (two-days) , *ACM/IEEE Fall Joint Computer Conference,* Dallas, Texas, Nov. 1986.

5. Modeling Using SHARPE: Digital Equipment Corporation; several times (two-day course).

6. Modeling Using Stochastic Petri Nets: Digital Equipment Corporation; Software Productivity Consortium (two-day course).

7. Markov Modeling (one-day): Boeing Commercial, Italtel.

8. Computer System Reliability Modeling: Techniques and Tools (one-day): University of Southern California on National Satellite TV Network of NTU; Stratus Computers, Inc.; (two-day) at Jet Propulsion Laboratory.

9. Reliability and Availability Modeling Techniques and Tools (two-day): IBM Communications Division, RTP, NC; (3-day) AT & T, Holmdel, NJ, July 1997.

10. Putting Stochastic Petri Nets to Work (one-day); University of Southern California on National Satellite TV Network of NTU.

11. Reliability Modeling; ACM SIGMETRICS 92.

12. Performability Modeling; Performance Tool'92.

13. Dependability and Performability Analysis; Performance'93.

14. Stochastic Petri Nets with Generally Distributed Firing Delays, Sigmetrics'94.

15. Reliability and Availability Modeling Techniques and Tools (one week): HP, Cupertino, CA, 1995.

16. Fluid Stochastic Petri Nets Tutorial, PNPM '97/TOOLS '97 (joint conference), Saint-Malo, France, Jun. 3-6, 1997.

17. Reliability Modeling Using SHARPE, Motorola University, May 98.

18. System Availability Modeling, Motorola University, Dec 98, March 99; Sun Microsystems (Oct. 2000, May 2001), Nokia (Dec. 2002).

19. Architecture Based Software Reliability, Annual Reliability and Maintainability Symposium, (RAMS 2001), Philadelphia, Pennsylvania, Jan. 2001; RAMS 2003.

20. Reliability and Availability Modeling using the SHARPE Software Package, Annual Reliability and Maintainability Symposium, (RAMS 2002), Seattle, Washington, Jan. 2002.

21. Software Aging and Rejuvenation: Modeling and Analysis, ACM SIGMETRICS, June 2002; IFIP Performance, Sept. 2002; ISSRE 2002.

22. Software Reliability and Rejuvenation: Modeling and Analysis, Boeing, Seattle, June 2002.

INVITED CONFERENCE PRESENTATIONS

1. Int. Workshop on Applied Mathematics and Performance/Reliability Models of Computer and Communication Systems, Pisa, 1983 .

2. Int. Conference on Modeling Techniques and Tools for Performance Analysis, Paris, 1984.

3. Int. Workshop on Modeling and Performance Evaluation of Parallel Systems, Grenoble, France, 1984.

4. Workshop on Reliability/Availability Modeling Tools and their Applications, Puerto Rico, 1985.

5. Int. Conference on Modeling Techniques and Tools for Performance Analysis, Sophia Antipolis, 1986.

6. Int. Workshop on Applied Mathematics and Performance/Reliability Models of Computer and Communication Systems, Rome, 1987.

7. Tenth Brazilian Computer Science Congress, 1990.

8. First Int. Workshop on the Numerical Solution of Markov Chains, Raleigh, 1990.

9. First Int. Workshop on Performability Modeling of Computer and Communication Systems, the Netherlands, 1991.

10. IMA Conf. on Linear Algebra, Markov Chains, and Queueing Models, Minneapolis, 1992.

11. 14th Int. Conference on Applications and Theory of Petri Nets, Chicago, June 1993.

12. Second Int. Workshop on Performability Modeling of Computer and Communication Systems, France, 1993.

13. 7th ITG/GI Conference on Measurement, Modelling and Evaluation of Computer and Communication Systems, Aachen University of Technology, Sept. 1993.

14. Int. Conference on Modeling Techniques and Tools for Performance Analysis, Vienna, 1994.

15. NATO ASI Conference on *Reliability and Maintenancce of Complex Systems,* June 1995, Turkey.

16. Reliability 2000 Conference, Zurich, Oct. 1996.

17. DIMACS Workshop on Performance of Realtime Applications on the Internet, Rutgers University, South Plainfield, NJ, Nov. 1996.

18. European Safety and Reliability Association (ESREL '97), Lisbon, Jun. 1997.

19. European Simulation Multi-conference (ESM '97), Istanbul, Jun. 1997.

20. VII Simposio de Computadores Tolerantes a Falhas (VII SCTF), Campina Grande, Brazil, Jul. 1997.

21. First World Congress on systems Simulation (WCSS '97), Singapore, Sept. 1997.

22. Stochastic Processes and Their Applications, Chennai, India, Jan 1998.

23. European Simulation Multiconference ESM'99, Warsaw, Poland, June 1999.

24. Workshop on Modeling of Heterogeneous Networks, Maryland, Oct. 1999.

25. International Conference on Applied Stochastic System Modeling (ASMM'2000), March 29-30, 2000, Kyoto, JAPAN.

26. Workshop on Fault Tolerant Control and Computing, May 22-23, 2000, Seoul, Korea.

27. Keynote speech, 33rd Annual Simulation Symposium, April 2000, Washington, DC.

28. International Conference on Performance and QoS of Next Generation Networking, 27-30 November 2000, Nagoya, Japan.

29. National Academy of Sciences Workshop on Software Reliability, Washington DC, July 2001.

30. Keynote, SHAMAN Workshop, New York, June 2002.

31. Keynote, SPECTS 2002, San Diego, July 2002.

32. Keynote, DPDNS Workshop, Miami, FL, April 2008.

SEMINARS

Over 100 seminars at many universities and industrial labs including, AT&T Bell Labs, Holmdel, Naperville, Murray Hill, Ballistic Missile Defense Advanced Technology Center, Huntsville, Bellcore, NJ, Bendix Aerospace Technology Center, Columbia, MD, Bilkent University, Ankara, Turkey, Boeing, Seattle, City University of hong Kong, Columbia University, Daimler-Benz, Berlin, Department of Transportation, Boston, Mass., Digital Equipment Corp., Draper Laboratory, Ericsson, Sweden, FAA Technical Center, Atlantic City, GE Corporate Research Division, Schenectady, NY, General Dynamics, Greensboro, NC, Honeywell Systems Research Center, Minneapolis, Hong Kong Institute of Science and Technology, Hong Kong Polytechnic University, HP, Cupertino, IBM Res. Center, Yorktown Heights, Infosys, Banglore, Indian Institute of Science, Bangalore, India, Indian Institute of Technology, Bombay, India, Indian Institute of Technology, Kharagpur, India, Indian Institute of Technology, Kanpur, India, Indian Institute of Technology, Chennai, India, Indian Space Research Organization, Banglore, Institute National de Recherche en Informatique et en Automatique, Roquencourt, France, Jet Propulsion Laboratory, Pasadena California, Johns Hopkins University, Lucent Bell Laoratory, Microsoft Research, NASA Langley Research Center, National Aeronautics Laboratory, Banglore, India, National Inst. of Standards and Technology, Naval Ocean Systems Center, Naval Surface Weapons Center, Ohio State University, PennState University, Politecnico di Torino, Italy, Software Productivity Consortium, Southern Methodist University, Stanford University, Stratus Computers, Marlboro, Mass., Technical University of Berlin, Technical University of Vienna, Texas A & M University;, University of Erlangen, University of Illinois at Urbana-Champaign, Univ. of Massachusetts, University of Michigan, University of Torino, Italy, University of Southern California, Univ. of Washington, Univ. of Wisconsin, USAF Rome Laboratories. Vanderbilt University,

RESEARCH GRANTS

1. $107,000 NSF Grant for conducting research in problems of parallel computation, Mar. 1977-Mar. 1979.

2. $145,000 NSF grant for conducting research in the problems of Computer Configuration Design, July 1979-June 1981.

3. $65,000 NASA grant for evaluation of CARE III, a computer-based reliability estimation package, June 1980 - Sept. 1982.

4. $45,000 NASA grant for the design of the Hybrid Automated Reliability Predictor, Oct. 1982 - Sept. 1983.

5. $96,890 NSF grant for the analysis of parallel and distributed systems, Aug. 1983- July 1985.

6. $90,000 NASA grant for the design of the Hybrid Automated Reliability Predictor, Oct. 1983-Sept. 1984.

7. $52,000 IBM grant for modeling the recovery behavior of IBM Systems, May 1984-Apr. 1985.

8. $196,787 ARO grant for the effectiveness evaluation of fault-tolerant multiprocessor systems, Apr. 1984- Sept. 30, 1986.

9. $138,265 AFOSR grant for the reliability evaluation of fault-tolerant multiprocessor systems, May 1984- Apr. 1986.

10. $90,000 NASA grant for the Design and Implementation of The Hybrid Automated Reliability Predictor, Oct. 1984- Sept. 1985.

11. $77,120 IBM grant for modeling the recovery behavior of IBM Systems, May 1985-Apr. 1986.

12. $90,000 NASA grant for the Design and Implementation of The Hybrid Automated Reliability Predictor, Oct. 1985- Sept. 1986.

13. $180,500 AFOSR grant for the reliability evaluation of fault-tolerant multiprocessor systems, May 1986- Apr. 1988.

14. $300,000 DOD-URI equipment grant, FY 1987.

15. $33,000 Burroughs Corporation grant for the Performance Analysis of Functional Programming Architecture, Sept. 1986-Aug. 1987.

16. $100,000 NASA grant for the Design and Implementation of The Hybrid Automated Reliability Predictor, Nov. 1986- Oct. 1987.

17. $172,838 NASA grant for the Design and Implementation of The Hybrid Automated Reliability Predictor, Feb. 1988- Nov. 1990.

18. $125,778 grant from the Software Productivity Consortium for the Performance Analysis of Ada Designs, Jan. 1988-Dec. 1990.

19. $232,786 grant from SDIO/IST Program, Naval Ocean Systems Center, July 1988- Dec. 1990.

20. $70,000 equipment grant from Digital Equipment Corporation for Techniques and Tools for Performance Analysis, Sept. 1990- Aug. 1991.

21. $263,161 grant from Union Switch and Signals for Performance and Dependability Modeling, May 1991-Feb. 1994.

22. $145,000 grant from Boeing Commercial Aeroplane for Reliability Modeling, Sept. 1, 1991-Dec. 1994.

23. $45,000 grant from Naval Surface Warfare Center on Methodology for the Specification of Fault-Tolerant Real-Time Systems, Sept. 1991- August 1992.

24. $157,173 grant from the National Science Foundation on Towards a Theory of Hierarchical Modeling, Sept 15, 1991- Sept 14, 1993.

25. $123,331 grant from Naval Surface Warfare Center on Integration of Design Specification and Dependability Evaluation Methods, Sept. 1, 1992- August 30, 1994.

26. $123,200 grant from IBM Communications Division on Markov Chains and SPN Techniques for the Analysis of Computer and Communication Systems, March 1993-Jan. 1995.

27. $50,000 planning grant from the National Science Foundation for an Industry-University Co-operative Research Center, July 1993- June 1994.

28. $70,000 IBM equipmement grant, 1993.

29. $46,200 NSF CS & E research associate award, June 1, 1993- Nov. 30, 1995.

30. $35,000 Draper Laboratory grant for investigation into fault injection, August 1994- July 1995.

31. $41,300 grant from IBM Communications Division on Software Process and Performance, July 1994-July 1995.

32. $555,000 National Science Foundation Grant for an Industry-University Cooperative Research Center, Oct. 1994- Sept. 1999.

33. $60,000 award as affiliate fees of the Center for Advanced Computing and Communication, Oct. 1994-Sept. 1995.

34. $105,000 Draper Laboratory grant for investigation into software reliability, August 1995- July 1997.

35. $80,000 award for affiliate fees of the Center for Advanced Computing and Communication, Oct. 1995-Sept. 1996.

36. $140,000 USAF Rome Laboratory grant for software reliability research, Oct. 1995-Sept. 1998.

37. $90,757 RTI subcontract for research in hierarchical fault injection, Aug 1995-Dec. 1996.

38. $35,000 GTE Lab grant for measurement and modeling of high-speed networks, Mar. 1995-Feb 1996.

39. $82,000 IBM equipment grant of networking hardware, 1995.

40. $50,000 award from DoD as affiliate fee for the Center for Advanced Computing and Communication, Oct. 1996-Sept. 1997.

41. $200,000 award from Bellcore as affiliate fee for the Center for Advanced Computing and Communication, Oct. 1996-Sept. 2000.

42. $20,000 gift from AlliedSignal Aerospace, Oct.1995- Sept. 1997.

43. $80,000 IBM Equipment grant for 4 RISC 6000 Workstations, 1996.

44. $60,000 IBM Equipment grant for an ATM Switch, 1996.

45. $200,000 award from DoD as affiliate fee for the Center for Advanced Computing and Communication, Sept. 1996-Aug. 2000.

46. $144,959 DoD/NSA Enhancement Grant for REGAL project, Jul. 1997-Aug. 31, 1998.

47. $50,000 NSF TIE project, Architecture-Based Estimation of Software Reliability, with A. Mathur from Purdue, Sept. 1997-Aug. 1999.

48. $10,000 IDEAS project award from NC ACTS, Aug. 1997-Jul. 1998.

49. $10,000 IDEAS project award from Kenan Institute, Aug. 1997-Jul. 1998.

50. $20,000 Analytical Model Development, IBM Enhancement, Aug. 1997-Jul. 1998.

51. $55,000 Draper Laboratory grant for investigation into software reliability, Jul. 1997-Jun. 1998.

52. $1,547,927 NSF Challenges in CISE award, TUNE: System Support for Memory-Friendly Programming, (co-PIs: J. Board, S. Chatterjee, A. Lebeck, X. Sun), Sept. 1997-Aug. 2000.

53. $48,400 DoD/NSA Enhancement Grant, ATM Networks, Jan.1, 1998- Dec. 31, 1998.

54. $1,801,700 DARPA, TUNE: Mathematical Models and Transformations for Memory-Friendly Programming, (co-PIs: J. Board, S. Chatterjee, A. Lebeck, X. Sun, P. Hanlon, L. Greengard), Feb. 1, 1998- Jan. 31, 2001.

55. $50,000 Draper Laboratory grant for investigation into software reliability, Jul. 1998-Jun. 1999.

56. $40,000 from Motorola for two fellowships, Sept. 1998- Aug. 1999.

57. $110,000 from Motorola, Jan. 1999- Dec 1999.

58. $20,000 from NCNI a fellowship, Sept. 1998- Aug. 1999.

59. $40,000 from Alcatel for two fellowships, Jan. 1999-Dec 1999.

60. $50,000 CACC Membership from Alcatel, July 1999 - June 2000.

61. $50,000 CACC Membership from Telcordia, July 1999 - June 2000.

62. $53,845 Enhancement project from National Security Agency, July 1999 - June 2000.

63. $30,000 NSF partnership award to CACC, July 1999-June 2000.

64. $21,999 NSF-Italy International cooperation grant.

65. $24,200 IBM Fellowships, summer 1999.

66. $51,800 Atmel Fellowships, Sept 1998- May 2001.

67. $50,794 NSF-Korea Cooperative Reseach grant, Sept. 1998 - Aug. 2000.

68. $160,000 from Motorola, Jan. 2000- Dec 2000.

69. $23,000 Motorola UPP Fellowship from SABA.

70. $20,000 Telcordia fellowship, Spring 2000-Fall 2000.

71. $20,345 Motorola SABA-UPR Fellowship, 9/1/00–5/31/01.

72. $50,400 from Motorola for 3 fellowships, 6/1/00 - 8/31/00.

73. $35,000 from Motorola for 2 fellowships, 6/1/99 - 8/31/99.

74. $75,000 from Motorola for 2 fellowships, 12/1/98 - 5/1/00.

75. $24,500 IBM fellowship, 6/1/99 - 8/31/00.

76. $20,000 NCNI fellowship, 7/1/99 - 6/30/01.

77. $20,000 CACC membership, Stratus, July 2000-June 2001.

78. $15,000 IBM fellowship, Summer 1999.

79. $30,000 IBM Enhancement Project, 1/1/00 - 12/31/00.

80. $150,000 Nasa's Remote Exploration and Experimentation (REE) Project,"Reliability and Availability of the REE System", 5/1/00 - 9/30/01.

81. $749,994 Air Force Office of Scientific Research (AFOSR) Multidisciplinary Research Initiative (MURI) Program, "Real-Time Fault Tolerant Network Protocols", 6/01/00 - 5/31/03.

82. $468,236 Defense Advanced Research Projects Agency (DARPA) Scalable Intrusion Tolerant Systems, 7/27/00 - 6/21/03.

83. $48,950 DoD/NSA, affiliate fee for Center for Advanced Computing and Communication, 7/1/00 - 6/30/01.

84. $50,000 CACC membership from Alcatel, July 2000-June 2001.

85. $50,000 CACC membership from Telcordia, July 2000-June 2001.

86. $30,000 National Science Foundation partnership award to CACC, July 2000-June 2001.

87. $150,000 Motorola, January 2001-December 2001.

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