

ADITYA P. MATHUR

October 20, 2009

GENERAL INFORMATION

EDUCATION

1970	BS (Electrical Engineering)	BITS [§]
1972	MS (Electrical Engineering)	BITS
1977	PhD (Computer Science)	BITS

[§] Birla Institute of Technology and Science, Pilani, India

PROFESSIONAL/ADMINISTRATIVE POSITIONS

August 1972–December 1973	Programmer	BITS
January 1973–March 1976	Assistant Lecturer	BITS
April 1976–February 1982	Assistant Professor [†]	BITS
March 1982–August 1985	Associate Professor	BITS Head, Department of Computer Science, BITS
September 1985–August 1987	Visiting Associate Professor	Georgia Institute of Technology
September 1987–July 1989	Visiting Associate Professor	Purdue University
August 1989–July 1996	Associate Professor	Purdue University
January 1, 1994–June 30, 1994	Acting Director, SERC [‡]	Purdue University
July 1995–June, 2001	Director, SERC	Purdue University
August 1996	Professor	Purdue University
August 1997–June 2001	Associate Head	Department of Computer Science Purdue University
July 2003–December 2003	Visiting Professor	BITS
August 2004–June 2007	Associate Dean, Graduate Education and In- ternational Programs	College of Science, Purdue University
August 2005– July 2007–	Adjunct Professor Head	BITS Department of Computer Science Purdue University

[†] Awarded double promotion.

[‡] Software Engineering Research Center

HONORS AND AWARDS

Top 10 Outstanding Teacher in the School of Science during 1990-91, 91-92, 93-94, and 94-95.

Chelmsford Distinguished Speaker, Cadence Corporation, 1998.

Finalist, Indiana Information Technology Association's Outstanding Educator Award, 2000.

Distinguished Speaker, Department of Computer Science, Washington State University, Pullman, WA, 2000.

Distinguished Speaker, Center for Advanced Computer Studies, University of Louisiana, 2001.

Outstanding service award, 2002 from the Software Engineering Research Center.

IT Man of India, 2003, awarded by Rakshpal Bahadur Management Institute, Bareilly, India.

Keynote speaker at Rakshpal Bahadur Management Institute, Bareilly, India during an International Seminar on "Success Mantras for IT Industry in the Next Decade."

Fellow, CIC Academic Leadership Program, 2004-2005.

PROFESSIONAL MEMBERSHIPS

Institute of Electrical & Electronics Engineers.

RESEARCH INTERESTS

Software testing and reliability, Management of Internet Services, Program sonification, Parallel architectures and algorithms, Software Process Control, and Music composition.

PUBLICATIONS (all authors are equal coauthors)*BOOKS AND BOOK CHAPTERS*

1. *Introduction to Microprocessors*, Tata-McGraw Hill, First edition 377 pp., 1980, Second edition 480 pp., 1984.
2. *Introduction to Pascal*, Tata-McGraw Hill, coauthors: Kulbir S. Arora (SUNY at Buffalo) and Uday S. Reddy (Univ of Illinois at Urbana Champaign), 370 pp., 1983.
3. *Introduction to Microprocessors*, Third edition, Answers to all the Exercises, Tata-McGraw Hill, 176 pp., 1989.
4. *Introduction to Microprocessors*, Third edition, Tata-McGraw Hill, 612 pp., 1989. [26th reprint in September 2007.]
5. *Mutation Testing*, Encyclopedia of Software Engineering, John Wiley & Sons, Inc., pp 707-713, 1994.

6. *Software Testing and Reliability*, in McGraw Hill Software Reliability Engineering Handbook, 1996, Ed. Michael R. Lyu, co-author: J. R. Horgan.
7. *Fault-based Testing of CORBA Component Software*, S. Ghosh and A. P. Mathur, Book Series on Component-Based Software Development, Vol 1, Ed. Kung-Kiu Lau, World Scientific Press, March 2004.
8. *Foundations of Software Testing, Volume 1*, 689 pages, Pearson Education, 2007.
9. *Enterprise Access Control Policy Engineering Framework*, in Handbook of Research on Information Security and Assurance, Ed: Jatinder Gupta and Sushil Sharma, Chapter XXVIII, Arjmand Samuel, Ammar Masood, Arif Ghafoor, and Aditya Mathur, August 2008.

REFEREED JOURNALS

1. An SLR(1) Parser Generating System, *Journal of Computer Society of India*, Vol. 5, 1975, pp.3-7 (with S.K. Jain, M.L. Suthar, and Krishna Kant).
2. Some Problems and Solutions in the Design of a Reconfigurable Transputer Based Multiprocessor, *International Journal of Mini and Microcomputers*, Vol. 10, 1988, pp. 14-20 (with Kui Wenming).
3. Exploiting Parallelism Across Program Execution: A Unification Technique and Its Analysis, *IEEE Transactions On Parallel and Distributed Computing*, Vol. 1, 1990, pp 399-414 (with V. J. Rego)¹.
4. Concurrency Enhancement Through Program Unification: A Performance Analysis, *Journal of Parallel and Distributed Computing*, Vol. 8, 1990, pp.210-217 (with V. J. Rego).
5. High Performance Software Testing On SIMD Machines, *IEEE Transactions On Software Engineering*, Vol. 17, No. 5, May 1991, pp. 403-423 (with V. J. Rego and E.W. Krauser).
6. Parallel Parsing on a Transputer Network, *Journal of Computer System Sciences and Engineering*, Vol. 7, No. 3, July 1992, pp. 152-159 (with W. B. Ligon).
7. Assessing Tools in Research and Education, *IEEE Software*, May 1992, pp.61-69 (with J. R. Horgan).
8. An Application of Program Unification to Priority Queue Vectorization, *International Journal of Parallel Programming*, Vol. 21, No. 3, June 1992, pp. 193-224 (with L. Chuang and V. J. Rego).
9. High Performance Mutation Testing, *The Journal of Systems and Software*, Vol. 20, No. 2. February 1993, pp. 135-152 (with B. Choi).

¹This paper was originally accepted for publication in the IEEE Transactions on Computers. The Editor informed us that there was a backlog of three years. For faster availability to the community, we accepted the editor's offer of publishing the paper in IEEE Transactions On Parallel and Distributed Computing.

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10. Experiments with Program Unification on the Cray Y-MP, *Concurrency Practice and Experience*, Vol. 6(1), pp. 33-53, February 1994 (with L. Chuang and V. Rego).
 11. An Empirical Comparison of Data Flow- and Mutation Based Test Adequacy Criteria, *The Journal of Software Testing, Verification, and Reliability*, Vol. 4, No. 1, March 1994, pp. 9-31 (with W. E. Wong).
 12. Effect of Testing Techniques on Software Reliability Estimates Obtained Using a Time-Domain Model, *IEEE Transactions On Reliability*, Vol. 44, No. 1, March 1995, pp. 97-103 (with M. Chen and V. Rego).
 13. Investigating Coverage-Reliability Relationship and Sensitivity of Reliability Estimates to Errors in the Operational Profile, in *Computer Science and Informatics Journal - Special Issue on Software Engineering*, Vol. 25, NO. 3, pp 4-16, September 1995 (with Mei-Hwa Chen, Praerit Garg, and Vernon J. Rego)
 14. Fault Detection Effectiveness of Mutation and Data Flow Testing, *Software Quality Journal*, Vol. 4, 1995, pp. 69-83 (with W. E. Wong).
 15. Some Critical Remarks on a Hierarchy of the Fault-Detecting Ability of Test Methods, *Correspondence in IEEE Transactions on Software Engineering*, Vol. 21, No. 10, pp 858-861, October 1995 (with R. A. DeMillo and W. E. Wong).
 16. Reducing the Cost of Mutation Testing: An Empirical Study, *The Journal of Systems and Software*, Vol. 31, No. 3, December 1995, pp 185-196 (with W. E. Wong).
 17. Effect of Test Set Minimization on Fault Detection Effectiveness, *Software Practice and Experience*, Volume 28, Issue 4, pp. 347-370, 1998 (with J. R. Horgan and Eric Wong).
 18. Test Set Size Minimization and Fault Detection Effectiveness: A Case Study in a Space Application, *Journal of Systems and Software*, *Volume 48, Number 2, pp 79-89, October 1999* (with J. R. Horgan and Eric Wong).
 19. Interface Mutation: An Approach for Integration Testing, *IEEE Transactions on Software Engineering*, Vol. 27, No. 3, March 2001 (with Jose Maldonado and Marcio Delamaro).
 20. An iterative relaxation technique to generate test data for path testing, *submitted August 2000* (with Neelam Gupta and Mary Lou Soffa).
 21. An Empirical evaluation of Interface Mutation, *Journal of Empirical Software Engineering*, 6(2), pp 111-142, June 2001 (with Marcio Delamaro, Jose Maldonado, and Alberto Pasquini).
 22. Effect of code coverage on software reliability measurements, *IEEE Transactions on Reliability*, (with Mei-Hwa Chen, Eric Wong, Michael Lyu, and Vernon Rego). ²

²This paper had five authors at the time it was accepted for publication. At the time of printing, the authors were informed that IEEE Trans. on Reliability allows at most three authors for each publication. I decided to

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23. Interface Mutation, *Journal of Software, Testing, Verification and Reliability*, Volume 11, Issue 4, 2001, pp 227-247 (with S. Ghosh).
 24. Testing for Software Vulnerability Using Environment Perturbation. *Quality and Reliability Engineering International*, Volume 18, Issue 3, Special Issue: Secure, Reliable Computer and Network Systems, pp 261-272, 2002 (with Wenliang Du). *This is a revised version of conference paper #??.*
 25. A Formal Model of the Software Test Process, *IEEE Transactions on Software Engineering*, Vol. 28, No. 8, pp. 782-796, August 2002 (with Joao Cangussu and Ray DeCarlo).
 26. Digital Device Manuals for the Management of Connected Spaces, *IEEE Communications Magazine*, August 2002, Vol. 40, No. 8, 2002, pp. 78-85 (with Baskar Sridharan and Steven G.. Unger).
 27. Using Sensitivity Analysis to validate a State Variable Model of the Software Test Process, *IEEE Transactions on Software Engineering*, Vol. 29, No. 5, pp 430-443, May 2003 (with Joao Cangussu and Ray DeCarlo).
 28. A control-theoretic approach to the management of the software system test phase, *Journal of Software and Systems*, Volume 79, Issue 11, November 2006, Pages 1486-1503 (with Scott Miller, Raymond DeCarlo, and Joao Cangussu).
 29. Masood Ammar, Arif Ghafoor, Aditya Mathur, "Conformance Testing of Temporal Role-Based Access Control Systems," *IEEE Transactions on Dependable and Secure Computing*, 21 Jul. 2008. IEEE computer Society Digital Library. IEEE Computer Society, (<http://doi.ieeecomputersociety.org/10.1109/TDSC.2008.41>).
 30. Masood, Ammar; Bhatti, Rafee; Ghafoor, Arif; Mathur, Aditya P., "Scalable and Effective Test Generation for Role-Based Access Control Systems," *IEEE Transaction on Software Engineering*, Volume 35, Issue 5, Sept.-Oct. 2009, Page(s):654 - 668
 31. Masood Ammar, Arif Ghafoor, Aditya Mathur, Fault coverage of constrained random test selection for access control : A formal analysis, under revision.
 32. Aircraft Safety in the Presence of Personal Electronic Devices, *Submitted* (with Baskar Sridharan)

REFEREED CONFERENCE/WORKSHOP PROCEEDINGS³

33. Railway Yard Design Using Digital Simulation, *Proceedings of SIMSIG Winter Simulation Conference*, Canberra, Australia, 1978 (page numbers not available as I am unable to

withdraw my name from the list of authors in favor of junior authors. Note that the theory in this paper was developed at Purdue by Chen, Mathur and Rego while Chen was completing her doctoral work at Purdue. This theory also appears in Chen's doctoral dissertation completed at Purdue under joint advisement of Rego and Mathur.

³Publications marked with an asterisk (*) are preliminary versions of those submitted subsequently for publication in journals.

trace the proceedings.)

34. Program Testing on a Massively Parallel Transputer Based System, *Proceedings of the ISMM International Symposium on Mini and Microcomputers and their Applications*, Acta Press, Anaheim, 1986, pp 67-71 (with E. W. Krauser.)
35. The Simulation of Multiple Transputer Systems, *Proceedings of the ISMM International Symposium on Mini and Micro Computer Applications*, Acta Press, Anaheim, 1986, pp 63-66 (with G. Sullivan, G. T. Li and S. Crawford.)
36. *Some Problems and Solutions in the Design of a Reconfigurable Transputer Based Multiprocessor, *Proceedings of the ISMM International Symposium on Mini and Microcomputers and their Applications*, Acta Press, Anaheim, 1986, pp 1-5 (with K. Wenming.)
37. Design of a Dynamically Reconfigurable Keyboard, *Proceedings of the International Conference on Chinese and Oriental Language Computing*, IEEE Computer Society, 1987, pp 20-23 (with F. Fowler),
38. Parallel Parsing on a Transputer Network, *Proceedings of the International Conference on Parallel Processing for Computer Vision and Display*⁴, 1988 (with W. B. Ligon III.)
39. Modeling Mutation on a Vector Processor, *Proceedings of the International Conference on Software Engineering*, IEEE Computer Society, 1988, pp 154-161 (with E. W. Krauser.)
40. Exploiting Parallelism for Real Time Control of a Flexible Robot, *Proceedings of the Manufacturing International 88*, The American Society of Mechanical Engineers, 1988, pp 57-61 (with R. R. Murphy and A. Grover.)
41. Inducing Vectorization: A Formal Analysis, *Proceedings of the Third International Conference on Supercomputing*, International Supercomputing Institute Inc., 1988, pp 455-463 (with E. Galiano.)
42. *High Performance Testing On SIMD Machines, *Proceedings of the Second Workshop on Software testing, Verification and Analysis*, IEEE Computer Society Press, 1988, pp 171-177 (with E. W. Krauser and V. J. Rego.)
43. Parallel Models in Software Life Cycle, in *Empirical Foundations of Information and Software Science V*, Plenum Press, Ed. Pranas Zunde and Dan Hocking, 1988, pp 65-79.
44. *Exploiting Parallelism Across Program Execution: A Unification Technique and Its Analysis, *Proceedings of the International Seminar on Performance of Distributed and Parallel Systems*, North-Holland, Kyoto, Japan, December 7-9, 1988, pp 397-412 (with V. J. Rego.)
45. The Mothra Tool Set, *Proceedings of Hawaii International Conference on System Sciences*, Kailua-Kona, Hawaii, 1989, pp 257-284 (with B. J. Choi, R. A. DeMillo, E. W. Krauser, R. J. Martin, A. J. Offutt, H. Pan, and E.H. Spafford.)

⁴This paper was presented during the conference. However, due to restrictions on the total number of pages that could appear in the proceedings, it did not appear in the final printed proceedings.

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46. Experience with PMothra: A Tool for Mutation Based Testing on the Hypercube, *Proceedings of the Workshop on Experiences with Building Distributed and Multiprocessor Systems*, USENIX Association, 1989, pp 237-253 (with B. J. Choi.)
 47. Scheduling Mutants for Execution on a Hypercube, *Proceedings of Software Testing, Analysis, and Verification Symposium*, ACM Press, 1989, pp 58-65 (with B. J. Choi and B. Pattison.)
 48. Mutant Unification: A New Method for Mutation Based Testing On SIMD Machines, *Proceedings of the Third International Workshop, Software Engineering and its Applications*, EC2-Dépôt légal, 1990, pp 749-762 (with E. W. Krauser and V. J. Rego.)
 49. Performance Evaluation of a Mutant Unification Algorithm, *Proceedings of the Fifth International Symposium on Computer and Information Sciences, ISCIS V*, İstanbul Teknik Üniversitesi, 1990, pp 211-221 (with V. J. Rego.)
 50. Software and Hardware Quality Assurance: Towards A Common Platform for High Reliability, Conference Record, IEEE International Conference on Communications, ICC Part 4(of 4), Atlanta, GA, April 1990, pp 1324-1328 (with R. J. Martin.)
 51. Concurrent Stochastic Simulations: Experiments with Unification *Proceedings of Supercomputing Symposium '91*, University of New Brunswick Press, Fredericton, Canada, 1991, pp 139-150, (with V. J. Rego and L. Chuang.)
 52. Compiler Integrated Program Mutation *Proceedings of COMPSAC '91*, IEEE Computer Society Press, 1991, pp 351-356 (with R. A. DeMillo and E. W. Krauser.)
 53. On the Relative Strengths of Data Flow and Mutation Testing, *Proceedings of the Ninth Annual Pacific Northwest Software Quality Conference*, Pacific Agenda, pp 165-181, 1991.
 54. Compiler Support for Program Testing on MIMD Architectures, *Proceedings of the Ninth Annual Pacific Northwest Software Quality Conference*, Pacific Agenda, 1991, pp 221-234 (with R. A. DeMillo and E. W. Krauser.)
 55. A Family of White-Box Models for Estimating Software Reliability, Fourteenth Minnowbrook Workshop on Software Engineering, Blue Mountain Lake, NY, July 23-26, 1991, pp 80-81 (with J. R. Horgan, M. H. Chen, V. J. Rego.)
 56. Performance, Effectiveness, and Reliability Issues in Software Testing, *Proceedings of COMPSAC '91*, IEEE Computer Society Press, 1991, pp 604-605.
 57. Experience in Using Three Testing Tools for Research and Education in Software Engineering, *Proceedings of the Symposium on Assessment of Quality Software Development Tools*, IEEE Computer Society Press, New Orleans, LA, May 1992, pp 128-143 (with J. R. Horgan.)

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58. Effect of Testing Techniques on Software Reliability Estimates Obtained Using Time Domain Models, *Proceedings of the 10th Annual Software Reliability Symposium*, IEEE Reliability Society, Denver, Colorado, June 25-26, 1992, pp. 116-123, (with M. H. Chen and V. J. Rego.)
 59. Experiments with Program Unification on the Cray Y-MP, *Proceedings of the International Conference on Parallel and Distributed Systems (ICPADS'92)*, Hsinchu, Taiwan, December 1992, pp 433-440, (with L. Chuang and V. J. Rego)
 60. T&RSE: A Tool for Evaluating Software Reliability Models, *Proceedings of the 4th International Symposium on Software Reliability Estimation*, Denver, CO, November 1993, pp 274-283, (with M. H. Chen, M. K. Jones, and V. J. Rego.)
 61. An Empirical Evaluation of the Difficulty of Satisfying Mutation and Data Flow Based Test Adequacy Criteria, *Proceedings of Software Engineering Research Forum (SERF-93)*, Orlando, Florida, November 11-13, 1993, pp 35-44, October 26-29, 1993, pp. 35-44 (with W. E. Wong.)
 62. Evaluation of the Cost of Alternate Mutation Testing Strategies, *Proceedings of 7th Brazilian Symposium on Software Engineering*, Rio de Janiero, Brazil, Sociedade Brasileira de Computacao, pp 320-335 (with W. E. Wong.)
 63. A Two-Semester Undergraduate Sequence in Software Engineering: Architecture and Experience, *Lecture Notes in Computer Science*, Springer-Verlag, 1994, pp 5-22, San Antonio, TX (with D. Boardman.)
 64. A Theoretical Comparison Between Mutation and Data Flow Based Test Adequacy Criteria, *Proceedings of 1994 ACM Computer Science Conference (CSC'94)*, Phoenix, Arizona, March 8-10, 1994, pp 38-45 (with W. E. Wong.)
 65. LSL: A Specification Language for Program Auralization, *Proceedings of International Conference on Auditory Display, ICAD 94*, November 7-9, 1994, Santa Fe, NM, pp 257-264 (with D. Boardman and V. Khandelwal.)
 66. Constrained Mutation in C Programs, *Proceedings of VIII Simposio Brasileiro De Engenharia De Software*, Curitiba, October 26-27, 1994, pp 439-452 (with J. C. Maldonado and W. E. Wong.)
 67. Effect of test set size and block coverage on the fault detection effectiveness, *Proceedings of the Fifth International Symposium on Software Reliability Engineering*, IEEE Computer Society Press, Monterey, California, November 6-9, 1994, pp 230-238 (with E. W. Wong and J. R. Horgan.)
 68. A Case Study To Investigate Sensitivity Of Reliability Estimates To Errors In The Operational Profile, *Proceedings of the Fifth International Symposium on Software Reliability Engineering*, IEEE Computer Society Press, Monterey, California, November 6-9, 1994, pp 276-281 (with M. H. Chen and V. J. Rego.)

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69. Mutation versus All-uses: An Empirical Evaluation of Cost, Strength, and Effectiveness, *Proceedings of the IFIP Conference on Software Quality and Productivity*, Chapman & Hall, Ed. Matthew Lee, Ben-Zion Barta and Peter Juliff, December 5-7, 1994, pp 258-265, City Polytechnic of Hong Long, Hong Kong (with J. C. Maldonado and W. E. Wong.)
 70. How Strong Is Constrained Mutation In Fault Detection ? *Proceedings of the 1994 International Computer Symposium*, IEEE Taipei Section, Taiwan, December 1994, pp 515-520, (with W. E. Wong.)
 71. Effect of Test Set Minimization on Fault Detection Effectiveness, *Proceedings of the 17th International Conference on Software Engineering*, April 23-30, 1995, Seattle, Washington, pp 41-50 (with J. R. Horgan, S. London, and W. E. Wong)
 72. LISTEN: A Tool to Investigate the Use of Sound for the Analysis of Program Behavior, *Proceedings of the Nineteenth Annual International Computer Software & Applications Conference (COMPSAC'95)*, IEEE Computer Society Press, August 9-11, 1995, Dallas, Texas, pp 184-193 (with D. Boardman, G. Greene, and V. Khandelwal.)
 73. On the Correlation Between Code Coverage and Software Reliability, *Proceedings of the Sixth International Symposium on Software Reliability Engineering*, IEEE Press, Toulouse, France, pp 124-132, October 24-27, 1995 (with F. Del Frate, P. Garg, and A. Pasquini.)
 74. On Software Reliability Models and Code Coverage, *Proceedings of the 1996 IEEE Aerospace Applications Conference*, Feb. 3-10, 1996, Snowmass, CO (with P. Garg and R. Karcich.)
 75. New trends in software quality monitoring and achievement during software development, *Proceedings of the VII Conference International De Tecnologia De Software Qualidade De Software*, Curitiba, Parana, Brazil, June 27-28, 1996, pp 43-50.
 76. Integration testing using interface mutations, *Proceedings of the Seventh International Symposium on Software Reliability Engineering*, IEEE Computer Society Press, White Plains, New York, pp 112-121, October 30-November 2, 1996 (with M. Delamaro and J. Maldonado.)
 77. Using computer programs as generators of compositions, *Proceedings of the IV Simpósio Brasileiro de Computação e Música, Brasília*, DF 3-7 August 1997, pp 31-41.
 78. Test Set Size Minimization and Fault Detection Effectiveness: A Case Study in a Space Application, on Fault Detection Effectiveness, *Proceedings of the Twenty-First Annual International Computer Software and Application Conference (COMPSAC'97)*, Washington, D.C., August 11-12, 1997 (with J. R. Horgan, A. Pasquini, and E. Wong.)
 79. On the Estimation of Reliability of a Software System Using Reliabilities of its Components, *Proceedings of the 8th International Symposium on Software Reliability Estimation*, Albuquerque, New Mexico, November 1997 (with S. Krishnamurthy.)

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80. Software fault-injection testing on a distributed system, *Quality Week Europe*, Brussels, 1997 (with Sudipto Ghosh.)
 81. On Errors and Failures in Distributed Systems Built to CORBA and COM Standards, *Proceedings of the International Conference on Software Engineering and its Applications*, December 19-21, 1997, Hyderabad, India, pp 56-64 (with Sudipto Ghosh.)
 82. Categorization of Software Errors that led to Security Breaches, *Proceedings of the 21st National Information Systems Security Conference*, October 5-8, 1998, pp 392-405, Crystal City (with Wenliang Du.)
 83. Automated Test Data Generation Using An Iterative Relaxation Method, *Proceedings of ACM SIGSOFT'98 Sixth International Symposium on the Foundations of Software Engineering (FSE-6)*, Lake Buena Vista, Florida, USA. November 3-5, Orlando 1998, pp 231-244 (with Neelam Gupta and Mary Lou Soffa)[19.8%]
 84. A Framework for Assessing Test Adequacy, Architecture Extraction, Metering, Monitoring and Controlling Distributed Component-Based Systems, *Proceedings of 1st Symposium on Reusable Architectures and Components for Developing Distributed Information Systems*, August 2-3, 1999, Orlando, pp 657-660 (with Baskar Sridharan, Sudipto Ghosh, Priya Govindarajan)
 85. UNA Based Iterative Test Data Generation and its Evaluation, *14th IEEE International Conference on Automated Software Engineering (ASE'99)*, Cocoa Beach, Florida, USA, October 1999. (with Neelam Gupta and Mary Lou Soffa.) [20.3%]
 86. Security Relevancy Analysis on the Registry of Windows NT 4.0, *Proceedings of the 5th ACSAC: Annual Computer Security Applications Conference*, December 6-10, 1999, Phoenix, pp 331-340, (with Wenliang Du and Praerit Garg.)
 87. Generating Test Data for Branch Coverage, *15th IEEE International Conference on Automated Software Engineering (ASE'00)*, Grenoble, France, September 2000 (with Neelam Gupta and Mary Lou Soffa.) [23%]
 88. Testing for Software Vulnerability Using Environment Perturbation. *Proceeding of the International Conference on Dependable Systems and Networks (DSN 2000), Workshop On Dependability Versus Malicious Faults*, pp. 603-612, June 25-28 2000, New York City, NY (with Wenliang Du).
 89. On Building Non-intrusive Performance Instrumentation Blocks for CORBA-based Distributed Systems, *Proceedings of Fourth IEEE International Computer Performance and Dependability Symposium*, Schaumburg, IL, March, 2000, pp. 139-143 (with Baskar Sridharan and Balakrishnan Dasarathy).
 90. Non-intrusive testing, monitoring, and control of distributed CORBA objects, *Technology of Object-Oriented Languages and Systems*, St. Malo, France, June 2000 (with Baskar Sridharan and Sambrahma Mundkur.)
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91. Interface Mutation, S. Ghosh, A. P. Mathur, *Proceedings of MUTATION 2000*, October 6-7, 2000, San Jose, CA (with S. Ghosh.)
 92. Interface Mutation to Assess the Adequacy of Tests for Components, *Proceedings of TOOLS USA 2000*, IEEE Computer Society Press, Santa Barbara, Jul 30-Aug 2, 2000 (with S. Ghosh.)
 93. TDS: A Tool for Testing Distributed Component-Based Applications, *Proceedings of MUTATION 2000*, October 6-7, 2000, San Jose, CA (with S. Ghosh and P. Govindarajan.)
 94. A state variable model for the software test process, *Proceedings of 13th International Conference, Software & Systems Engineering and their Applications (ICSSEA 2000)*, December 5-8, 2000, Vol. 2 (no absolute page numbers available), Paris, (with J. Cangussu and R. A. DeCarlo.)
 95. Digital Device Manuals for Managing Home Networks, 4th IEEE International Workshop on Networked Appliances, Gaithersburg, MD, January 2001 (with Baskar Sridharan and Steve Unger.)
 96. A XML Based Policy-Driven Information Service, 7th IFIP/IEEE International Symposium on Integrated Networked Management, Seattle, WA, May 2001 (with Ramkumar Nataraajan and Paul McKee.)
 97. Certification of Distributed Component Computing Middleware and Applications, *Proceedings of the 4th Component Based Software Engineering Workshop during ICSE 2001*, May 14-15, 2001, Toronto, Canada (with S. Ghosh.)
 98. Sensitivity Analysis of the State Variable Model of the Software Test Process, IEEE Systems, Man, and Cybernetics 2001 (SMC'2001), Tucson-AZ, October 7-10, 2001 (with J. Cangussu and R. A. DeCarlo.)
 99. A State Model for the Software Test Process with Automated Parameter Identification, Mathur, A.P.; IEEE Systems, Man, and Cybernetics 2001 (SMC'2001), Tucson-AZ, October 7-10, 2001 (with J. Cangussu and R. A. DeCarlo.)
 100. Feedback control of the software test process through measurements of software reliability, *Proceedings of the 12th International Symposium on Software Reliability Engineering*, IEEE Press, Hong Kong, pp 232-241, November 27-30, 2001 (with Joao Cangussu and Raymond DeCarlo)
 101. Comparison of architecture-based software reliability models, *Proceedings of the 12th International Symposium on Software Reliability Engineering*, IEEE Press, Hong Kong, pp 22-31, November 27-30, 2001 (with Katerina Goševa-Popstojanova and Kishor Trivedi.)
 102. Effect of Disturbances on the Convergence of Failure Intensity, *Proceedings of the 13th International Symposium on Software Reliability Engineering*, IEEE Press, Annapolis, Maryland, November 12-15, 2002 (with Joao Cangussu and Raymond DeCarlo.)

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103. Synthesizing Optimum Safety Controllers for Connected Spaces, *Submitted* (with Baskar Sridharan and Rahul Shah.)
 104. Synthesizing Distributed Controllers for the Safe Operation of Connected Spaces, *Proceedings of IEEE International Conference on Pervasive Computing and Communications*, Dallas-Fort Worth, USA, March 23-26, 2003, pp 452-459 (with Baskar Sridharan and K. Cai.)
 105. Synthesis of a Safety Controller for Connected Spaces Using Supervisory Control *Submitted* (with Baskar Sridharan and K. Cai)
 106. Monitoring the Software Test Process Using Statistical Process Control: A Logarithmic Approach, *Proceedings of European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering, ESEC/FSE 2003*, Helsinki, Finland, September 1-5, 2003, pp. 158-167 (with Joao Cangussu and Raymond DeCarlo.)
 107. An overview of software cybernetics, *Proceedings of Eleventh International Workshop on Software Technology and Engineering Practice*, Amsterdam, The Netherlands, September 2003, pp 77-86 (with K-Y. Cai, J. W. Cangussu, and R. A DeCarlo).
 108. Software Release Control using Defect Based Quality Estimation, *in Proceedings of the 15th International Symposium on Software Reliability Engineering*, St-Malo, France, 2004, pp 440-450 (with Joao Cangussu, Rick karcick, and Raymond DeCarlo.) [32.5%]
 109. Modeling and control of the incremental software test process, *Proceedings of the 28th Annual International Computer Software & Applications Conference, Hong Kong*, Workshop papers and fast Abstracts, Sept 28-30, 2004, pp 156-159 (with Scott Miller and Raymond DeCarlo).
 110. Interceptor based Constraint Violation Detection, *Proceedings of the 12th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems (ECBS 2005)*, April 3-8, 2005, Washington DC (with Qianxiang Wang).
 111. Service level constraints for self-managing software: Runtime Structure and Design time Description, *submitted*, 2005, (with Qianxiang Wang).
 112. DIG: A Tool for Software Process Data Extraction and Grooming, *Proceedings of the The 29th Annual International Computer Software and Applications Conference (COMP-SAC 2005)*, Edinburgh, July 26-28, 2005, pp 35-40 (with Scott Miller and Raymond DeCarlo).
 113. A software cybernetic approach to the control of the software system test phase, *Proceedings of the Second International Workshop on Software Cybernetics*, Edinburgh, July 26-28, 2005, pp. 103–108 (with Scott Miller and Raymond DeCarlo).

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114. On the adequacy of statecharts as a source of tests for cryptographic protocols, *Proceedings of the 32nd Annual IEEE International Computer Software and Applications Conference*, pp.937-942, Turku, Finland, July 28–August 1, 2008. (This paper was a part of the Second IEEE International Workshop on Security in Software Engineering (IWSSE 2008)) (with K. Jayaram).
 115. Quantitative Modeling for incremental software process control, *Proceedings of the 32nd Annual IEEE International Computer Software and Applications Conference*, pp.830–846, Turku, Finland, July 28–August 1, 2008 (with Raymond E. DeCarlo and Scott Miller).

*OTHER PUBLICATIONS*⁵

116. *SPERM - System Program Evaluation and Remodification Package (for IBM 1130), *Proceedings of the Annual Convention of Computer Society of India*, New Delhi, 1973.
117. An Introduction to Algorithm Development and Coding for Computers, Lecture Notes, Educational Development Division, BITS, Pilani, 690 pp, 1976.
118. Jhansi Yard Simulation Study, Report No. 1/76/6, Operations Research Cell, Railway Board, Government of India, New Delhi, 1976.
119. Digital Simulation of Railway Yards, Ph.D. Dissertation, B.I.T.S., Pilani, India, December 1977.
120. *Exploiting Parallel Architectures for Mutation Based Testing, *Proceedings of the Fifth Annual Joint Conference on Software Quality and Productivity*, invited paper, 1989.
121. *Software Testing Environments of the Future: Position Statement, *Workshop on Future Directions in Software Testing and Analysis*, Collection of position statements, San Diego, 1989.
122. Software and Hardware Quality Assurance: Towards A Common Platform for High Reliability, *Proceedings of the International Conference on Communications*, ICC, 1990, invited paper, (with R. J. Martin).
123. The Mothra Mutation Analysis Software Testing Environment, (with R. A. DeMillo, E. W. Krauser, R. J. Martin, and E. Spafford), *IEEE Software*, 1990, p 56.
124. Mutation Testing: Tutorial PART I: What is Mutation Testing ?, SERC Newsletter, Vol. 5, No.1, 1st Quarter, 1991; PART II: Effectiveness of Mutation Testing ?, SERC Newsletter, Vol. 5, No.2, 2nd Quarter, 1991; PART III: Using Mutation Testing In A Corporation ?, SERC Newsletter, Vol. 5, No.3, 3rd Quarter, 1991.
125. On the Impact of Microchips on Music, *EEE Magazine*, Second Semester, 1993, BITS Pilani, India.

⁵Papers that have appeared in unbound proceedings, and hence without any explicit page numbers, are marked with an asterisk (*).

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126. Software Engineering Research Center at Purdue University/University of Florida: Industry Affiliate Programmes, Curie: Journal of Cooperation among University, Research, and Industrial Enterprises, BITS, Pilani, pp. 6-9, Vol. 1, No. 2, July 1994.
 127. How different architecture-based software reliability models are related? *Fast abstracts, 11th International Symposium on Software Reliability Engineering*, IEEE Press, pp 25-26, 2000 (with Katerina Goševa-Popstojanova and Kishor Trivedi).
 128. Infrastructure for the Management of SmartHomes, White Paper (with Ramkumar Nataraajan and Baskar Sridharan). April 2001.
 129. Response to "A new answer to 'How important is Mathematics to the Software Practitioner'?", Letter to Editor, *IEEE Software*, May/June 2001, p 11.
 130. Software Engineering for Secure Software - State of the Art, joint CERIAS/SERC Technical Report, September 2005, (with K. Jayaram).
 131. Modeling and Simulation of the Auditory Pathway Technical Report: SERC-TR-287. 3/1/2007 (with Alok Bakshi).
 132. Adequacy of Statecharts as a Source of Tests for Implementations of Cryptographic Protocols Technical Report SERC-TR-288. 4/27/2007 (with K. Jayaram).
 133. Integrating Model Checking and Test Generation for Reliable and Secure Concurrent Programs Technical Report SERC-TR-292. 4/1/2008 (with Daniel Tang).
 134. FacFinder: Search for Expertise in Academic Institutions. Technical Report: SERC-TR-294. 10/20/2008 (with Yi Fang and Luo Si).

WORK RELATED TO MUSIC AND SOUNDS

My interest in music has led me to investigate (a) formal means to construct new forms of tonal music and (b) use of sounds and music in program understanding and composition. I have two publications in this area [??,??]. I have supervised Master's theses by David Boardman (1994), Vivek Khandelwal (1995), M.C. Gopinath (2004), and R. Jagadish Prasath (2004) that relate to my research in music and sounds. In addition I have composed about 45 pieces in various styles. A list of all my compositions, and some scores, is found at:

<http://www.cs.purdue.edu/homes/apm/aditya-music/music-pages/apmMusicFrameset.htm>

My music is mostly a blend of elements of Indian and Western classical styles and instruments. For example, *Polymodal Fun on a Fibonacci Pyramid*, uses North Indian modes Khamaaj and Todi in a simultaneous rendition of two supporting melodies. This composition also changes time signatures...from 4/4 to (3+2+2)/8 and back to 4/4. *Birthday Wishes for an Aspiring Trumpeter*, uses Strings and the Indian Tabla drums. The *Welcome Song* combines the Indian Sitar with the traditionally Western Strings, French Horn, and Tuba to accompany a melody in the North Indian Rāgā Yaman Kalyana. A *Little Fantasy* written for solo piano was inspired by a

North Indian classical melody in Rāgā Bhopali. The melody in the third movement of *Variations on a Theme from Brazil* changes from major mode to the North Indian mode Bhairavi and then back to major. The song *In the Bright Summer Morning* uses Bhairav, a morning rāgā. *Mhari Gayyan Khul Khul Jaye* uses a variety of western instruments to accompany a rustic melody switching between the North Indian modes Bilaval, Kalyana, and Bhairavi. Mode switching between Kalyana and Bhairavi also takes place in *Rondo for Violin and Tabla*.

SOFTWARE TOOLS DEVELOPED

Software systems that I developed and/or for which I was the team leader are listed below. The year listed against each project is the year during which Version 1 of the software was available.

1. SLR(1) Parser Generating System: 1974

Sponsor: Department of Electronics, Government of India.

Role: Chief designer and programmer supported by two graduate students.

Use: Used commercially by DCM Data Products, India in the development of compilers for Fortran 77, a proprietary Process Control Language, and the Hi-BASIC programming language.

2. HI-BASIC Compiler (with complete runtime support): 1979

Sponsor: DCM Data Products, India.

Role: Chief designer and programmer supported by four undergraduate and two graduate students.

Use: Sold commercially by DCM Data Products for their Spectrum Series of computers.

3. Pascal Compiler: 1980

Sponsor: BITS, Pilani.

Role: Advisory; programmed by Jishnu Mukerjee, a graduate student.

Use: In regular use at BITS, Pilani, India, in the introductory course on programming until 1985.

4. Educational Administration System: 1985

Sponsor: BITS, Pilani.

Role: Chief designer and programmer; supported by three faculty and four data entry assistants.

Use: In regular use at BITS, Pilani, India since 1985 for administering course registration, grade reporting, and several other administrative tasks.

5. ATAC enhancements: 1992/1995

Sponsor: Bellcore, National Science Foundation, IBM.

Role: Developed the requirements and initial design; programmed by the CS 406/407 class in 1991/92 and one graduate student in 1995.

Use: Enhancements integrated by Bellcore into their version of ATAC in 1993/1995. ATAC has been in use in research, education, and commercial projects for the measurement of control and data flow coverage.

6. LISTEN: 1994

Sponsor: National Science Foundation through Undergraduate REU awards.

Role: Designer of the language LSL underlying LISTEN; first implementation by David Boardman, a graduate student and subsequently enhanced by two graduate and three undergraduate students.

Use: Research in program auralization; the tool is in public domain; the source has been made available explicitly to two research groups.

7. TAMER: 1995

Sponsor: Software Engineering Research Center and Purdue Research Foundation.

Role: Advisory; programmed by Tsanchi Li, a graduate student.

Use: Research in fault tolerance; the tool is not in public domain; delivered in 1996 to Bellcore for enhancement and use in the testing of fault-tolerant software.

8. WABASH: 1998-2000

Sponsor: Software Engineering Research Center and Purdue Research Foundation (British Telecom, Telcordia, and Tivoli).

Role: Advisory, design, programmed by 5 graduate and 1 undergraduate students.

Use: Research in test and management of Internet Services. Previous version of the tool, named TDS, licensed to one company. Technology disclosure filed with PRF.

9. GAPS: 1998-2000.

Sponsor: Department of Computer Sciences.

Role: Designer and advisor. Programmed in Java by Matthew Baarman, a graduate student.

Use: GAPS is intended to support graduate applications processing in the Department of Computer Sciences.

10. JListen: 2003-2004.

Sponsor: Department of Computer Science, Purdue University and Department of Computer Science, Purdue University.

Role: Designer and advisor. Programmed in Java by a group of undergraduate and graduate students while I was on sabbatical at BITS, Pilani, India.

Use: Auralization of Java applications.

11. PURE/INDURE: 2006-2008.

Sponsor: Indiana Economic Development Corporation.

Role: Project lead, designer, tester.

Use: Faculty expertise search from among faculty at Ball State University, Indiana University, Purdue University, and University of Notre Dame.

COURSES TAUGHT

Number of semesters taught is in parentheses.

Undergraduate

Computers and Programming	1976-1985 (3)
Computer Programming and Organization	1985-1987 (2)
Introductory programming	1972-2004 (21)
Fortran: 1972-77, Pascal: 1978-82	
C: 1985-1994, Java: 2004, 2008	
Microprocessors	1980-1985(3)
Programming Languages	1973-1984(8)
Programming Languages and Compilers	1987-1995(11)
Senior Design Project	2001 (1)
Software Engineering	1991-03 (13)
Systems Programming	1983 (1)
Systems Simulation	1976-1980 (3)
Software Testing	2006-07 (1)

Graduate

Advanced Computer Architecture	1985-1987 (5)
Compiler Construction	1980-1985(3)
Recent Advances in Computer Science	1982 (1)
Software Engineering	1988-90 (3)
Software Testing	2005-06 (1)

Number of semesters taught is in parentheses.

TEACHING PERFORMANCE

Included in Top Ten Outstanding Teachers in the School of Science, 1990-91, 1991-92, 1993-94, and 1994-95. Finalist, Indiana 21st Century Outstanding Information Technology Educator, 2000.

DOCTORAL THESES ADVISED/ADVISING

1. Byoungju Choi, co-advisor, Advisor: R. A. DeMillo, December 1990. Associate Professor, Ewha Womans University, South Korea.

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2. Edward Krauser, co-advisor, Advisor: R. A. DeMillo. December 1991. Bellcore and then Sumitomo Bank, NY.
 3. Eric Wong, advisor, May 1993. Associate Professor, University of Texas at Dallas, TX.
 4. Mei-Hwa Chen, co-advisor; Advisor: Vernon Rego, May 1994. Associate Professor, State University of New York, Albany, NY.
 5. Tsanchi Li, advisor, August 1995 Accepted software developer position.
 6. Neelam Gupta, advisor, August 1999. Assistant Professor, University of Arizona, Tucson, AZ.
 7. Sudipto Ghosh, advisor, August 2000. Assistant Professor, Colorado State University, Fort Collins, CO.
 8. Joao Cangussu, advisor, co-advisor: Raymond DeCarlo. Summer 2002. Assistant Professor, University of Texas at Dallas, TX.
 9. Baskar Sridharan, advisor, August 2003, Microsoft, Advanced OS Group.
 10. Ramkumar Natarajan, advisor, passed Ph. D. Qualifier II examination. *terminated unexpectedly*.
 11. Scott D. Miller, advisor, co-advisor: Raymond DeCarlo, passed PhD prelim examination. Expected graduation: Fall 2005.
 12. K.R. Jayaram, advisor. Joined in Summer'05.
 13. Ammar Masood, co-advisor with Professor Arif Ghafoor, December 2006. Returned to Pakistan.

DOCTORAL ADVISORY COMMITTEES

Hiralal Agrawal, Mei-Hwa Chen, Ling-Yu Chuang, Hiram Hunt, Brian L. Stuart, Patricia Dorn (Department of Audio and Speech Sciences), Rajiv Chaudhary, Hyeran Byun, Anupam Joshi, Silvio Picano (School of Electrical Engineering, Naren Ramakrishnan, Reuben Pasquini, Juan Gomez, Ivan Krsul, Swapna Gokhle (Duke University, 1998), Yung-Ping Chen, Yi Lu (2004). Ammar Masood (ECE, 2005).

MASTER'S THESES ADVISED

Thesis title, name, year of graduation, university, company/university.

1. Development of a Discrete Event Model of a Railway Network, Part II, K. Kant, 1975, BITS, Pilani. Director, National Informatics Center, New Delhi, India.
2. Development of a Discrete Event Model of a Railway Network, Part I, S. K. Jain, 1975, BITS, Pilani.

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3. A Pascal Compiler for IBM 1130, Jishnu Mukherji, 1976, BITS, Pilani. Novell.
 4. Simulation of Some Aspects of a Road Transport System, A. K. Batra, 1976, BITS, Pilani. Cisco.
 5. Simulation of Control and Movement of Traffic in a Railway Subnetwork, P. K. Goel, 1976, BITS, Pilani.
 6. Computer Aided Design of a University Time Table, K. Usha, 1978, BITS, Pilani.
 7. Query Evaluation and Optimization in Very Large Data Bases, Joseph Kuruvilla, 1978, BITS, Pilani.
 8. Performance Evaluation of a Database Management System, P. C. Chordia, 1978, BITS, Pilani.
 9. Computer Network Interfacing a Multi-Microcomputer Master-Slave Configuration, R. S. Dia, 1979, BITS, Pilani.
 10. A Query Language for a Relational Database, Vernon Rego, 1979, BITS, Pilani. Professor, Purdue University.
 11. Code Generation in a Fortran-77 Compiler for a Microcomputer, Anant S. Senapati, 1984, BITS, Pilani.
 12. Parser and Code Generator for a Devanagari Based Programming Language, Ravi Kant, 1984, BITS, Pilani.
 13. Artificial and Natural language Interface to Databases, Anil K. Sharma, 1984, BITS, Pilani.
 14. Implementation of an Interactive Parser Generation System, S. Goel, 1984, BITS, Pilani.
 15. LISTEN: A System for Program Auralization, David Boardman, 1994, Purdue University. HP.
 16. On Program Auralization, Vivek Khandelwal, 1995, Purdue University. Nortel Networks.
 17. On Code Coverage and Software Reliability, Praerit Garg, 1995. Purdue University. Microsoft.
 18. Software Reliability: A Component-based Approach, Saileshwar Krishnamurthy, Purdue University, August 1997. IBM.
 19. CBRE: Un Metodo per la Misura dell’Affidabilità, Pietro Michielan, University of Padova, Italy, December 1997.
 20. Misura dell’Affidabilità del Software il Metodo di Laprie e Kanoun, Manuela Schiona, University of Padova, Italy, December 1997.

21. Auralization of Intrusion Detection System using JListen, M. C. Gopinath, Birla Institute of Technology and Science, Pilani, India, 2004. HCL India. (This work resulted from my sabbatical at BITS Pilani.)
22. Auralization of Web Server Using JListen, R. Jagadish Prasath, Birla Institute of Technology and Science, Pilani, India, 2004. WIPRO, India. (This work resulted from my sabbatical at BITS Pilani.)

MASTER'S THESES COMMITTEES

Kumar Brahmamath (CS), Nathaniel Nystrom (CS), Chao-Lung Yang (2004, IE).

UNDERGRADUATE STUDENTS ADVISED

I have not kept track. From 1973-1985 I have advised over 50 undergraduate students on various research and development projects. During 1982-84 I advised about 20 undergraduate students who helped develop the first multi-lingual computer in India. Since 1985 I have advised about 2-3 undergraduate students each year. Most of these students have been supported through NSF REU or other NSF and industrial grants.

PROFESSIONAL LECTURES

1. *Spoonerisms*, Mathematics society, BITS, Pilani, 1973.
2. *Mathematics, Computers, and Industry: A Relational Perspective*, Annual Convention of Indian Mathematical Society at Bombay, India, 1973.
3. *Administering an Injection of Intelligence*, Symposium on Microprocessor Based Systems at Central Electronics Engineering Research Institute at Pilani, 1983.
4. *Keynote address*, Seminar/workshop conducted by National Institute of Information Technology at New Delhi, 1984.
5. *Towards A Truly Multi-lingual Computer*, Georgia Institute of Technology, Atlanta, Georgia, April 1986.
6. *Vectorization Over Multiple Program and Data Sets*, Georgia Institute of Technology, Atlanta, Georgia, April 1987.
7. *High Performance Testing Using Parallel Machines*, Racal-Milgo, Ft. Lauderdale, Florida, 1988.
8. *High Performance Testing of Software Systems*, Bell Communications Research, Piscataway, New Jersey, May, 1988.
9. *Software Engineering Research and Education*, Birla Institute of Technology and Science, Pilani, India, December 27, 1989.

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10. *Performance In Software Testing*, Department of Computer Science, Portland State University, Oregon, October 11, 1989.
 11. *Performance Issues in Software Testing for High Reliability*, Computer Sciences Corporation, Moorestown, PA, March, 1990.
 12. *High Performance Software Testing*, Iowa State University, April 1990.
 13. *Automatic Fault Monitoring and Classification*, Bell Communications Research, April 1991.
 14. *Comparing the Effectiveness of Data Flow and Mutation Testing*, Quality Week 1991, San Francisco, May 1991.
 15. *Software Testing for High Reliability*, at Intel Corporation, Sun Microsystems, and Computer Associates during May 1991.
 16. *New Approaches to Software Reliability Modelling*, AT&T, Naperville, September 1991.
 17. *Reliability Modelling*, Northrop Electronic Systems Division, Chicago, September 1991.
 18. *Software Testing for High Reliability*, at Computer Science Department, Ball State University, February 1992.
 19. *An Overview of Recent Research in Software Testing and Reliability*, Grambling State University, Grambling, LA, May, 1992.
 20. *Experience with ATAC in Software Engineering Research and Education at Purdue*, Bell Communications Research, Piscataway, NJ, June, 1992.
 21. *Integration Testing*, Bellcore, Morristown, NJ, January, 1993.
 22. *Testing Via Interfaces*, Bell Northern Research, Research Triangle Park, NC, January, 1993.
 23. *Testing Fault Tolerant Systems*, Siemens Corporate Research, Princeton, NJ, January 1994.
 24. *Testing Fault Tolerant Systems*, Bell Communications Research, Morristown, NJ, January 1994.
 25. *Testing Fault Tolerant Systems*, Harris Corporation, Melbourne, FL, February 1994.
 26. *Software Reliability Estimation*, Hughes Network Systems, Germantown, MD, March 1994.
 27. *New Approaches to Software Reliability Estimation*, University of Padova, Padova, Italy, May 1994, Ansaldo, Naples, XCIItaly, June 1994, and IBM Labs. Toronto, Canada, July 1994.
 28. *Software Testing and Reliability*, half day seminar at Center for Development of Telematics (CDOT), New Delhi, India, December 1994.

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29. *Software Testing*, half day tutorial, International Conference on Software Testing, Reliability, and Quality Assurance, New Delhi, India, December 19-22, 1994.
 30. *Testing fault tolerant systems*, Harris Corporation, Melbourne, Florida, March, 1995.
 31. *New approaches to software reliability modelling*, University of Campinas, Campinas and University of Sao Paulo at Sao Carlos, Brazil, July 1995.
 32. *On the importance of coverage in software testing*, Tandem Computers, August 1995.
 33. *Quantification of software quality through coverage measures*, Microsoft Corporation, August 1995.
 34. *Software architecture based testing and reliability estimation*, Northrop Electronic Systems Division, October 1995.
 35. *Architecture-based software reliability estimation*, Hughes Network Systems, March 1996.
 36. *New trends on software quality achievement during software development, with emphasis on testing and reliability*, Invited talk at the Seventh International Conference on Software Technology: Software Quality, Curitiba, Brazil, June 1996.
 37. *Reliability, availability, and security: An integrated view*, invited talk at Motorola and Northern Telecom, February 1997.
 38. *Testing Distributed Systems*, invited talk at Motorola and Software Artistry, 1998.
 39. *Software Capsules: A Mantra for Global Supremacy in Software*, Indian Institute of Science and National Institute of Advanced Studies, Bangalore, India, August 1998.
 40. *Coverage Principle: A Mantra for Software Testing and Reliability*, Cadence Corporation, Distinguished Speaker Program, August 1998.
 41. *Testing distributed Systems*, Microsoft, June 1999 and Invited lecture to Software Engineering class at Ball State University, Muncie, July 1999.
 42. *Test and management of distributed systems*, Invited Talk, British Telecom, Martlesham, UK, and Tivoli, Rome, Italy, July 1999.
 43. *Testing, Monitoring, and Control of Distributed Objects*, Invited talk in Cellular Subscriber Testing Symposium, Motorola, Schaumburg, November 9, 1999.
 44. *Testing, Monitoring, and Control of Internet Services*, Distinguished speaker at Washington State University, Pullman, April 2000.
 45. *Test and Management of Internet Services*, Hewlett Packard at Palo Alto, July 5, 2000, Design2Deploy at Mountain View on July 6, 2000, and British Telecom at Ipswich (UK) on July 18, 2000.
 46. *Monitoring SmartHomes*, British Telecom, Ipswich (UK), July 23, 2001.

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47. *Newton's law in Software Development Processes ?*, Distinguished Speaker, Center for Advanced Computing Studies, University of Louisiana, Lafayette, LA, February 1, 2002.
 48. Keynote address: "Success Mantras for IT Industry in the Next Decade," at Rakshapal Bahadur Management Institute, Bareilly, India, October 11, 2003.
 49. *Newton's law in Software Development Processes ?* October 27, 2003 at IIT Delhi and November 10, 2003 at IIT Kanpur, India.
 50. *Feedback control of software pocesses: Progress and Problems*, December 2004, Beijing University of Aeronautics and Astronautics, Beijing, China.
 51. *Software Cybernetics: Progress and Challenges*, December 20, 2004, University of Paderborn, Germany.
 52. *Why the existing theory of software reliability must be discarded..and what should replace it?*, Reliability Group, Microsoft, Redmond, July 26, 2006.
 53. Keynote address: *Saturation effect and the need for a new theory of software reliability*, The 2nd IEEE International Symposium on Dependable, Autonomic and Secure Computing (DASC'06).
 54. Invited talk: *Why the existing theory of software reliability must be discarded..and what should replace it ?*, University of Sao Paulo, Sao Carlos, Brazil. February 6, 2007.

Editorial Board

Software Testing Verification and Reliability Editorial Board, John Wiley and Sons, Ltd.

Referee

National Science Foundation, ACM Transactions On Software Engineering Methodology, IEEE Transactions on Computers, IEEE Transactions on Software Engineering, Information Science, IEEE Software, Journal of the Association of Computing Machinery, Journal of Parallel and Distributed Computing , Performance Evaluation, Software Practice and Experience, Journal of Computer and Software Engineering, and numerous conferences.

RESEARCH FUNDING

1. An SLR(1) Parser Generating System⁶ Department of Electronics, Government of India, No. 2(129)/81-TDID, (Indian Rupees) 125,000, 1974.
2. Simulation of Railway Marshalling Yard, Railway Board, Unlimited travel support, Government of India, 1976.

⁶This project was originally carried out on the IBM 1130 computer without any external support. Subsequently, the Electronics Commission awarded money for an enhancement of this project. See the Data Base project in item ??.

3. Simulation of Train Movement in a Double Line Section with a Single Line Bridge in-between, Railway Board, Government of India, Unlimited travel support, 1976.
4. Design and Development of a Compiler for Hi-Basic Language, DCM Data Products, India, DP:R&D:AK:102/2527, (Indian Rupees), 60,000, 1979.
5. Development of Software and Hardware for Devanagari Based Information Processing System, Department of Electronics, Government of India, No. 2(49)/80-TDID (Indian Rupees) 296,000, 1980.
6. Enhancement grant for the project Development of Software and Hardware for Devanagari Based Information Processing System, Department of Electronics, Government of India, No. 2(49)/80-TDID/148, (Indian Rupees) 125,000, 1981.
7. Development of Video Courses on Microprocessors, Department of Electronics, Government of India, No. 2(124)/81-TDID, (Indian Rupees), 212,400, 1982.
8. Enhancement grant for the project Development of Video Courses on Microprocessors, Department of Electronics, Government of India, No. 2(124)/81-TDID/224, (Indian Rupees), 140,000, 1982.
9. Development of Data Base Management System and Software Tools to Aid in Education and Design of System and Application Software, Electronics Commission, No. 2(129)/81-TDID, (Indian Rupees) 1,321,200, 1982. (Co-PI with Professor Praveen Dhyani).
10. Devanagari Computer for Demonstration and Use during Third World Hindi Convention, Department of Electronics, Government of India, No. 2(144)/82-TDID/244, (Indian Rupees) 275,000, 1984.
11. Development of a Transputer Network Simulator, Inmos, \$5,000, 1986.
12. Program Mutation for SDI Applications (Faculty Associate with R. A. DeMillo as the PI), RADC F 30602-85-C-0255, \$388,670, 1987.
13. Use of Fifth Generation Computers for High Performance Reliable Software Testing, Software Engineering Research Center, \$43,000, 1988.
14. Cochlear Emissions and Psychoacoustic Microstructure, (Co-PI with Arnold Tubis and Glennis Long) NIH 2 R01 NS22095-04A1, \$9,508, 1989.
15. Compiler Integrated Testing, Software Engineering Research Center, \$28,000, 1989.
16. Enhancement of a Wide Spectrum Tool for Software Testing, NSF ECD-8913133, \$20,000, 1990.
17. Faculty Research Program, Bellcore-6711469, \$9,479, 1990.
18. Faculty Research Program, NSF, ECD-8913133, \$9,479, 1990.

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19. Compiler Integrated Testing (Renewal), Software Engineering Research Center, \$10,433, 1990.
 20. Design and Implementation of a Program Unification Tool, NSF Award: 9002225, \$128,094, 1990 (Co-PI with V. J. Rego).
 21. Effectiveness and Performance in Software Testing, NSF Award: 9102311 (with V. J. Rego as Co-PI), \$226,006, 1991.
 22. Documentation and Enhancement of a Data Flow Testing Tool for Use in Software Engineering Education, Educational Supplement for the existing grant "Effectiveness and Performance in Software Testing", NSF, \$22,237, Grant No. CCR-9102311, (Co PI: Vernon Rego), 1992.
 23. Effectiveness of Constrained Mutation, Purdue Research Foundation 1992 PRF Research Grant, \$9,900.
 24. United Nations Training Programme (UNDP), Training fees, September 1992, \$1,000.
 25. Educational supplement to grant in item ?? above (NSF), \$22,402, August 1993.
 26. Testing Fault-Tolerant Software Systems, 1994 PRF Research Grant, \$10,200 (Co-PI: R. A. DeMillo).
 27. A Synthesis of Coverage Testing and Modelling in Software Reliability Estimation, National Science Foundation, \$120,000, NSF Award: 9311862 (Co-PI's: J. Berger, R. A. DeMillo, and V. J. Rego) August 1994-July 1997.
 28. Virtual SERC, \$113,218, NSF Award: 9528527, Co-PI: Buster Dunsmore, 1995-96.
 29. Software Reliability and Testing, IBM Toronto Laboratories, Canada, \$100,000 and summer support for one graduate student at IBM Toronto Labs, 1994-1997.
 30. Software Reusability, SERC grant, \$27,000, 1997-98.
 31. Virtual SERC, PI, NSF Award: 9705332, \$55,000, 1997-98.
 32. Component-based estimation of software reliability, NSF Grant, \$50,000, 1997-99. NSF Tie Project with the Center for Advanced Computers and Communications, Duke University.
 33. Software Engineering Re-training (SERT) program, Raytheon Technical Services, \$300,000 (with Buster Dunsmore), summer 1998.
 34. Software Engineering Research Center, PI, NSF, \$35,000, 1998-99.
 35. Testing Distributed Systems, gift from Motorola, \$10,000, 1998-99.
 36. Value-Based Software Engineering for Small Business, \$240,000, NSF Award No.: 9905789, 1999-2001, CO-PIs: David Raffo, Stuart Faulk, and Robert R. Harmon.

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37. Testing Distributed Systems, Internet 2 project, PI, NSF grant, \$125,000, 1999-2001.
 38. Software Engineering Research Center, PI, NSF Award: 9908659, Center Renewal grant, \$100,000, 1999-2001.
 39. Testing Distributed Systems, SERC (Telcordia and Tivoli), \$50,000, 1999-2000.
 40. Management of Smart Homes, SERC (Telcordia), \$25,000, 2000-2001.
 41. Management of Smart Homes, SERC (British Telecom), \$25,000, 2000-2001.
 42. Mutation 2000: Mutation Testing in the Twentieth and the Twenty First Century, PI, NSF, \$13,315, 2000.
 43. Monitoring and Control of Next Generation Systems, PI, NSF Award, \$25,000, 2002-2004.
 44. Monitoring and Control of the Test Process, Guidant Corporation/SERC, \$30,000, 2003-2004.
 45. Discovery-to-delivery of pharmaceuticals: Safely efficiently using advanced analytical techniques, 21st Century Research and Technology Fund, (Co-PI) \$58,389, 2004-06.
 46. Tools for quantifying software vulnerability and protection: A Science and Technology Arxan Technologies/21STC.R&T Fund, PI (Purdue)\$141,962, 2004-06.
 47. Computational models for the study of hearing and language impairment in children, PI, NSF, \$120,911. 2005–06.
 48. Locating and testing insecure paths in implementations of cryptographic protocols, PI, Army Research Lab, \$52,501. 2006–07.
 49. Development, Deployment, & Maintenance of the Indiana Database for University Research Expertise, PI, Indiana Economic Development Council, INC, \$105,000. March 31, 2008–July 31, 2008. Co-PI: Luo Si.

UNIVERSITY SERVICE

Administrative positions

1. *Member*, Graduate and Undergraduate Computer Science Curriculum development committee, Birla Institute of Technology and Science, Pilani, India, 1973.
2. *Head*, Department of Computer Science, Birla Institute of Technology and Science, Pilani, India, 1982-1985.
3. *Member* of several project review committees set up by the Department of Electronics, Government of India, my role was advisory, 1982-1985.

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4. *Member*, Research Board (responsible for the administration of doctoral and other research programs), Birla Institute of Technology and Science, Pilani, India, 1980-1985.
 5. *Member*, University Senate, Birla Institute of Technology and Science, Pilani, India, 1982-1985.
 6. *Member*, Facilities Committee, Department of Computer Science, Purdue University, 1991.
 7. *Alternate member* School of Science Grievance Committee, Purdue University, 1991.
 8. *Faculty mentor* Summer Research Program for minorities, Purdue University, Summer 1991.
 9. *Chairman* Department Colloquia and Seminars, Purdue University, 1991-92.
 10. *Member* School of Science Elections Committee, Purdue University, 1992-93.
 11. *Member* Facilities Committee, Purdue University, 1992-93.
 12. *Incharge* SERC Seminar, Fall 1993.
 13. *Member* Teaching Evaluation Committee, Purdue University, Fall 1993.
 14. *Member* PRF Summer Faculty Grants committee, Purdue University, Spring 1994.
 15. *Member* Hiring committee, Purdue University, 1993-94.
 16. *Member* Head Review Committee, Purdue University, 1993-94.
 17. *Acting Director*, Software Engineering Research Center, Purdue University, January 1, 1994 till June 30, 1994.
 18. *Member*, Ad-hoc committee to examine duplication of courses in EE and CS departments, August 1995.
 19. *Director*, Software Engineering Research Center, Purdue University, July 1995-2001.
 20. *Member*, Faculty Search Committee, Department of Computer Science, 1996-98; *Chair*, Committee for the evaluation of yearly progress of Assistant Professors; *Member* Space Committee, 1998, *Member*, Visual Arts Committee, 1997-98.
 21. *Faculty Advisor* Indian Classical Music Association (ICMAP), 1997-2002.
 22. *Member*, Summer PRF Grants Evaluation Committee, 1997-1998.
 23. *Member* Graduate Council, 1998-2000.
 24. *Associate Head*, Department of Computer Science, 1997-2001
 25. *Chair*, Graduate Committee, 1998-2001.

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26. *Member* Personnel Committee, 1998-2002.
 27. *Chair*, Graduate Admissions Committee, 1999-2001 and member 2001-2002.
 28. *Chair*, PRF Evaluations Committee (CS), 2000.
 29. *Chair*, Internet Olympiad Committee, 2000-2002.
 30. *Member*, CS Awards Committee and Personnel committee, 2001-2002.
 31. *Chair*, CS Head Search Committee, 2001-2002.
 32. *Member*, GEA, Graduate School, 2004–2007.
 33. *Member*, IUPUI College of Science Dean Search Committee, 2007.

PROFESSIONAL SERVICES

Consultancy

1. Full time consultant to DCM Data Products, a leading computer manufacturing company in India during June/July 1981.
2. Part time consultant for Sree Technical Services, Atlanta, a software company.
3. Consultant to Guidant Corporation, Minneapolis, July 2003.

Conferences, Workshops, and Special Courses

4. Chair, 3-week summer school on Microprocessors sponsored by Indian Society of Technical Education, 1979.
5. Chair, 2-week winter school on Microprocessors for University teachers sponsored by the Indian Society of Technical Education., 1980.
6. Chair, 1-week intensive lecture-cum-workshop on Compiler Construction conducted for the engineers of DCM Data Products, New Delhi, India, (the participants of this course used some of the rare and early compiler writing tools which I had developed namely the SLR(1) Parser Generating System and a lexical analyzer generator), 1980.
7. Co-chair, 14th Minnowbrook Workshop on Software Engineering, July 23-26, 1991 at Blue Mountain Lake, NY; sponsored by SERC, Syracuse University, and Rome Air Development Center.
8. Co-Chair, Workshop on Issues in Software Reliability Estimation, sponsored by SERC and Department of Computer Science, May 21, 1991 at Purdue University.
9. Panel member, Battle of the Testing Gurus, Software Quality Week'91, San Francisco, May 1991.

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10. Panel member, Innovations in Software Testing and Quality Assurance, International Computer Software and Applications Conference, Tokyo, September 1991.
 11. Session Chair, Scheduling and Operating Systems Issues and Parallel and Distributed Systems at International Computer Software and Applications Conference, Tokyo, September 1991.
 12. Program Co-Chair, Second Workshop on Issues in Software Reliability Estimation, Piscataway, New Jersey, October 12-13, 1992. Other Co-Program chairs: Vernon Rego and Bob Horgan (Bellcore).
 13. Member, Program Committee, Third International Symposium on Software Reliability Engineering, Research Triangle Park, NC, October 7-9, 1992.
 14. Member, Program Committee, 15th International Conference on Software Engineering (ICSE 15) Baltimore, MD, May 18-20, 1993.
 15. Session Chair, session 1E-Testing, 15th International Conference on Software Engineering, May 17-21, 1993.
 16. Chair, panel on "Issues in Software Reliability Estimation: A Research Agenda" at the Fifth International Symposium on Software Reliability Engineering, Monterey, California, November 6-9, 1994.
 17. Chair, International Program Committee, First International Conference on Software Testing, Reliability, and Quality Assurance (STRQA'94), New Delhi, India, Dec. 19-22, 1994; Co-Chair STRQA'96, Taiwan.
 18. Member Organizing Committee, Fourth Bellcore/PTT/Purdue Workshop on Issues in Software Reliability, Netherlands, October 22-23, 1995.
 19. Member, Program Committee, Tenth Brazilian Symposium on Software Engineering, Saõ Carlos, Brazil, October 1996.
 20. Member, Program Committee, Seventh International Symposium on Software Reliability Engineering, New York, October 1996.
 21. Member, Program Committee, Eleventh Brazilian Symposium on Software Engineering, Fortaleza, Brazil, October 1997.
 22. Member Program Committee, session chair, and a panelist, Eight International Symposium on Software Reliability Engineering, Albuquerque, November 1997.
 23. Co-Coordinator, Software Engineering Re-training (SERT) course for Raytheon, Indianapolis, June-July 1998.
 24. Coordinator, Software Analysis and Design course for Raytheon, Indianapolis, June 1999.
 25. Member Program Committee, Ninth International Symposium on Software Reliability Engineering, Paderborn, Germany, November 1998.

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26. Member, Program committee Application-specific Software Engineering and Technology (ASSET'98)
 27. Member Program Committee, Ninth International Symposium on Software Reliability Engineering, Boca Raton, Florida, November 1999.
 28. General Chair, Mutation 2000, October 2000, San Jose, CA, USA.
 29. Member, Program Committee, Workshop on Object-Oriented Reliable Distributed Systems (WOODS 2000), Nürnberg, Germany.
 30. Member, Doctoral Symposium Committee, International Conference on Software Engineering 2001, Toronto.
 31. Member Program Committee, 12th International Symposium on Software Reliability Engineering, Hongkong, October 2001.
 32. Member Program Committee, 13th International Symposium on Software Reliability Engineering, November 12-15, 2002, Annapolis, MD.
 33. Session Chair, 13th International Symposium on Software Reliability Engineering, November 12-15, 2002, Annapolis, MD.
 34. Software Testing: Techniques, Tools, and Processes, a short course at Guidant Corporation, Minneapolis. August 12-16, 2002.
 35. Software Testing, a short course at Guidant Corporation, Minneapolis. May 19-23, 2003.
 36. Organizer, Software Technology and Engineering Practice (STEP 2003) workshop on "Software Test and Reliability Estimation Process," Amsterdam, September 19, 2003.
 37. Chair, Brainstorming session on "Center for Research in Software Technologies (CRiST)," November 15, 2003, BITS, Pilani, India.
 38. Chair, First Workshop on Software Cybernetics, International Computer Software and Applications Conference, Hong Kong, Sept 30, 2004.
 39. Member Program Committee, 28th International Computer Software and Applications Conference, Sept 28-30, 2004, Hong Kong.
 40. Panelist, Panel of Computer Supported Work in Software Engineering, 28th International Computer Software and Applications Conference, Hong Kong, Sept. 28-30, 2004.
 41. Member Program Committee, 29th International Computer Software and Applications Conference, July 26-28, 2005, Edinburgh, Scotland.
 42. Co-Chair, 2nd International Workshop on Software Cybernetics, Edinburgh, Scotland, July 26-28, 2005, Edinburgh, Scotland.

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43. Moderator, Panel on “Model-based testing and verification,” 29th International Computer Software and Applications Conference, Edinburgh, Scotland, July 26-28, 2005, Edinburgh, Scotland.
 44. Member, Program Committee, International Symposium on Software Reliability Engineering, Chicago, November 8–11, 2005.
 45. Member, Program Committee, Second Workshop Model Design and Validation in conjunction with MoDELS, Montego Bay, Jamaica, October 3, 2005.
 46. Honorary Chair, The First IFIP Workshop on Trusted and Autonomic Ubiquitous and Embedded Systems (TAUES 2005), Nagasaki, Japan, 6-9 December 2005.
 47. Co-Chair, Program Committee, 30th International Computer Software and Applications Conference, Chicago, September 18-21, 2006.
 48. Member, Steering Committee, 3rd International Workshop on Software Cybernetics, Chicago, September 18-21, 2006.
 49. Member, Program Committee, The 17th International Symposium on Software Reliability Engineering, 6-10 November 2006 - Raleigh, North Carolina, USA
 50. Member, Program Committee, 13th Asia-Pacific Software Engineering Conference (APSEC'06), December 6-8, 2006, Bangalore, India.
 51. Co-Chair, Program Committee, Seventh International Conference on Quality Software, Portland, Oregon, 2007.
 52. Member, steering committee, 2nd and 3rd Workshops on Advances in Model-based Software Testing, 2006 and 2007.
 53. Member, steering committee, COMPSAC 2007, Beijing.
 54. Testing Techniques for Achieving Highly Reliable Software, short course for Graduate Students and Software Test Professionals, Universidade de São Paulo, São Carlos, Brazil February 6-7, 2007.
 55. Member, Program Committee, Second Workshop on Automation of Software Test, Minneapolis, May 20-26, 2007.
 56. Member, Program Committee, The 18th International Symposium on Software Reliability Engineering, 5-9th of November, 2007, Trollhättan, Sweden.
 57. PC Co-Chair, First International Conference on Software Testing, Verification, and Validation, Lillehammer, Norway. April 9-11, 2008
 58. Member, Program Committee, 1st India Software Engineering Conference, Hyderabad, India, February 19-22, 2008.