MOSHE Y. VARDI

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Research Interests

Applications of logic to computer science:

- database systems
- complexity theory
- multi-agent systems
- specification and verification of hardware and software

Education

Sept. 1974 B.Sc. in Physics and Computer Science (*Summa cum Laude*), Bar-Ilan University, Ramat Gan, Israel

May 1980 M.Sc. in Computer Science, The Feinberg Graduate School, The Weizmann Institute of Science, Rehovoth, Israel
Thesis: *Axiomatization of Functional and Join Dependencies in the Relational Model.*

Advisors: Prof. C. Beeri (Hebrew University)
Prof. P. Rabinowitz

Sept 1981 Ph.D. in Computer Science, Hebrew University, Jerusalem, Israel
Thesis: *The Implication Problem for Data Dependencies in the Relational Model.*

Advisor: Prof. C. Beeri

Professional Experience

Nov. 1972 – June 1973 Teaching Assistant, Dept. of Mathematics, Bar-Ilan University. Course: Introduction to computing.

Nov. 1978 – June 1979 Programmer, The Weizmann Institute of Science. Assignments: implementing a discrete-event simulation package and writing input-output routines for a database management system.

Feb. 1979 – Oct. 1980 Research Assistant, Inst. of Math. and Computer Science, The Hebrew University of Jerusalem. Research subject: Theory of data dependencies.

Nov. 1980 – Aug. 1981 Instructor, Inst. of Math. and Computer Science, The Hebrew University of Jerusalem. Course: Advanced topics in database theory.

Sep. 1981 – Aug. 1983 Postdoctoral Scholar, Dept. of Computer Science, Stanford University.

Sep. 1983 – Aug. 1984 Visiting Scientist, Dept. of Computer Science, IBM Research Laboratory, San Jose, California.

Sep. 1984 – Aug. 1985 Research Associate, Center for Study of Language and Information, Stanford University.

Sep. 1985 – Nov. 1993 Research Staff Member, IBM Almaden Research Center, San Jose, California.

Dec. 1989 – Nov. 1993 Second-level manager, Department of Mathematics and Related Computer Science, IBM Almaden Research Center, San Jose, California. Managed four groups: Discrete Mathematics, Foundations of Computer Science, Functional Languages, and System Fundamentals.

March 1991 – August 1995 Consulting Professor, Dept. of Computer Science, Stanford University.

Dec. 1993 – June 2000 Noah Harding Professor, Dept. of Computer Science, Rice University.

July 2000 – present Karen Ostrum George Professor in Computational Engineering, Dept. of Computer Science, Rice University.

Jan. 1994 – June 2002 Chair, Dept. of Computer Science, Rice University.

June 1996 – August 1996 Consultant, Bell Labs, New Jersey.

June 1997 – August 1997 Visiting faculty, Intel Design Center, Haifa, Israel.

June 1998 – August 1998 Visiting faculty, Intel Design Center, Haifa, Israel.

Sept. 1998 – January 1999 Varon Visiting Professor, Weizmann Institute of Science, Israel.

June 1999 – August 1999 Visiting faculty, Intel Design Center, Haifa, Israel.

May 2000 - June 2000 Visiting Professor, Laboratoire d'Informatique Fondamentale d'Orleans, University of Orleans, France.

June 2000 – August 2000 Visiting faculty, Intel Design Center, Haifa, Israel.

January 2001 – present Director, Ken Kennedy Institute for Information Technology Institute, Rice University.

January 2006 – July 2006 Visiting Fellow, Clare Hall, University of Cambridge, UK.

Awards, Fellowships, and Honors

Nov. 1971 – Oct. 1973 Shapiro Fellowship, Bar-Ilan University.

Nov. 1972 Loker Award, Bar-Ilan University.

Nov. 1979 – July 1980 M.Sc. Fellowship, The Weizmann Institute of Science.

Sep. 1981 Fulbright Award, U.S.-Israel Education Foundation.

Sep. 1981 – Aug. 1983 Weizmann Post-Doctoral Fellowship, The Weizmann Institute of Science.

March 1987 Outstanding Innovation Award, Theory of Knowledge, IBM Research.

March 1989 Outstanding Innovation Award, Automata-Theoretic Approach to Program Verification, IBM Research.

March 1992 Outstanding Innovation Award, Zero-One Laws, IBM Research.

August 1998 Spinoza Lecture, 10th European Summer School on Logic, Language, and Information, Saarbruecken, Germany.

May 2000 Fellow, Association for Computing Machinery.

May 2000 Gödel Prize (with P. Wolper).

February 2002 Member, U.S. National Academy of Engineering

March 2002 Doctor honoris causa (accompanied by a special symposium), Saarland University, Germany

October 2002 Doctor honoris causa, Orleans University, France

October 2002 Member, European Academy of Science

October 2002 Fellow, American Association for the Advancement of Science

January 2003 Member, Texas Academy of Medicine, Engineering and Science

April 2003 Saul Gorn Memorial Lecture, University of Pennsylvania

July 2004 Fellow, American Association for Artificial Intelligence

May 2005 Guggenheim Fellow

May 2006 ACM Paris Kanellakis Award for Theory and Practice (w. G. Holzmann, R. Kurshan, and P. Wolper)

August 2006 IEEE Symp. on Logic in Computer Science Test-of-Time Award (w. P. Wolper)

April 2007 Foreign member, Academia Europaea

June 2008 ACM SIGMOD Edgar F. Codd Innovations Award

June 2008 ACM PODS Alberto O. Mendelzon Test-of-Time-Award (w. P. Kolaitis)

June 2008 ACM Presidential Award

November 2008 Blaise Pascal Medal, European Academy of Sciences

January 2009 IEEE Fellow

March 2009 Best Paper Award, 12th Int'l Conf. on Foundations of Software Science and Computation Structures.

June 2009 Milner Lecture, University of Edinburgh

Professional Activities

University Service

1. Chair of Computer Science: Jan. 1994 – June 2002
2. Departmental Search Committee: Jan. 1994 – June 2002
3. Departmental Computing Facility Committee: Jan. 1994 - June 2002
4. Departmental Corporate Affiliates Committee: Jan. 1994 - present
5. University Council: Sep. 1995 – August 1996
6. Promotion and Tenure Committee: Sep. 1995 – August 1996
7. Graduate Council: Sep. 1995 – August 1996
8. Conflict-of-Interest Committee: Dec. 1995 – April 1997
9. President, Rice Chapter of the American Association of University Professors, August 1996 – August 1998.
10. Graduate Council, chair: Sep. 1996 – June 1998.
11. Faculty Handbook Committee: Sep. 1996 – June 1998.
12. Intellectual Property Committee: Dec. 1996 – December 1997.
13. Rice Engineering Day Organizing Committee: Sep. 1996 - March 1997
14. Computational Engineering Computing Committee: Dec. 1996 – Dec. 2000
15. Research Council: January 1999 – June 1999

16. Library Committee: January 1999 – June 2002
17. Task Force on Future Electronic Grant Management: January 1999 – July 1999
18. Committee on Digital Architecture: November 1999 – June 2000
19. Executive Committee, Keck Center for Computational Biology: Sep. 2000 – June 2001
20. Steering Committee Chair, Gulf-Coast Consortium for Bioinformatics: Jan. 2001 – present
21. Computer and Information Technology Institute, Director: Jan. 2001 – December 2007
22. Ken Kennedy Institute for Information Technology, Jan. 2008 – present
23. Science and Engineering Computing Committee, Chair: Sep. 2002 – May 2004
24. Advanced Placement Digital Library Project Advisory Board: November 2002 – October 2005
25. Search committee, Vice Provost for Information Technology, April 2003 – October 2003.
26. Ad-Hoc Committee on Copyright Policy, February – April 2004.
27. Information Technology Advisory Committee, July 2004 – February 2007.
28. Co-chair, Information Technology Advisory Committee, February 2007 – present
29. Senate Working Group on Email Privacy, January 2007 – February 2008
30. Bioinformatics and computational biology chair search committee, M.D. Anderson Cancer Center, spring 2007.
31. Chair, Graduate Council, September 2007 – present
32. Research Advisory Group, September 2007 – present

Program Committees:

1. 3rd ACM Symp. on Principles of Database Systems, March 1984.
2. 4th ACM Symp. on Principles of Database Systems, March 1985.
3. 1st Conf. on Theoretical Aspects of Reasoning about Knowledge, March 1986.
4. 5th ACM Symp. on Principles of Database Systems, March 1986.
5. 1st Symp. on Logic in Computer Science, June 1986.
6. 1st International Conf. on Database Theory, Aug. 1986.
7. 27th IEEE Symp. on Foundation of Computer Science, Oct. 1986.
8. **program chair**, 6th ACM Symp. on Principles of Database Systems, March 1987.

9. **program chair**, 2nd Conf. on Theoretical Aspects of Reasoning about Knowledge, March 1988.
10. 16th ACM Symp. on Principles of Programming Languages, Jan. 1989.
11. 2nd Conf. on Mathematical Foundations of Database Systems, July 1989.
12. 1st Int'l Conf. on Deductive and Object-Oriented Databases, Dec. 1989.
13. ACM Int'l Conf. on Management of Data, May 1990.
14. 31st IEEE Symp. on Foundations of Computer Science, Oct. 1990.
15. 5th Jerusalem Conf. on Information Technology, October 1990.
16. 3rd International Conf. on Database Theory, Dec. 1990.
17. 18th Int'l Colloq. on Automata, Languages, and Programming, July 1991.
18. 2nd Int'l Symp. on AI and Mathematics, Jan. 1992.
19. 7th IEEE Symp. on Logic in Computer Science, June 1992.
20. 32nd IEEE Symp. on Foundations of Computer Science, Oct. 1992.
21. **program chair**, 8th IEEE Symp. on Logic in Computer Science, June 1993.
22. IJCAI Workshop on Principles of Hybrid Representation and Reasoning, Aug. 1993.
23. 13th ACM Symp. on Principles of Database Systems, May 1994.
24. Symp. on Logical Foundations of Computer Science, July 1994.
25. 34nd IEEE Symp. on Foundations of Computer Science, Oct. 1994.
26. **program co-chair**, Int'l Conf. on Database Theory, Jan. 1995.
27. 27th ACM Symp. on Theory of Computing, May 1995.
28. 7th Int'l Conf. on Computer-Aided Verification, July 1995.
29. 3rd Int'l Conf. on Information and Knowledge Management, Nov. 1995.
30. 4th Int'l Symp. on Artificial Intelligence and Mathematics, Jan. 1996.
31. **program chair**, 4th Israeli Symposium on the Theory of Computing and Systems, June 1996.
32. 8th Conf. on Computer-Aided Verification, July 1996.
33. 22nd Int'l Conf. on Very Large Databases, Sep. 1996.
34. 5th Israeli Symposium on Theory of Computing and Systems, June 1996.

35. 9th Conf. on Computer-Aided Verification, June 1997.

36. 5th Int'l Symp. on Artificial Intelligence and Mathematics, January 1998.

37. 17th ACM Symp. on Principles of Database Systems, June 1998.

38. **program co-chair**, 10th Conf. on Computer-Aided Verification, June 1998.

39. AAAI'98, Symposium of the American Association for Artificial Intelligence, August 1998.

40. 18th Symposium on Foundations of Software Technology and Theoretical Computer Science, Chennai, India, December 1998.

41. 6th Workshop on Logic, Language, Information and Computation, Rio de Janeiro, Brazil, May 1999.

42. 6th International Conference on Logic for Programming and Automated Reasoning, Tbilisi, Georgia, September 1999.

43. 5th International Conference on Logic Programming and Nonmonotonic Reasoning, El Paso, December 1999.

44. 6th International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, January 2000.

45. Conference on Foundations of Software Science and Computation Structures, Berlin, March 2000.

46. 19th ACM Symp. on Principles of Database Systems, Dallas, May 2000.

47. 17th Int'l Conf. on Automated Deduction , Pittsburgh, Pennsylvania, June 2000.

48. 11th Int'l Conf. on Concurrency Theory, State College, Pennsylvania, August 2000

49. Annual Conf. of the European Association for Computer Science Logic, Fischbachau/Munich, Germany, August 2000.

50. 7th International SPIN Workshop on Model Checking of Software, Stanford University, August 2000

51. 8th International Conference on Database Theory, London, January 2001.

52. International Joint Conference on Automated Reasoning, Siena, Italy, June 2001.

53. 8th International Symposium on Temporal Representation and Reasoning, Cividale del Friuli, Italy, June 2001.

54. 5th Annual Conference of the European Association for Computer Science Logic, Paris, France, September 2001.

55. 8th Int'l Workshop on Knowledge Representation Meets Databases, Rome, Italy, September 2001.

56. Joint Workshop on Process Algebra and Performance Modelling and Probabilistic Methods in Verification, Aachen, Germany, September 2001.

57. 3rd ACM Conference on Electronic Commerce, Tampa, October 2001.

58. 8th International Conference on Logic for Programming, Artificial Intelligence and Reasoning, Havana, Cuba, December 2001.

59. European Conference on Design, Automation and Test, Paris, France, March 2002.

60. 9th International SPIN Workshop on Model Checking of Software, Grenoble, France, April 2002.

61. 9th International Symposium on Temporal Representation and Reasoning, Manchester, United Kingdom, June 2002.

62. 18th Int'l Conf. on Automated Deduction, Copenhagen, Denmark, July 2002.

63. 4th Int'l Workshop on Verification of Infinite-State Systems, Brno, Czech Republic, August 2002.

64. 8th Int'l Conference on Principles and Practice of Constraint Programming, Ithaca, September 2002.

65. **program co-chair**, 22nd IFIP WG 6.1 International Conference on Formal Techniques for Networked and Distributed Systems, Houston, November 2002.

66. European Conference on Design, Automation and Test, Munich, Germany, March 2003.

67. 9th Conference on Theoretical Aspects of Rationality and Knowledge, Bloomington, June 2003.

68. 19th Int'l Conf. on Automated Deduction, Miami, July 2003.

69. 12th Int'l Congress of Logic, Philosophy, and Methodology of Science, Oviedo, Spain, August 2003.

70. **program co-chair**, 10th Int'l Conference on Logic for Programming, Artificial Intelligence, and Reasoning, Almaty, Kazakhstan, September 2003.

71. 23nd IFIP WG 6.1 International Conference on Formal Techniques for Networked and Distributed Systems, Berlin, Germany September 2003.

72. 12th Conference on Correct Hardware Design and Verification Methods, L'Aquila, Italy, October 2003.

73. European Conference on Design, Automation and Test, Paris, France, March 2004.

74. 23rd ACM Symposium on Principles of Database Systems, Paris, France, June 2004.

75. 19th IEEE Symposium on Logic in Computer Science, Turku, Finland, July 2004.

76. **program co-chair**, Computing Research Association Biennial Meeting, Snowbird, Utah, July 2004.

77. 1st Int'l Conference on Quantitative Evaluation of Systems, Enschede, the Netherlands, September 2004.

78. 20th Int'l Conference on Automated Deduction, Tallinn, Estonia, July, 2005.

79. 3rd Int'l Symposium on Automated Technology for Verification and Analysis Taipei, Taiwan, October, 2005.

80. 33rd International Conference on Very Large Data Bases, September 2007, Vienna, Austria.

Invited Talks:

1. On the properties of total join dependencies. Workshop on Formal Bases for Data Bases, CERT-DERI, Toulouse, Dec. 1979.

2. Second-order dependency theory. XP4.5 Workshop on Database Theory, Stanford University, Aug. 1983.

3. On the semantics of database updates. Conf. on Logic in Computer Science, CUNY, New York, Dec. 1983.

4. The theory of data dependencies. AMS short course on The Mathematics of Information Processing, Louisville, Jan. 1984.

5. Fundamentals of database theory. Course on Computation Theory, CISM, Udine (Italy), Sep. 1984.

6. Fundamentals of dependency theory. Workshop on Logic and Computer Science, Lexington, June 1985.

7. Issues in logical databases (tutorial), 12th Int'l Conference on Very Large Data Bases, Kyoto, Japan, August 1986.

8. Unified verification theory, Colloq. on Temporal Logic in Specification, Altrincham, UK, April 1987.

9. Unified verification theory, US-Japan Workshop on Logic of Programs, Hawaii, May 1987.

10. An automata-theoretic approach to automatic protocol verification. Concurrency 88, Hamburg, Germany, Oct. 1988.

11. Automata theory for database theoreticians, 8th ACM Symp. on Principles of Database Systems, March 1989.

12. Global optimization problems for database logic programs, Workshop on Logic Related to Computer Science, Mathematical Science Research Institute, Nov. 1989.

13. Global optimization problems for database logic programs, 7th Int'l Conf. on Logic Programming, Jerusalem, Israel, June 1990.

14. Knowledge without probability, Workshop on Learning, Rationality, and Games. Santa Fe Inst., April 1991.

15. Infinitary logic in computer science, NSF-INRIA Workshop on Databases and Finite-Model Theory, June 1992.

16. Infinitary logic in computer science, 19th Int'l Coll. on Automata, Languages, and Programming, Vienna, Austria, July 1992.

17. Fixpoint logics, relational machines, and computational complexity, Annual Meeting of the Association for Symbolic Logic, Notre Dame University, March 1993.

18. Finite-model theory, process theory, and program logics. Jumelage'93, SRI International, Oct. 1993.

19. Nontraditional applications of automata theory. Symp. on Theoretical Aspects of Computer Software, Sendai, Japan, April 1994.

20. Infinitary logic in computer science. Logic Colloquium'94, Clermont-Ferrand, France, July 1994.

21. An automata-theoretic approach to program specification and verification. 8th Banff Higher-Order Workshop, Banff, Canada, Sep. 1994.

22. Fixpoint logic and program verification. 2nd International Workshop on Finite Model Theory, Luminy, France, April 1995.

23. Program logics and finite-model theory. DIMACS Workshop on Finite Models and Descriptive Complexity, Princeton, January 1996.

24. Computational model theory. *Keislerfest* – a Conference on Current Trends in Applied Model Theory in Honor of H.J. Keisler, Madison, March 1996.

25. Verification = Logic + Algorithmics. DIMACS Workshop on Computational and Complexity Issues in Automated Verification, Piscataway, March 1996.

26. Global optimization problems for database logic programs. 17th IPP Symposium – a Technical Perspective on Paris Kanellakis, Brown University, May 1996.

27. Infinite games against nature. DIMACS Workshop on Controllers for Manufacturing and Automation: Specification, Synthesis, and Verification Issues. Piscataway, May 1996.

28. Verification = Logic + Algorithmics. Keynote lecture, SPIN'96 – 2nd International SPIN Workshop, August 1996.

29. Computational model theory. CSL'96 – Annual Conference of the European Association for Computer Science Logic, September 1996.

30. Common knowledge: now you have it, now you don't. Intelligent Systems–a Semiotics Perspective, the 1996 Int'l Multidisciplinary Conference, October 1996.

31. Automated verification = graphs, logic, and automata. Intel Symposium on Formal Verification, Haifa, Israel, June 1997.

32. Alternating automata: unifying truth and validity checking for temporal logics. 14th International Conference on Automated Deduction, Townsville, Australia, July 1997.

33. Computational model theory. 4th Workshop on Logic, Language, Information and Computation (WoLLIC'97), Fortaleza (Ceara'), Brazil, August 1997.

34. Modular model checking. International Symposium on Compositionality (COMPOS'97), Bad Malente, Germany, September 1997.

35. Unifying truth and validity checking for temporal logics. Dagstuhl Workshop on Applications of Tree Automata, Germany, October 1997.

36. Verification of open systems. 17th Conf. on Foundations of Software Technology and Theoretical Computer Science, Kharagpur, India, December 1997.

37. Conjunctive-query containment and constraint satisfaction. Workshop on Finite-Model Theory, Oberwolfach, Germany, February 1998.

38. The automata-theoretic approach to verification of probabilistic programs. Workshop on Probabilistic Methods in Verification, Indianapolis, June 1998.

39. Linear vs. branching time: the complexity-theoretic perspective. 13th IEEE Symposium on Logic in Computer Science, Indianapolis, June 1998.

40. Automated verification = graphs, logic, and automata. Intel Symposium on Formal Verification, Portland, Oregon, June 1998.

41. Automated verification = graphs, logic, and automata. Workshop on Reasoning about Actions, 10th European Summer School on Logic, Language, and Information, Saarbruecken, Germany, August 1998.

42. Unifying truth and validity for temporal logic. *Spinoza Lecture*, 10th European Summer School on Logic, Language, and Information, Saarbruecken, Germany, August 1998.

43. Sometimes and not never re-revisited: on branching vs. linear time. 9th Int'l Vonf. on Concurrency Theory, Nice, France, September 1998.

44. Verification of open systems. DIMACS 10th Year Anniversary, Rutgers University, October 1998.

45. Temporal Logic – Finite-Model Theory vs. Automata Theory. School on Finite-Model Theory, Chennai, India, December 1998.

46. The complexity of constraint-satisfaction problem. IRCS/DIMACS Tutorial on Logic and Cognitive Science, University of Pennsylvania, April 1999.

47. Probabilistic Linear-Time Model Checking: an Overview of The Automata-Theoretic Approach. 5th Int. AMAST Workshop on Real-Time and Probabilistic Systems, Bamberg, Germany, May 1999.

48. The descriptive complexity of constraint satisfaction. Workshop on Implicit Computational Complexty, Federated Logic Conference, Trento, Italy, July 1999.

49. Logic and computer-aided verification, mini-course, Second Pan-Hellenic Logic Symposium, Delphi, Greece, July 1999.

50. The truth, the whole truth, and nothing but the truth. 6th International Workshop on Knowledge Representation Meets Databases, Linköping, Sweden, July 1999.

51. Automata theory: what is new since 1959? Workshop on Model Checking and Program Analysis, Schloss Ringberg, February 2000.

52. Automated verification = graphs, logic, and automata. Journees de Verification Formelle, LIFO, University of Orleans, France, June 2000.

53. From verification to synthesis. Journees de Verification Formelle, LIFO, University of Orleans, France, June 2000.

54. Constraint satisfaction and view integration. First International Conference on Computational Logic, London, July 2000.

55. The ultimate temporal specification language. IBM Formal Verification Summer Symposium, Israel, August 2000.

56. Automated verification = graphs, logic, and automata. Annual Conference of the European Association for Computer Science Logic, August 2000, Fischbachau, Germany

57. 0-1 Laws for Fragments of Existential Second-Order Logic: A Survey. 25th International Symposium on Mathematical Foundations of Computer Science, Bratislava, Slovak Republic, August 2000.

58. Alternation. Advances in Modal Logic - International Conference on Temporal Logic, Leipzig, Germany, October 2000.

59. Common Knowledge: Now You Have It, Now You Don't. Language, Logic and Logistics: Modeling and Cross-Disciplinary Discourse. New Mexico State University, January 2001.

60. Branching vs. Linear Time: Final Showdown. European Joint Conferences on Theory and Practice of Software, Genova, Italy, April 2001.

61. Automated verification = graphs, logic, and automata. Bar-Ilan International Symposium on Foundations of Artificial Intelligence, Ramat Gan, Israel, June 2001.

62. Designing a Property Specification Language. Intel Symposium on Formal Verification, Haifa, Israel, July 2001.

63. Benefits of bounded model checking in an industrial setting. Dagstuhl Seminar on Exploration of Large State Spaces, November 2001.

64. Constraint satisfaction and database theory. 7th Int'l Conference on Principles and Practice of Constraint Programming, Paphos, Cyprus, November 2001.

65. 0-1 Laws for Fragments of Existential Second-Order Logic: A Survey. AMS-MAA-ASL Joint Mathematics Meetings, San Diego, January 2002.

66. On the unusual effectiveness of logic in computer science. Symposium on the Effectiveness of Logic in Computer Science in Honour of Moshe Vardi, International Max Planck Research School for Computer Science, Saarbrücken, Germany, March 2002.

67. Logic and automata: a match made in heaven. Symposium on the Effectiveness of Logic in Computer Science in Honour of Moshe Vardi, International Max Planck Research School for Computer Science, Saarbrücken, Germany, March 2002.

68. Automated verification = graphs, logic, and automata. 2002 Clifford Lectures, Mathematical Logic for Computer Science, Tulane University, New Orleans, March 2002.

69. Common knowledge revisited. Symposium on Dimensions in Epistemic Logic, Danish Network for Philosophical Logic, Roskilde University, May 2002.

70. On the unusual effectiveness of logic in computer science. Workshop on Learning and Formal Verification - in Honor of Eli Shamir, Neve Ilan, Israel, May 2002.

71. Automata and logic: words, trees, and forests. Workshop on Hybrid Logic, Federated Logic Conference, Copenhagen, Denmark, July 2002.

72. The information revolution - reality or hype? International School on Disarmament and Research on Conflicts, Trento, Italy, August 2002.

73. Model checking: a complexity-theoretic perspective. 1st Int'l Workshop on Parallel and Distributed Model Checking, Brno, Czech Republic, August 2002.

74. Alternation. 8th European Conf. on Logics in Artificial Intelligence, Cosenza, Italy, september 2002.

75. Verification=logic+algorithms. Games Network Kick-Off Meeting, Edinburgh, UK, September 2002.

76. Common knowledge: now you have it, now you don't. Approches Formelles Outils D'Analyse et de Synthese, Orleans University, France, September 2002.

77. A call to regularity. Computer Science Symposium in Honor of Jeffrey D. Ullman, Stanford, December 2002.

78. Designing a Property Specification Language. Dutch Theory Day, Utrecht, The Netherlands, March 2003.

79. And logic begat computer science. Saul Gorn Memorial Lecture, University of Pennsylvania, April 2003.

80. Probabilistic Linear-Time Model Checking: an Overview of The Automata-Theoretic Approach. Dagstuhl Workshop on Probabilistic Methods in Verification and Planning, Dagstuhl, Germany, May 2003.

81. And Logic Begat Computer Science, Symposium in honor of Professor Baruch Muskat, Bar Ilan University, Israel, May 2003.

82. Constraints, Graphs, Algebra, and Logic. Third Haifa Workshop on Interdisciplinary Applications of Grapg Theory, Combinatorics, and Algorithms, May 2003.

83. A call to regularity. Workshop on Principles of Computing and Knowledge (in memory of Paris C. Kanellakis), Federated Computing Research Conference, June 2003.

84. Logic and automata: a match made in heaven. Int'l Colloq. on Automata, Languages, and Programming, July 2003.

85. Automated verification = graphs, logic, and automata. Int'l Joint Conference on Artificial Intelligence, Acapulco, Mexico, August 2003.

86. Liveness and co-liveness. Beyond Safety - an Int'l Workshop, Schloss Ringberg, Germany, April 2004.

87. Markov Processes and Markov Decision Processes - The Verification Perspective. Invited talk, 20th Conference on Uncertainty in Artificial Intelligence. Banff, Canada, July 2004.

88. The logic of life. Informatics–Defining the Research Agenda. Indiana University, Bloomington, September 2004.

89. Alternation as an algorithmic construct. A Tribute to Larry Stockmeyer, IBM Almaden Research Center, October 2004.

90. Model checking for database theoreticians, Tenth International Conference on Database Theory, Edinburgh, Scotland, January 2005.

91. A Game-theoretic approach to automated program generation, IFIP Working Group 2.11 on Program Generation, Rice University, March 2005.

92. Tutorial on computer-aided verification (three lectures). Annual Meeting of the Association for Symbolic Logic, Stanford University, March 2005.

93. Alternation as an algorithmic construct. Workshop on Programming Logics in memory of Harald Ganzinger, MPI, Germany, June 2005.

94. Tree automata in program synthesis. Dagstuhl Workshop on Synthesis and Planning, June 2005.

95. Büchi complementation – a 40-year saga. Ninth Asian Logic Conference, Novosibirsk, Russia, August 2005.

96. A Call to Regularity. Colloquium Honoris Causa, IRISA, Rennes, France, October 2005.

97. Alternation as an algorithmic construct. Invited talk, British Colloquium of Theoretical Computer Science, Swansea, April 2006.

98. Globalization and Offshoring of Software. The Innovation Imperative – Globalization and National Competitiveness Conference, Stockholm, April 2006.

99. Games as an algorithmic construct. Invited Tutorial, Annual Meeting, Games and Automata for Synthesis and Validation Research Training Network, Cambridge, UK, July 2006.

100. From Church and Prior to PSL, Workshop on 25 Years of Model Checking, Federated Logic Conference, Seattle, August 2006.

101. From verification to synthesis. Keynote talk, 5th International Symposium on Formal Methods for Components and Objects, Amsterdam, November 2006.

102. Automata-Theoretic Model Checking Revisited. Invited talk, 8th International Conference on Verification, Model Checking and Abstract Interpretation, Nice, France, January 2007.

103. The Büchi Complementation Saga. Invited talk, 24th Symp. on Theoretical Aspects of Computer Science, Aachen, Germany, February 2007.

104. Process Equivalene Revisited. 23rd Conference on the Mathematical Foundations of Programming Semantics, New Orleans, April 2007.

105. Globalizationa and Offshoring of Software. Plenary talk, American Distance Education Consortium, Seattle, April 2007.

106. Where Have All the IT Jobs Gone? There, There, and Right Here. Conference on the New Knowledge Economy – Global Trends and Opportunities, IIT Alumni Association of North Texas, May 2007.

107. Constraint Satisfaction – An Introduction. Invited tutorial, Workshop on Universal Algebra and the Constraint Satisfaction Problem, Nashville, June 2007.

108. Formal Techniques for SystemC Verification. Intel's Annual Symposium on VLSI CAD and Validation – Design and Validation Challenges of Multi-Core Systems in Nanoscale Silicon, Haifa, July 2007.

109. Linear-Time Model Checking – Automata Theory in Practice. 12th Int'l Conf. on Implementation and Applications of Automata, Prague, July 2007.

110. Logic, Automata, Games, and Algorithms. Invited Talk, 13th Int'l Congress on Logic, Methodology, and Philosophy of Science, Beijing, August 2007.

111. From Löwenheim to PSL. Invited Talk, British Logic Colloquium, London, September 2007.

112. The Automata-Theoretic Approach. Invited Tutorial, 5th International Symposium on Automated Technology for Verification and Analysis, Tokyo, Japan, October 2007.

113. Branching vs. Linear Time: Semantical Perspective. Keynote Talk, 5th International Symposium on Automated Technology for Verification and Analysis, Tokyo, Japan, October, 2007.

114. The Büchi Complementation Saga. Invited Talk, 1st Workshop on Omega-Automata, Tokyo, Japan, October, 2007.

115. From Löwenheim to PSL. Workshop on Automata and Logic, Aachen, Germany, December 2007.

116. The High-Tech Industry in Israel. The Houston Jewish Community 2008 Study Day, February 2008.

117. And Logic Begat Computer Science. Algebra Mini-Conference, Sam Houston State Universty, April 2008.

118. From Philosophical to Industrial Logic. Keynote Talk, 6th NASA Langley Formal Methods Workshop, April 2008.

119. Designing a property specification language. Invited talk, Workship on 25 Years of Concurrency at CWI, Amsterdam, May 2008.

120. Logic, Automata, Games, and Algorithms. Invited Tutorial, Computability in Europe 2008, Athens, Greece, June 2008.

121. And Logic Begat Computer Science. International Guest Lecture, Kiel Week Festival, Kiel, Germany, June 2008.

122. From Philosophical to Industrial Logic. Symposium on XML, Logic, and Automata, Grantown-on-Spey, Scotland, July 2008.

123. From Verification to Synthesis. Invited talk, First BCS Conference on Visions of Computer Science, London, UK, Sep. 2008.

124. From verification to synthesis. Keynote talk, 2nd IFIP Working Conference on Verified Software – Theories, Tools, and Experiments, Toronto, Canada, Sep. 2008.

125. Automata-Theoretic Model Checking Revisited. Keynote talk, 4th Haifa Verification Conference, Haifa, Israel, October 2008.

126. Logic and Computation. European Academy of Science, Brussels, Belgium, November 2008.

127. From Philosophical to Industrial Logics. Invited Talk, 3rd Indian Conference on Logic and Its Applications, Chennai, India, January 2009.

128. From program synthesis to service composition. Bertinoro Workshop on Data and Service Integration. Bertinoro, Italy, March 2009.

129. From Aristotle to the Pentium. Public Symposium on The Convergence of Logic, Mathematics and Computer Science, UCLA, April 2009.

130. Constraints, Graphs, Algebra, Logic, and Complexity. Plenary talk, 6th Annual Conference on Theory and Applications of Models of Computation, ChangSha, China, May 2009.

131. And Logic Begat Computer Science. Milner Lecture, School of Informatics, Edinburgh University, Scotland, June 2009.

132. Constraints, Graphs, Algebra, Logic, and Complexity. An Honorary Day for Robert L. Constable, Ben Gurion University, Israel, June 2009.

133. From Verification to Synthesis. Keynote Talk, 29th Brazilian Computer Society Congress, Bento Goncalves, Brazil, July 2009.

134. Constraints, graphs, algebra, logic, and complexity. Invited talk, Maltsev Meeting, Novosibirsk, Russia, August 2009.

135. Model checking as a reachability problem. Invited talk, 3rd Workshop on Reachability Problems, Paris, France, September 2009.

Meetings Led and Organized:

1. *conference chair*, 2nd Conf. on Theoretical Aspects of Reasoning about Knowledge, March 1988.

2. *conference chair*, 3nd Conf. on Theoretical Aspects of Reasoning about Knowledge, March 1990.

3. *member, board of directors*, Theoretical Aspects of Reasoning about Knowledge, Inc., Sep. 91 – present.

4. *conference chair*, 11th ACM Symp. on Principles of Database Systems, May 1992.

5. *member, organizing committee*, IEEE Symp. on Logic in Computer Science, June 1991 – present.

6. *conference chair*, 12th ACM Symp. on Principles of Database Systems, May 1993.

7. *member, advisory board*, ACM Special Interest Group on Management of Data (SIGMOD), June 1993 – June 1998.

8. *general chair*, 10th IEEE Symp. on Logic in Computer Science, June 1995.

9. *co-director*, DIMACS Special Year on Logic and Algorithms, 1995–6.

10. *steering committee chair*, Federated Logic Conference, June 1996.

11. *workshop co-organizer*, Logic and Algorithms – One Year Later, DIMACS Workshop, July 1997.

12. *board member*, European Association for Computer Science Logic, August 1997 – September 2005.

13. *workshop co-organizer*, Dagstuhl Seminar on Applications of Tree Automata, October 1997.

14. *workshop co-organizer*, IRCS/DIMACS Tutorial and Workshop on Logic and Cognitive Science: Linking Finite Model Theory, Descriptive Complexity, and the Study of Cognition. University of Pennsylvania, April 1999.

15. *steering committee chair*, Federated Logic Conference, July 1999.

16. *workshop co-organizer*, Dagstuhl Seminar on Finite-Model Theory, Databases, and Computer-Aided Verification, October 1999.

17. *workshop co-organizer*, Model Checking and Program Analysis, Schloss Ringberg, February 2000.

18. *workshop co-organizer*, Dagstuhl Seminar on Probabilistic Methods in Verification, May 2000.

19. NSF/CISE Workshop on The Unusual Effectiveness of Logic in Computer Science, Arlington, January 2001.

20. *general chair*, 8th International SPIN Workshop on Model Checking of Software, May 2001.

21. *workshop co-organizer*, Dagstuhl Seminar on Exploration of Large State Spaces, November 2001.

22. *general chair*, 9th International SPIN Workshop on Model Checking of Software, April 2002.

23. *steering committee chair*, Federated Logic Conference, July 2002.

24. *workshop co-organizer*, Workshop on Learning and Formal Verification - in Honor of Eli Shamir, Neve Ilan, Israel, May 2002.

25. *symposium chair*, GCC/Keck Bioinformatics 2002, Houston, October 2002.

26. *conference chair*, 22nd IFIP WG 6.1 International Conference on Formal Techniques for Networked and Distributed Systems, Houston, November 2002.

27. Co-director, Special Programme on Logic and Algorithms, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, January - July 2006.

28. Workshop on Constraints and Verification, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, May 2006.

29. General Chair, 4th Federated Logic Conference, Seattle, August 2006.

30. Chair, Symposium on Challenges in Computing and Information Technologies, Rice University, December 2007.

31. Co-chair, De Lange Conference on Emerging Libraries, Rice University, March 2007.

32. Co-chair, Workshop on Logic and Algorithms, International Center for Mathematical Science, July 2008.

Editorships:

1. Guest editor, special issue of *J. Computer and System Sciences* (selected papers from the 6th ACM Symp. on Principles of Database Systems, March 1987), 1990.

2. Guest editor, special issue on Database Logic Programming. *J. Logic Programming* 10:3&4(1991).

3. Issue editor, special issue dedicated to Paris Christos Kanellakis, *Information and Computation* 127:2(1996).

4. Guest editor, special selection in logic in computer science. *J. of Symbolic Logic* 62:2(1997).

5. Guest co-editor, special issue of *Theoretical Computer Science* (selected papers from the Int'l Conf. on Database Theory, January 1995) 190:2(1998).

6. Associate editor, *Information and Computation*, April 1989 – present.

7. Associate editor, *J. of Computer and System Sciences*, June 1993 – present.

8. Associate editor, *Chicago J. of Theoretical Computer Science*, April 1994 – present.

9. Member of editoral board, *SIAM J. on Computing*, July 1994 – December 2007.

10. Associate editor, *ACM Tran. on Database Systems*, Sep. 1995 – Sep. 2001.

11. Associate editor, *Formal Methods in System Design*, Dec. 1996 – August 2005.

12. Advisory Board, *International Journals on Software Tools for Technology Transfer*, Feb. 1999 – present.

13. Associate editor, *Electronic Notes in Theoretical Computer Science*, Jan. 2000 – present.

14. Member of editorial board, *Lecture Notes in Computer Science*, Springer-Verlag, May 2004 – December 2007.

15. Managing editor, *Logical Methods on Computer Science*, Sep. 2004 – present.

16. Editor in Chief, *Communications of ACM*, June 2008 – present.

Funding:

1. PI, NSF Grant no. IRI-8715814, 1988 ($21.5K): 2nd Conf. on Theoretical Aspects of Reasoning about Knowledge.
2. PI, AFOSR Contract no. F49620-90-C-0020, 1990 ($10K): 3nd Conf. on Theoretical Aspects of Reasoning about Knowledge.
3. Co-PI, DOD Grant for Independent Research and Development: System Fundamentals, 1986-1993
4. Co-PI, NSF Grant no. CDA-9502791, July 1995 - June 2000 ($1.05M) Multi-processor cluster computing.
5. PI, NSF CISE Postdoctoral Program no. CDA-9625898, March 1996 – Feb. 1999 ($50K): Diagrammatical Reasoning in Hardware Verification.
6. PI, NSF Grant no. CCR-9628400, Aug. 1996 - July 1998 ($130K): Development of Reliable Distributed Protocols.
7. PI, NSF Grant no. CCR-9700061, June 1997 - May 2001 ($235K): Variable-Confined Logics in Finite-Model Theory.
8. PI, NSF Grant no. CCR-9711212, Sep. 1997 - Aug. 1998 ($9K): Workshop on Applications of Tree Automata.
9. PI, Intel grant, July 1997 - June 2000 ($120K): Automated Verification of Large Designs.
10. Co-PI, Intel equipment grant, Jan. 1998 - Dec. 2000 ($185K): Architectural simulations and verification.
11. Program co-chair, a 20-company sponsorship grant, 10th Conf. on Computer-Aided Verification, June 1998 ($40K).
12. Co-PI, US-Israel Binational Science Foundation, BSF-9800096, Sept. 1999 - August 2002 ($65K): Automata-theoretic approach to design verification.
13. PI, Intel grant, July 2000 - June 2003 ($120K): Automated Verification of Semiconductor Designs – A Linear-Time Approach.
14. PI, NSF Grant no. IIS-9908435, August 2000 - July 2003 ($330K): Constraint satisfaction, database query evaluation, and information integration.
15. Co-PI, NSF Grant no. IIS-9978135, September 2000 - August 2004 ($593K): Constructing probability models for large corpora of well-informed by probabilistically incoherent judgements.
16. PI, NSF Grant no. CCR-9988322, August 2000 - July 2003 ($330K): Developing Linear-time Model-checking Technology.
17. PI, NSF Grant no. EIA-0086264, September 2000 - August 2003 ($490K): Educational Innovation–Integrating Logic in the Computer Science Curriculum.

18. PI, ONR Grant no. N00014-01-1-0767, April 2001 - March 2002 ($2K): 8th International SPIN Workshop on Model Checking of Software.

19. PI, NSF Grant no. EIA-0216467, September 2002 - August 2005 ($1.15M): MRI–Acquisition of CITI Terascale Cluster (CTC).

20. Network Site, European Research Training Network: Games and Automata for Synthesis and Validation, September 2002 - August 2006.

21. PI, NSF Grant no. CCR-0311326, July 2003 - July 2006 ($200K): Automata-Theoretic Approach to Design Verification.

22. Co-PI, US-Israel Binational Science Foundation, BSF-2002268, Sep. 2003 - August 2006 ($60K): Automata and games in design verification.

23. PI, Texas Advanced Technology Program, Grant 003604-0058-2003, January 2004 - December 2005 ($198K): Scaling-Up Formal Verification Technology.

24. PI, Intel grant, June 2006 - June 2009 ($120K): Formal Technologies for High-Level Models.

25. PI, NSF Grant no. CCF-0613889, August 2006 - August 2008 ($200K): A Theory of Automated Design.

26. Co-PI, NSF Grant no. CNS-0615328, August 2006 - July 2009 ($720K): A Robotics-Inspired Approach for the Verification of Hybrid Systems.

27. Co-PI, US-Israel Binational Science Foundation, BSF-2006215, Sept. 2007 - August 2011 ($70K): Automated system synthesis.

28. PI, NSF Grant no. CCF-0728882, September 2007 - July 2010 ($300K): An Automata-Theoretic Approach to Design Synthesis.

Patents:

1. Directly verifying a black-box system, US Patent 6,526,544, Feb. 25, 2003.

2. System and method to analyze VLSI designs, US Patent 7,203,621, April 10, 2007.

Teaching Experience:

1. *Issues in database theory*, Hebrew University of Jerusalem, Israel, spring 1981.

2. *Fundamentals of dependency theory*, CISM, Udine, Italy, summer 1984.

3. *An automata-theoretic approach to temporal logic*, Weizmann Inst. of Science, Israel, summer 1987.

4. *Issues in Logical Databases*, University of Tampere, Finland, summer 1987.

5. *Seminar on Computer-Aided verification*, Rice University, fall 1994.

6. *Logic in computer Science*, Rice University, spring 1995–2003.

7. *Database systems*, Rice University, fall 2003.

8. *Research ethics seminar*, Rice University, fall 1997.

9. *The automata-theoretic approach to design verification*, Advanced course, 10th European Summer School on Logic, Language, and Information, Saarbruecken, Germany, August 1998

10. *The automata-theoretic approache to design verification*, Graduate course, Feiberg Graduate School, Weizmann Institute of Science, Israel, fall 1998.

11. *Logic and computer-aided verification*, mini-course, Second Pan-Hellenic Logic Symposium, Delphi, Greece, July 1999.

12. *The automata-theoretic approache to design verification*, First Southern African Summer School and Workshop on Logic, Universal Algebra, and Theoretical Computer Sceience (LUATCS'99), Rand Afrikaans University, Johannesburg, South Africa, December 1999.

13. *Games in verification.* Advanced course, 13th European Summer School on Logic, Language, and Information, Helsinki, Finland, August 2001.

14. *The automata-theoretic approache to automated verification*, minicourse, Department of Communication, Computer and System Sciences, University of Genoa, Italy, October 2001.

15. *The automata-theoretic approache to automated verification*, minicourse, Department of Computer Science, Haifa University, August 2002.

16. *Logic- and automata-based system design*, International Summer School on Proof Technology and Computation, Marktoberdorf, Germany, July-August 2003.

17. *The Automata-Theoretic Approach to Verification*, 17th International School for Computer Science Researchers, Lipari, Italy, July 2005,

18. *Games-, Automata- and Logic-Based Systems Design*, Summer School on Logical Aspects of Secure Computer Systems, Marktoberdorf, Germany, August 2005.

19. *Property-Specification Languages*, 6th International School on Formal Methods for the Design of Computer, Communication and Software Systems: Hardware Verification, Bertinoro, Italy, May 2006.

20. *Automata in Verification*, 5th International Ph.D. School in Formal Languages and Applications, Tarragona, Spain, December 2006.

Students Advised:

- Stanford University: G. Kuper, M. Winslett, T. Plambeck, R. Alur, S. Chaudhuri, H. Jakobsson, H. Wong-Toi.
- Weizmann Institute: S. Safra, N. Piterman,
- Haifa University: R. Wiener
- Technion: O. Bernholtz, A. Flaisher
- Rice University: D. Baker (committee), S. Ellner (committee), M. Kallahalla (committee), Z. Yang, D. Demopoulos, G. Pan, S. Tsavachidis, B. McMahan, P. Porter (undergraduate), X. Wang, B. Chen (committee), D. Tabakov, K. Rozier, S. Nain, S. Fogarty, K. Pershell (committee)
- University of Rome 1: M. Daniele
- University of Naples: A. Murano
- University of Trento: S. Tonetta

Postdoctoral Students Advised:

- Kathi Fisler: 1996–2000
- Armando Tacchella: 2001
- Doron Bustan: 2002–2004
- Yoad Lustig: 2008 – present

Related Experience:

1. University Space Research Association, CESDIS Evaluation Panel, Goddard NASA Air Base, June 1988.
2. Panel chair, Database logic programming, deductive databases, and expert database systems. ACM-SIGMOD Conf., June 1988.
3. Site review team, Computer and Information Sciences School, Syracuse University, Sep. 1990.
4. Panel member, Complexity theory and finite-model theory, NSF-INRIA Workshop on Databases and Finite-Model Theory, June 1992.
5. External review committee, Department of Computer Science, Vanderbilt University, March 1995.
6. Panel member, Database research: lead follow or get out of the way. Int'l Conference on Data Engineering, Feb. 1996.

7. Invited participant, Workshop on Future Directions in Database Research, San Jose, June 1995.

8. Panel chair, Logic in the computer science curriculum, DIMACS Symposium on Teaching Logic in an Illogical World, July 1996.

9. Award committee, ACM Kanellakis Award for Theory and Practice, 1996–2000.

10. Oversight committee, Master's Program in Logic and Algorithms, University of Athens, Greece, April 1997 - present.

11. Program review committee, proposal for a professional doctoral degree program in advanced computing, School of Computer Science and Information Systems, Pace Univerity, October 1997.

12. Visiting committee, Department of Computer Science, Stanford University, November 1997.

13. Panel moderator: Logic in the computer science curriculum, 29th ACM Symp. on Computer Science Education, February 1998.

14. NSF funding panel, Information and Intelligent Systems, May 1998.

15. Hiring committee, Dept. of Computing Science, Uppsala University, Sweden, November 1998.

16. Symposium organizer: On the unusual effectiveness of logic in computer science. Annual Meeting of the American Association for the Advancement of Science, January 1999.

17. Symposium speaker: From Boole to the Pentium. Annual Meeting of the American Association for the Advancement of Science, January 1999.

18. Computer Science Advisory Committee, Worcester Polytechnic Institute, January 1999 –present.

19. Promotion Committee, Department of Computer Science, University of Cyprus, July 2000.

20. NSF CAREER panel, Computer and Communication Research, October 2000.

21. Research Evaluation Committee, Department of Computer Science, Aalborg University, Denmark, January 2001.

22. Accellera Formal Verification Technical Committee, April 2001 – August 2004.

23. Board member, Computing Research Association, May 2001 –July 2008.

24. Member, Taulbee Survey Committee, July 2001 – June 2002.

25. Chair, Taulbee Survey Committee, July 2002 – June 2003.

26. Member, SIGMOD Award Committee, 2002.

27. Panelist, Workshop for New Chairs, CRA Snowbird Conference, July 2002.

28. Member, External Review Committee, Department of Computer Science, New York University, November 2002.

29. Member, SIGMOD Award Committee, 2003.

30. Member, Dissertation Defense Committee, Alex Thomo, Concordia University, Canada, June 2003.

31. NSF CISE Panel, March 2004.

32. Chair, SIGMOD Award Committee, 2004.

33. Panel member: Future of Constraint Databses. 1st International Symposium on Applications of Constraint Databases, Paris, France, June 2004.

34. Chair, ACM Task Force on Job Migration, July 2004 – February 2006.

35. Member, Advisory committee, School of Computer Science, The Interdisciplinary Center, Herzliya, Israel, October 2004 – December 2004.

36. Member, Scientific Advisory Board, Icelandic Centre of Excellence in Theoretical Computer Science (ICE-TCS), December 2004 – present.

37. Chair, SIGMOD Award Committee, 2005.

38. Member, Board of Electors to Professorship of Computing Science, University of Oxford, 2005.

39. Chair, Editor-in-Chief Selection Committee, ACM Transactions on Computational Logic, 2005.

40. External examiner, Dissertation Defense Committee, Marcelo Arenas, University of Toronto, September 2005.

41. Habilitation Committee, Luc Segoufin, University of Paris South XI, Sep. 2005.

42. Habilitation Committee, Sebastian Limet, University of Orleans, Nov. 2005.

43. Panel moderator: Educational Response to Offshoring. 37th ACM Symp. on Computer Science Education, 2006.

44. Panel member: Automata Theory–Its Relevance to Computer Science Students and Course Contents. 37th ACM Symp. on Computer Science Education, 2006.

45. Chair, Computing Research Association Distinguished Service Award, 2007.

46. CAV Award Committee, January 2008 – present.

47. Member, Technical Advisory Board, Jasper Design Automation, April 2008 – present.

48. Panel member, Coverage Metrics across the Verification Domain. 4th Haifa Verification Conference, Haifa, Israel, October 2008.

49. Member, Dissertation Defense Jury, Barbara Kordy, Orleans University, France, November 2008.

50. Panel member, The Future of Formal Verification, 8th Int'l Conference on Formal Methods in Computer-Aided Design, Portland, OR, November 2008.

Major Research Accomplishments

- **Logical Theory of Databases**:

  Database management systems are evolving from unsophisticated databases, which are essentially structured collections of data, toward "smart" databases possessing deductive capabilities. The line between databases and knowledge bases is becoming less and less clear. I have investigated the logical theory of databases, with a focus on the trade-off between expressiveness and computational complexity. My research laid the foundations in the following areas: integrity constraints, complexity of query evaluation, incomplete information, database updates, and universal-relation interfaces.

- **Reasoning about Knowledge**:

  Reasoning about knowledge has found applications in such diverse fields as economics, linguistics, artificial intelligence and computer science. For example, a robot in a system may have to know what other robots know in order to coordinate a plan. Similarly, in a bargaining session, side A may need to reason about what side B knows (and what side B knows about what side A knows, and so on) in order to bargain effectively. Together with Halpern and Fagin, I developed an extensive theory of reasoning about knowledge. This work focuses on (a) using reasoning about knowledge to design, analyze and verify the correctness of distributed systems, and (b) providing good formal models of knowledge that are appropriate for various applications

  In addition to pursuing this research, Fagin, Halpern and I initiated and organized an interdisciplinary conference on the subject. The conference ("Theoretical Aspects of Reasoning about Knowledge"), which brings together researchers from diverse fields, such as AI, game theory, philosophy, and distributed systems, met biannually since 1986. This work was recognized as one of the top accomplishments of the IBM Almaden Research Center in 1985, and won an IBM Outstanding Innovation Award in 1987. A book titled "Reasoning about Knowledge" by Fagin, Halpern, Moses, and myself, was published by MIT Press in 1995.

- **An Automata-Theoretic Approach to Concurrent Program Verification**:

  I have demonstrated that questions about correctness of concurrent programs can be reduced to questions about finite automata on infinitary input structures (infinite words or infinite trees). Carrying out this approach required advances in both automata theory and the theory of program logics. This connection brought a wealth of new techniques to the theory of program logic, and the new application revived the theory of automata on infinitary inputs. The work has several potential software engineering applications; a

particularly important application concerns automatic verification of finite-state protocols, such as communication protocols. This work serves as the basis of several automated verification tools, such as Lucent's FormalCheck, SDLVALID, and SPIN, and Intel's ForSpec.

This work was recognized as one of the top accomplishments of the IBM Almaden Research Center in 1987, won an IBM Outstanding Innovation Award in 1989, and the Gödel Prize (with P. Wolper) in 2000. PSL 1.1, an industrial-standard property-specification language in whose design I was involved, won a DesignVision Award from the International Engineering Consortium (IEC) in 2005, and has been established as IEEE Std 1850-2005.

- **Finite-Model Theory**:

  Model theory is a study of the logical properties of mathematical structures such as graphs and groups; finite-model theory focuses on finite structures. Finite-model theory is highly relevant to computer science, because of the intimate connection it has to several areas such as complexity theory, database theory and logic programming. For example, some of the most fundamental questions in complexity theory are equivalent to questions in finite-model theory. This is illustrated by a result of mine (obtained independently also by Immerman) that characterized the complexity class of polynomial time is terms of first-order logic enriched with the fixpoint operator.

  Of special interest is the study of asymptotic probabilities for properties of finite structures. The asymptotic probability of a property on the collection of all finite structures is the limit, as n gets arbitrarily large, of the fraction of structures with n elements satisfying the property, provided the limit exists. This probability can be viewed as the likelihood that an "average" graph satisfies the property. Kolaitis I investigated the asymptotic probability of certain classes of NP properties. These classes are expressible in fragments of existential second-order logic in which we restrict the patterns of first-order quantifiers. We proved that several such classes have a 0-1 law, i.e., the asymptotic probabilities of properties in these classes is always either 0 or 1.

  This work was recognized as of the top accomplishments of the IBM Almaden Research Center in 1990, and won an IBM Outstanding Innovation Award in 1992.