DEVIKA SUBRAMANIAN

Address:

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Education:

- Ph.D. in Computer Science, Stanford University, 1989.
  Thesis title: A Theory of Justified Reformulations.
  Advisors: Professors M.R. Genesereth, B.G. Buchanan, N.J. Nilsson.
- M.S. in Computer Science, Stanford University, 1984.
- B.Tech. in Computer Science and Engineering, Indian Institute of Technology, Kharagpur, India, 1982.

Honors and Awards:

- IJCAI Advisory Board, 2001.
- Editorial Board, Journal of AI Research, 1997-2001.
- Invited Speaker, NCARAI, Naval Research Laboratories, November 2001.
- Julia Miles Chance Prize for Excellence in Teaching, Rice University, 2000.
- Program Chair, AAAI 1999 (with J. Hendler).
- CRA DMP Mentor, 1996, 1997 and 1999.
- Editor, Special Issue on Relevance, Artificial Intelligence Journal, 1997 (with J. Pearl and R. Greiner).
- Invited Speaker, Plenary Session, IJCAI 1993, Chambery, France.
- Outstanding Educator Award, Merrill Presidential Scholar Program, Cornell University, 1993.
- Invited Lectureship, Institute for Research in Cognitive Science, University of Pennsylvania, June 1-15 1992.
- Outstanding Educator Award, Merrill Presidential Scholar Program, Cornell University, 1991.
- IBM Doctoral Fellowship, Stanford University, 1985-1988.
- George Forsythe Memorial Award for Excellence in Teaching, Stanford University, 1986.

- President of India Gold Medal, Indian Institute of Technology Kharagpur, 1982.
(awarded to valedictorian of class of 1982)
- B.P. Poddar Scholarship, Indian Institute of Technology, 1982.
(awarded to the best senior of class of '82)
- National Science Talent Scholarship, 1977.
(awarded by the Government of India to the top 100 high school students in the country)
- National Merit Scholarship, 1976.
(awarded by the Govt. of India to the top 20 students in the I.C.S.E exam)

Research Experience:

- Professor, Computer Science Department, Rice University, July 2003 - present.
  - Predicting protein-protein interactions, supported by the Keck Foundation (with K. Matthews).
  - An innovative research course in bioinformatics, supported by the NSF (with M. Kimmel, R. Guerra and L. Kavraki).
  - Prediction of militarized interstate disputes, supported by Intel and NSF ITR (with R. Stoll).
  - Hybrid learning architectures, supported by the ONR.
  - Learning algorithms for control of life support systems for the Mars mission, supported by NASA JSC.
  - Randomized adaptive search algorithms for multi-objective code optimization, supported by NSF ITR, Airforce, DARPA and Texas ATP (with K. Cooper and L. Torczon).
- Associate Professor, Computer Science Department, Rice University, July 1995 - June 2003.
  - Predicting protein-protein interactions, supported by the Keck Foundation (with K. Matthews).
  - Prediction of militarized interstate disputes, supported by Intel and NSF ITR (with R. Stoll).
  - Hybrid learning architectures, supported by the ONR.
  - Learning algorithms for control of life support systems for the Mars mission, supported by NASA JSC.
  - Randomized adaptive search algorithms for multi-objective code optimization, supported by NSF ITR, Airforce, DARPA and Texas ATP (with K. Cooper and L. Torczon).
  - Intelligent tools for synthesis of optomechanical devices, supported by the NSF.
  - Mobile robotics, supported by the School of Engineering, Rice.
  - Learning algorithms for routing, supported by SW Bell (with P. Druschel).
- Assistant Professor, Computer Science Department, Cornell University, 1989 - June 1995.
  - Automated reformulation, supported by the NSF.

  - Intelligent assistants for protein crystallography, supported by the NIH (with J. M. Rosenberg and B.G. Buchanan, University of Pittsburgh).
  - Bounded optimality, supported by the NSF (with Stuart Russell, UC Berkeley)
  - Formal foundations of AI algorithms (with C. Gunter, University of Pennsylvania).

- PhD student, Stanford University and IBM Doctoral Fellow, September 1985 to December 1988.

- Research Assistant, Heuristic Programming Project, Stanford, June 1983 to August 1985. (with Professor M.R. Genesereth)

- Research Assistant, Computer Science Department, Stanford, September 1982 to May 1983. (with Professor V.R. Pratt)

Professional Activities:

Students at Rice

1. M.S. advisor for Rajarshi Bandopadhyay, Computer Science (May 2002) thesis title: Predicting protein-ligand interactions from primary structure.

2. M.S. advisor for Sameer Siruguri, Computer Science (May 2001) thesis title: Tracking the evolution of learning in visualmotor tasks.

3. Ph.D. advisor for Johnny Chen, Computer Science (graduated July 1999) thesis title: Improving network performance by dynamic and multi-path routing. (co-advised with Peter Druschel)

4. Ph.D. advisor for Phil Schielke, Computer Science (graduated December 1999) thesis title: Stochastic techniques for instruction scheduling. (co-advised with Keith Cooper).

5. Member of Ph.D. thesis committee (partial list): M. K. Kiran (ECE, Rice), Chaitali Chakrabarti (ECE, Rice), Adam Rawlett (Chemistry, Rice), Erica Zimmer (CAAM, Rice).

6. Undergraduate mentoring: (R. Thrapp, P. Ramirez, T. Berning, N. Bobak, P. Fidelman) for 2000-2001. I have supervised 15 undergraduate students in 1995-2000 at Rice.

7. CRA DMP Mentor, Summer 1996 (Stephanie Weirich), and Summer 1997 (Deborah Watt), and Summer 1999 (Gwen Thomas and Gunes Ercal).

Students elsewhere

1. Ph.D. chair for 2 students, Masters advisor for 6 students, Undergraduate Research advisor for 12 students, at Cornell University. PhD theses under my direct supervision are

   (a) Adam Webber, Ph.D. (May 1993), thesis title: Principled optimization of functional programs.

   (b) Scott Hunter, Ph.D. (June 1997), thesis title: Design of adaptive controllers for discrete environments.

2. Member of Ph.D. thesis committee (partial list): , Laura Sabel (CS), Ted Fischer (CS), Desh Ranjan (CS), Alex Seigel (CS), Paul Wanuga (Graphics), Frank Chance (OR), Talal Shamoon (EE), Anoop Singhal (MechE), Navin Budhiraja (CS).

3. Member of Ph.D. thesis committee: Teow-Hin Ngair (CS, UPenn).

4. Undergraduate mentoring: I worked with the following undergraduates through their undergraduate career and sent them to graduate programs in artificial intelligence: Scott Benson (Stanford), Ed Wang (MIT), Todd Neller (Stanford), Ka Chai (University of Washington), Robert Wisniewski (Rochester), Scott Stoller (Cornell), James Altucher (CMU), Arjun Kapur (Stanford).

Invited Lectures

1. Distinguished Lucent/CRAW Lecturer, University of Washington, November 2002.

2. Invited Speaker, NCARAI Lecture Series at ONR, November 2001.

3. Invited Speaker, Workshop on Hybrid Architectures, Cognitive Science, Vancouver, August 1999.

4. Invited Speaker, Workshop on distributed systems in AI, AAAI 1999, July 1999.

5. Distinguished Lecture Series Speaker, Florida Atlantic University, April 1999.

6. Invited Speaker, Joint Brazilian Science Foundation and NSF workshop on Intelligent Robotic Agents, March 1997.

7. Invited Speaker, Plenary Session, IJCAI 1993.

8. Speaker, Invited Lecture Series (3 lectures), University of Pennsylvania, Philadelphia, June 1992.

9. Invited Speaker, AAAI Workshop on Creativity: Methods, Models and Tools, July 1991.

10. Invited Speaker, AAAI Workshop on Abstractions and Approximations, July 1991.

11. Invited Speaker, DARPA Workshop on How Things Work, July 1991.

12. Invited Speaker, Darpa Planning Workshop, San Diego, Nov 1990.

13. Invited Speaker, AAAI Workshop on Representation Change, Mar 1990.

14. Invited Speaker, Workshop on Large Knowledge Bases, Stanford University, Jan 1989.

Service to field

1. Panelist, Medium ITR selection committee, NSF, Washington D.C., May 2003.

2. Panelist, Study section for Bioinformatics proposals, ORAU, Washington D.C, April 2002.

3. IJCAI Advisory Board, 2001.

4. Editorial Board, Journal of the AI Research, 1997-2001.

5. Program Chair, AAAI-99 (with J. Hendler).

6. Panelist, NSF Career Proposals, 1999.

7. Senior Program Committee Member, AAAI 1998,

8. Editor, AI Journal Special issue on Relevance, 1997 (with J. Pearl and R. Greiner).
9. Program Committee Member, IJCAI 1997.
10. Program Committee Member, AAAI 1996.
11. Program Committee Member, Machine Learning 1996.
12. Program Committee Member, Neural Information Processing Systems 1996.
13. Program Committee Member, AAAI Spring Symposium on Multiagent systems, 1996.
14. Panelist, NSF IRIS Proposals, 1996.
15. Program Committee Member, Machine Learning 1995.
16. Program Committee Member, IJCAI Workshop on Multiagent systems Program Committee, 1995.
17. Program Committee Member, Machine Learning Workshop on Agents that Learn from other Agents, 1995.
18. Chair, Tutorial Program, AAAI 1994.
19. Program Committee Member, AAAI 1994.
20. Program Committee Member, KR 1994.
21. Co-chair, AAAI Fall Symposium on Relevance, 1994.
22. Program Committee Member, AAAI 1993.
23. Co-chair, Tutorial Program, AAAI 1993.
24. Program Committee Member, Machine Learning 1993.
25. Co-chair, AAAI Spring Symposium on Creative Design, 1993.
26. Co-chair, Workshop on Knowledge Compilation and Speed-up Learning, Machine Learning 1993.
27. Program Committee Member, Area Chair for Machine Learning, AAAI 1992.
28. Program Committee Member, KR 1992.
29. Co-chair, Workshop on Knowledge Compilation and Speed-up Learning, Machine Learning 1992.
30. Co-chair, Workshop on Inductive Biases in Learning, Machine Learning 1992.
31. Co-chair, Workshop on Approximations and Abstractions, AAAI 1992.
32. Technical Editor, AI Magazine, 1986-1991.
33. Program Committee Member, AAAI 1991.

34. Program Committee Member, AAAI 1990.

35. Program Committee Member, Machine Learning 1990.

36. Chair, Workshop on Representational Issues in Machine Learning, Machine Learning 1989.

37. Reviewer for Springer-Verlag, Morgan Kaufmann, Prentice Hall, AI Journal, Machine Learning Journal, Journal of Artificial Intelligence, Journal of Machine Learning Research, IEEE Pattern Analysis and Machine Intelligence, IEEE Robotics and Automation, Research in Engineering Design, Journal of Symbolic Computation, International Conference on Logic Programming, ASME, International Journal of Intelligent Systems, Information Processing Letters, Journal of the ACM, IEEE Transactions on Data and Knowledge Engineering, Cognitive Science, ACM Transactions on Information Systems, NASA, NSF, ONR.

Departmental Service

1. Member, Graduate Admissions Committee, Rice, 1996-present.

2. Member, Cognitive Science Steering Committee, Rice, 1996-present.

3. Member, CS Undergraduate Committee, Rice, 1996-2000.

4. Member, CS Faculty Recruiting Committee, Rice, 1997, 1998.

5. Member, CS Undergraduate Committee, Cornell, 1989 to 1993.

6. Member, CS Graduate Admissions Committee, Cornell, 1989, 1990.

7. Member, CS Recruiting Committee, Cornell, 1990.

University Service

1. Member, Patent Advisory Committee, Rice University, 2000-present.

2. Member, Duncan Hall Networking Committee, 2002-2003.

3. Developed Engineering Quad Robot Tour Guide, Rice University, 2001.

4. Member, CAIN communications project advisory committee, 1998-2001.

5. Engineering School Reorganization Committee, 1997.

6. Freshman advisor, Lovett College, Rice, 1996-1998.

7. Speaker, CRPC Math and Computational Sciences Awareness Workshop, 1996-2000.

8. Developed mobile robot for ribbon cutting ceremony for Rice University's dedication of Duncan Hall, 1996.

9. Developed enhancements to the problem reporting facility at Rice's Owlnet facility using belief networks with student Paul O'Brien and supported by a grant from Dean Michael Carroll, Summer 1996, Rice.

10. Workshop Leader, Expanding your Horizons, a national program for encouraging middle school girls in mathematics, science and engineering, Cornell University, 1990, 1992, 1994.

11. Faculty Council of Representatives, Cornell University, Jan 1990 to 1993.
12. Member, Committee for Minorities, Cornell University, 1991-92.
13. Instructor, Engineering 150, Cornell University, Fall 1991.
14. Member, Cognitive Studies Program Committee, Cornell University, Fall 1991.
15. Freshmen advisor, Cornell, 1989-1995 (handled 18 per year).
16. Technical Advisor/Reviewer, Engineering 350, Cornell, 1989-1995.
17. Member, AI Curriculum Committee, Stanford University, 1986-1988.
18. Member, Undergraduate Curriculum Committee, Stanford University, 1985-86

Grants

1. NSF ITR: Event, Patterns and Analysis: Forecasting conflicts in the twenty-first century, PI: D. Subramanian, co-PI: R. Stoll, 2002-2004, 400K.
2. NSF ITR: Building practical compilers based on adaptive search, 1.6M, 2002-2005,PI: K. Cooper, co-PIs: D. Subramanian and L. Torczon,
3. NSF CRCD:From sequence to structure: a new course in bioinformatics, 500K, 2002-2003. PI: M. Kimmel, co-PIs: Rudy Guerrera, L. Kavraki and D. Subramanian.
4. Hybrid learning, Office of Naval Research, 1995-2003, 1.6M. PI: D. Subramanian, co-PIs: D. Gordon and S. Marshall.
5. Digital Government, Intel 200K equipment grant, 2001-2003. joint PIs: Ric Stoll and D. Subramanian.
6. Machine learning for life support on Mars mission, NASA JSC, 50K/yr 2000-2003. PI: D. Subramanian.
7. Intelligent tools for synthesis of optomechanical devices:, NSF,180K, 1998-2003. PI: D. Subramanian.
8. Special-purpose compilers for embedded systems, Airforce/DARPA, 1997-2001, 700K. PI: K. Cooper, co-PIs: D. Subramanian and L. Torczon.
9. Compiling for low power applications, Texas ATP program, 2000, 200K. PI; K. Cooper, co-PIs: D. Subramanian and L. Torczon.
10. The Crystallographer's Assistant, NIH, 1994-1997, 750K. PI: J. M. Rosenberg, co-PIs: B. G. Buchanan and D. Subramanian and P. Wilkocz.
11. A Robust Infrastructure for Large-Scale Multimedia Networks, 50K grant from SW Bell for fiscal 1998. Joint PIs: P. Druschel and D. Subramanian.
12. Research on Automatic Reformulation, NSF, 320K, 1989-1993. PI: D. Subramanian.

Teaching Experience:

1. Designed and taught Comp 540 (Adaptive Systems) – a new advanced course in artificial intelligence in Fall 1996, Fall 1997, Fall 1999 and Fall 2002 at Rice. (http://www.owlnet.rice.edu/~ comp540)

2. Designed and taught Comp440 (Introduction to AI) – a new introductory course at Rice on designing adaptive discrete systems, in Spring 1996-Spring 2003. (http://www.owlnet.rice.edu/~ comp440)

3. Designed and taught Comp 430 (Database Systems) – an introductory course in database systems in Fall 1998 (http://www.owlnet.rice.edu/~ comp430)

4. Designed and taught CS571 (Intermediate AI) at Cornell in Fall 1994.

5. Designed and taught CS672 (Advanced AI) at Cornell in Spring 1989 and Fall 1991.

6. Designed and taught CS472 (Introduction to AI) at Cornell in Fall 1989, Fall 1990, Fall 1992.

7. Taught CS432 (Introduction to Databases) at Cornell in Spring 1990,Spring 1991, Spring 1992, Spring 1993 and Spring 1995.

8. Designed and taught a graduate AI course (CS229b : survey of research in AI) offered in Winter 84-85 at Stanford University under the direction of Bruce Buchanan.

The new courses Comp440 and Comp 540 at Rice form the foundation for a textbook I am developing on the design and analysis of discrete, adaptive embedded systems. The 2003 edition of Comp 440 is online and covers the latest techniques in modern AI at an undergraduate level. The 1999 edition of Comp 540 (with updates in 2002) forms the first comprehensive course on adaptive systems, and is probably the only one of its kind in the country. The course covers a board spectrum of stochastic techniques: Kalman filtering, HMMs, expectation maximization, boosting and ensemble learning, evolutionary computation, Monte Carlo methods, iterative repair and reinforcement learning.

Publications:

Refereed Journal Papers

1. A multistrategy learning scheme for knowledge assimilation in embedded agents, in *Informatica*,17:8-15, 1993 (with D. Gordon).

2. Shift of vocabulary bias in speedup learning, in *Machine Learning*, 20:155-191, 1995.

3. Kinematic Synthesis with Configuration Spaces, in *Research in Engineering Design*, 7:193-213, 1995 (with E. Wang).

4. Provably bounded optimal agents, in *Journal of Artificial Intelligence Research*, 2:575-609, 1995 (with S.J. Russell).

5. Customizing multimedia information access, in *ACM Computing Surveys* (special issue on multimedia systems), 27(4):627-629, 1995 (with D. Rus).

6. Information retrieval, information structure and information agents, in *ACM Transactions on Information Systems*, 15:(1), 67-101, 1997.

7. The Common-Order Theoretic Properties of Version Spaces and ATMSs, *Artificial Intelligence*, 95(2):357-407, 1997 (with C. Gunter, T. Ngair).

8. The relevance of relevance, *Artificial Intelligence*, Vol 97(1-2):1-5, 1997 (with R. Greiner and J. Pearl).

9. Statistical methods for the objective design of screening procedures for macromolecular crystallization, *Acta Crystallographica D* 56:817-827, 2000 (with J. Rosenberg, B. G. Buchanan, D. Hennessey, P. Wilkocz).

10. Adaptive optimizing compilers for the 21^{st} century, *Journal of Supercomputing*, 23:(1), 7-22, 2002 (with K. Cooper and L. Torczon).

11. A compositional theory of opto-mechanical synthesis, *Research in Engineering Design*, 13(4): 183-198, November 2002 (with R. Goldman).

12. Events, patterns and analysis: conflict prediction in the twenty-first century, in *Computer-aided methods for international conflict resolution and prediction*, edited by Robert Trappl, Springer-Verlag, Berlin, 2003.

13. Random 3-SAT: the plot thickens, in *Constraints* 8(3): 243-261, July 2003 (with M. Vardi, D. Demopolous, A. San Miguel Aguirre, C. Coarfa).

Refereed Conference and Workshop Papers

1. Compilation order matters: exploring the structure of the space of compilation sequences using randomized search algorithms, submitted, November 2003. (with K. Cooper, L. Torczon, L. Almagor, T. Harvey, A. Grosul, S. Reeves and T. Waterman).

2. The design of adaptive compilers, submitted, November 2003. (with K. Cooper, L. Torczon, L. Almagor, T. Harvey, A. Grosul, S. Reeves and T. Waterman).

3. Robust localization methods for an autonomous campus tour guide, *International Conference on Robotics and Automation*, 2001, (with R. Thrapp and C. Westbrook).

4. Machine learning techniques for designing life support systems, in *Proceedings of IEEE Aerospace*, 2000 (with P. Bonasso and D. Kortenkamp).

5. Random 3-SAT: the plot thickens, in *Proceedings of the International Conference on Constraint Programming*, 2000 (with M. Vardi, D. Demopolous, A. San Miguel Aguirre, C. Coarfa)

6. Inducing hybrid models of learning from visualmotor data, in *Proceedings of 22nd Annual Conference of the Cognitive Science Society*, 2000.

7. Optimizing for reduced code space using genetic algorithms, *ACM SIGPLAN Workshop on Languages, Compilers, and Tools for Embedded Systems (LCTES)*, Atlanta, GA, 1999, (Proceedings will appear as an issue of SIGPLAN Notices) (with P. Schielke and K. D. Cooper).

8. A new approach to routing using dynamic metrics, in *INFOCOM*, 1999. (with P. Druschel and J. Chen).

9. Modeling individual differences in the ONR Navigation task, in *Proceedings of 20th Annual Conference of the Cognitive Science Society*, 1998 (with D. Gordon).

10. An efficient multi-path forwarding method, in *INFOCOM*, 1998, (with P. Druschel and J. Chen).

11. Ants and reinforcement learning: a case study in routing in dynamic networks, in *Proceedings of the International Joint Conference on Artificial Intelligence*, 1997, (with P. Druschel and J. Chen).

12. A cognitive model of learning to navigate, in *Proceedings of 19th Annual Conference of the Cognitive Science Society*, Stanford, CA, 1997. (with D. Gordon).

13. Information retrieval, information structure and information agents, in *Intelligent Hypertext*, Lecture Notes in Computer Science Vol 1326, edited by C. Nicholas and J. Mayfield, 1997. (with D. Rus)

14. Sets as anti-chains, in *ASEAN* 1996, to appear in *Lecture Notes in Computer Science* (with C. Gunter and T. Ngair).

15. Cognitive modeling of action selection learning, in *Proc. 18th Annual Conference of the Cognitive Science Society*, San Diego, 1996 (with D. Gordon).

16. Comparison of action selection learning methods, in *Proceedings of the 3rd International Workshop on Multistrategy Learning*, Harpers Ferry, May 1996, pp 95-102. (with D. Gordon).

17. Induction of rules for biological macromolecule crystallization, *Proceedings of the 2nd International Conference on Intelligent Systems for Molecular Biology*, Stanford University, AAAI Press, pp 179-187, 1994 (with J. Rosenberg, B. Buchanan, V. Gopalakrishnan, D. Hennessy).

18. The Crystallographer's Assistant, *Proceedings of AAAI*, 1994 (with B. Buchanan, V. Gopalakrishnan and D. Hennessey).

19. Modular architectures for information agents, *Proceedings of the AAAI Spring Symposium*, pp 79-86, March 1994 (with D. Rus).

20. Intelligent tools for conceptual design and simulation of opto-electro-mechanical devices, *Proceedings of the NSF Design and Manufacturing Grantees Conference*, ASME Press, January 1994 (with E. Wang).

21. Multi-media RISSC informatics: retrieving information with simple structural components, *Proceedings of the ACM Conference on Information and Knowledge Management*, ACM Press, pp 283-294, November 1993 (with D. Rus).

22. Information agents for multi-media environments, *Proceedings of the Workshop on Hypermedia at the ACM Conference on Information and Knowledge Management*, pp 1-5, November 1993 (with D. Rus).

23. A multi-strategy approach to assimilating advice, *Proceedings of the 2nd International Workshop on Multi-Strategy Learning*, pp 218-233, May 1993 (with D. Gordon).

24. Provably bounded optimal agents, *Proceedings of International Joint Conference on Artificial Intelligence*, pp 338-344, 1993 (with S. Russell and R. Parr).

25. Artificial intelligence and conceptual design, *Proceedings of International Joint Conference on Artificial Intelligence*, **(invited paper)**, pp 800-809, 1993.

26. Issues in the design of provably good, distribution-sensitive, speedup learning algorithms, *Proceedings of the International Machine Learning Workshop on Knowledge Compilation and Speedup Learning*, pp 147-154, 1993.

27. Constraint-based kinematic synthesis, *Proceedings of the 7th International Workshop on Qualitative Reasoning about Physical Systems*, pp 228-239, 1993 (with E. Wang).

28. Constructing bounded optimal systems, *Proceedings of the AAAI Spring Symposium on AI approaches to NP-hard problems*, pp 144-148, 1993 (with S. Russell).

29. The computational impact of biases in learning, *Proceedings of the International Machine Learning Workshop on Inductive Biases*, pp 5-15, 1992 (with S. Hunter).

30. Knowledge compilation and speed-up learning, *Proceedings of the International Machine Learning Workshop on Knowledge Compilation and Speed-up Learning*, pp 3-5, 1992 (with P. Tadepalli and D. Fisher).

31. Estimating utility and the design of provably good EBL algorithms, *Proceedings of the 9th International Conference on Machine Learning*, pp 426-435, 1992 (with S. Hunter).

32. Estimating utility and the design of provably good EBL algorithms (extended abstract), *Proceedings of AAAI Spring Symposium on Knowledge Assimilation*, pp 131-140, 1992 (with S. Hunter).

33. The common order-theoretic properties of version spaces and ATMSs, *Proceedings of AAAI* 1991, pp 500-505, July 1991 (with C. Gunter, T. Ngair, P. Pannangaden).

34. The utility of EBL in recursive domain theories, *Proceedings of AAAI*, pp 942-949, 1990 (with R. Feldman).

35. Abstractions and approximations: some challenges, *Proceedings of the AAAI Workshop on the Automatic Generation of Abstractions and Approximations*, pp 7-8, 1990.

36. Subjective ontologies, *Proceedings of the AAAI Spring Symposium on Planning and Learning in Uncertain, Unpredictable Environments*, pp 130-135, 1990, (with J. Woodfill).

37. A theory of justified reformulations, *Proceedings of the 7th International Machine Learning Workshops*, pp 434-438, June 1989.

38. Representational issues in machine learning, *Proceedings of the 7th International Machine Learning Workshops*, pp 426-429, June 1989.

39. Making situation calculus indexical, *Proceedings of the First International Conference on Principles of Knowledge Representation and Reasoning*, pp 467-474, 1989, (with J. Woodfill).

40. Making situation calculus indexical (extended abstract), *Proceedings of the AAAI Spring Symposium on Limited Rationality*, pp 101-105, 1989, (with J. Woodfill).

41. Knowledge level learning: an alternative view, *Proceedings of the AAAI Spring Symposium on Explanation Based Learning*, pp 196-200, 1988 (with D.E. Smith).

42. Mutual constraints on representation and inference, *Proceedings of the International Workshop on Machine Learning, Meta-Logics and Inference*, pp 167-182, 1988 (with S.J. Russell).

43. The relevance of irrelevance, *Proceedings of the International Joint Conference on Artificial Intelligence*, pp 416-422, 1987 (with M.R. Genesereth).

44. Reformulation, *Proceedings of the AAAI/SIGART Workshop on Knowledge Compilation*, pp 119-121, 1986 (with M.R. Genesereth).

45. Factorization in Experiment Generation, *Proceedings of AAAI*, pp 518-522, 1986 (with J. Feigenbaum).

Edited collections and Book articles

1. Co-edited the special issue of *Artificial Intelligence* on Relevance, Volume 97(1-2), 402 pages, 1997 (with R. Greiner and J. Pearl).

2. Co-edited the *Proceedings of the AAAI Fall Symposium on Relevance*, November 1994 (with R. Greiner).

3. Edited the *Proceedings of the International Workshop on Knowledge Compilation and Speedup learning*, 1993.

4. On provably RALPHs (rational agents with limited performance hardware), in *Computational Learning and Cognition*, edited by Eric Baum, SIAM Press, pp 197-216, 1992 (with S. Russell).

5. A theory of justified reformulations, in *Change of Representation and Inductive Bias*, edited by Paul Benjamin, Kluwer Academic Press, pp 147-168, 1990.

6. Mutual constraints on representation and inference, in *Research on Machine Learning, Meta-Logics and Inference*, edited by Pavel Brazdil, Kluwer Academic Press, pp 85-106, 1989 (with S.J. Russell).

Working Papers and Technical Reports

1. Tracking evolution of policies in a visualmotor task, Technical Report TR02-491, Rice University, Aug 2002 (with S. Siruguri).

2. Predicting protein-ligand interactions from primary structure, Technical Report TR02-387, Rice University, February 2002 (with R. Bandyopadhyay, X.X. Tan and K. Matthews).

3. Compilation order matters, Technical Report, Rice University, January 2002 (with K. Cooper, L. Torczon and T. Harvey).

4. Genetic algorithms for plan space search in life support optimization, in preparation for Machine Learning, (with P. Bonasso and D. Kortenkamp), January 2002.

5. A simple, practical, distributed multipath routing algorithm, TR98-320, July 1998, Rice University (with J. Chen and P. Druschel).

6. Ants and reinforcement learning: a case study in routing in dynamic networks, TR96-259, Rice University (updated July 1998) (with J. Chen and P. Druschel).

7. An experimental evaluation of list scheduling, TR98-326, September 1998, Rice University (with K. Cooper and P. Schielke).

Other internally refereed reports

1. Creative synthesis of mechanisms from function, 1992. (with E. Wang, A. Kapur, S. Stoller and K. Chai).
2. Abstractions as postponement of computation, 1991.
3. A guide to the lego assistant, 1991 (with S. Benson and R. Wisniewski).
4. Life isn't perfect: an alternative method of learning abstraction hierarchies, 1990 (with J. Altucher).
5. A theory of justified reformulations, Logic Group Technical Report, 1988.
6. Abstraction reformulations and the irrelevance principle, Logic Group Working Paper, 1988.
7. A formal characterization of knowledge level learning, Logic Group Technical Report 15, January 1988 (with D. E. Smith).
8. The relevance of irrelevance, Logic Group Technical Report 5 (with M. R. Genesereth).
9. Inductive inference: a comparison of work in AI and philosophy, Logic Group Technical Report, 1987.
10. Report on the KSL Workshop on Reformulation, Logic Group Report, Computer Science Dept, Stanford University, 1986.
11. CS229b: A Survey of AI, *Stanford CS Department Technical Report STAN-CS-86-1104*, 1986.
12. A general reading list in artificial intelligence, *KSL Technical Report KSL-85-54, also Stanford CS Department Technical Report STAN-CS-86-1093*, 1985 (with B. G. Buchanan) (updated in 1995 with K. Myers and R. Zabih).
13. Experiment generation with version spaces, *Stanford HPP Technical Report HPP-84-44*, 1984.
14. On some properties of Abrahamson dynamic algebras, unpublished memo (with V. R. Pratt).

Others

1. AAAI-86 learning papers: developments and summaries, in *Machine Learning*, 1987 (with A. Prieditis, T. G. Dietterich, H. Hirsh, S. Kedar-Cabelli, R. Kempiminski, and S. Minton).
2. Scope and directions of artificial intelligence, prepared for the Computing the Future Board chaired by J. Hartmanis (with the help of notes from R. Reddy), 1991.

Lectures and Colloquia

1. Evolutionary Computation, Industrial Forum Lecture, Rice University, October 2003.
2. Evolutionary Computation, Scientia Lecture, Rice University, March 2003.
3. Computers and learning, Computer Science Computing and Mentoring Partnership, Rice University, June 2003.

4. Tracking the evolution of learning in the ONR Navigation Task, Lucent/CRAW lecture at the University of Washington, November 2002.

5. Tracking the evolution of learning in the ONR Navigation Task, NCARAI invited lecture series at the ONR, November 2001.

6. Distributed reinforcement algorithms for routing in packet networks, CS Department Colloquium, Texas A&M University, September 2001.

7. Robust localization methods for an autonomous campus tour guide, International Conference on Robotics and Automation, May 2001.

8. Tracking the evolution of learning in a visualmotor task, AI Colloquium series, Texas A&M University, March 2001.

9. Tracking the evolution of learning in a visualmotor task. CITI Lunch, December 2000.

10. Random 3-SAT: The plot thickens, CP 2000, Singapore, September 2000.

11. Inducing hybrid models of learning in the NRL Navigation task, Annual Conference on Cognitive Science 2000, Philadelphia, August 2000.

12. Progress in learning the NRL Navigation task, ONR workshop, Rice University, August 2000.

13. Modeling learning on the NRL Navigation task, invited workshop, Annual Conference on Cognitive Science 1999, Vancouver, August 1999.

14. Progress in learning the NRL Navigation task, ONR workshop, San Diego, July 1999 2000.

15. Reinforcement learning and routing in packet networks, invited lecture, AAAI 1999 Workshop on Distributed Systems in AI, July 1999.

16. Modeling learning on the NRL Navigation task, Distinguished Lecture Series, Florida Atlantic University, April 1999.

17. A study of individual differences in the ONR Navigation task, Annual Conference on Cognitive Science 1998, Madison, Wisconsin, July 1998.

18. Learning to Navigate: a new cognitive model, ONR Invited workshop on Hybrid Learning, Corvallis, July 1997.

19. A cognitive model of learning to navigate, Annual Conference on Cognitive Science 1997, Stanford, July 1997.

20. Genetic Algorithms: a gentle introduction, CRPC Science Awareness Seminar for High School teachers, July 1997.

21. How to design adaptive embedded systems: a task-oriented perspective, NSF workshop on Intelligent Robotic Agents, Brazil, March 1997.

22. Cognitive Modeling of the ONR Navigation Task: New Results, ONR Invited Workshop on Hybrid Learning, San Diego, November 1996.

23. Artificial Intelligence, lecture at CITI, Rice University, November 1996.

24. Cognitive Modeling of Action Selection, Psychology Departmental Colloquium, Rice University, October 1996.

25. Artificial Intelligence: The New Challenges, CRPC Symposium on Math and Computational Sciences Awareness, July 1996.

26. Cognitive Modeling of Action Selection, Cognitive Science 1996, San Diego, July 1996.

27. Introduction to Neural Networks, Honors Senior Seminar, Cognitive Science Program, Rice University, April 1996.

28. Representation and Action Choice for Bounded Agents, Rice University, April 1995.

29. Teaching Artificial Intelligence, Rice University, April 1995.

30. Artificial Intelligence and Conceptual Design, Rice University, December 1994.

31. The Crystallographer's Assistant, Department of Biochemistry, Rice University, December 1994.

32. Kinematic synthesis using configuration spaces, Dartmouth College, October 1994.

33. Artificial Intelligence and Conceptual Design, Computer Science Department and Knowledge Systems Laboratory at Stanford University, June 1994.

34. Artificial Intelligence and Conceptual Design, NASA Ames and SRI, June 1994.

35. Artificial Intelligence and Conceptual Design, Stanford Research Institute, June 1994.

36. Modular Architectures for Information Agents, AAAI Spring Symposium on Software Agents, Stanford University, March 1994.

37. The Cornell Lego project, University of Illinois at Urbana-Champaign, September 1993.

38. Constraint-based kinematic synthesis, invited lecture at IJCAI 1993, August 1993.

39. Constraint-based kinematic synthesis, Harvard University, March 1993.

40. The Cornell Reformulation project, University of Pittsburgh, March 1993.

41. Estimating Utility and the Design of Provably Good EBL Algorithms, Machine Learning 1992, Aberdeen, Scotland, July 1992.

42. Computational Impact of Biases in Learning, Workshop on Biases in Inductive Learning, Aberdeen, Scotland, July 1992.

43. A Comparative Analysis of Speed-up Learning Methods, Workshop on Knowledge Compilation and Speed-up Learning, Aberdeen, Scotland, July 1992.

44. A Theory of Justified Reformulations, Invited Lecture Series, University of Pennsylvania, Philadelphia, June 1992.

45. The Design of Provably Good Speed-up Learning Algorithms, Invited Lecture Series, University of Pennsylvania, Philadelphia, June 1992.

46. Designing Adaptive Discrete Control Systems, Invited Lecture Series, University of Pennsylvania, Philadelphia, June 1992.

47. Conceptual Synthesis of Mechanisms from Specifications of Behaviour, Invited Lecture Series, University of Pennsylvania, Philadelphia, June 1992.

48. Estimating Utility and the Design of Provably Good EBL ALgorithms, AAAI Spring Symposium on Knowledge Assimilation, March 1992, Stanford, California.

49. Panel on Artificial Intelligence, Cornell University Philosophy Dept, November 1991.

50. The Cornell Lego Project, AAAI Workshop on Creativity in Design and Workshop on How Things Work, July 1991.

51. The Reformulation Project, Navy Research Lab in Artificial Intelligence, April 1991.

52. Indexicality in Planning, Cognitive Science Seminar, Cornell University, November 1990.

53. A Theory of Justified Reformulations, Psychology Department Colloquium, Cornell University, November 1990.

54. Abstraction as Postponement of Computation, AAAI Workshop on the Automatic Generation of Approximations and Abstractions, August 1990.

55. The Utility of EBL in Recursive Domain Theories, AAAI, August 1990.

56. Learning and Planning, AAAI Spring Symposium on Planning in Unpredictable and Uncertain Environments, March 1990.

57. A Theory of Justified Reformulations: University of Pennsylvania, Departmental Colloquium, March 1990.

58. Reformulations and Planning, Cognitive Science Colloquium, Cornell University, February 1990.

59. Research on Reactive Planning, IBM Hawthorne, Philips Lab, January 1990.

60. Representational Issues in Machine Learning, International Machine Learning Workshop, Cornell University, 1989.

61. Indexicals in Planning, AAAI Spring Symposium, March 1989.

62. Research on Automated Reformulation, Cornell Computer Science Industrial Forum, 1989.

63. Research on Automated Reformulation, At the AI Labs of IBM Yorktown Heights, Knowledge Systems Lab Colloquium, Stanford University in Oct 1988, IBM Almaden Research Center in November 1988.

64. A Theory of Justified Reformulations, At the Computer Science Departments of MIT, University of Massachusetts, Cornell, Carnegie-Mellon University, Oregon State University, Courant Institute, Rutgers University, University of California at Berkeley, in March-April 1988

65. Knowledge Level Learning: An Alternative View, At the Spring-Symposium on Explanation Based Learning, Stanford, March 1988.

66. The Relevance of Irrelevance, IJCAI-87, Milan, August 1987

67. Reformulation, At the Knowledge Compilation Workshop, Oregon, September 1986, and the Stanford Computer Forum, February 1987

68. Factorization in Experiment Generation, At AAAI-86, Philadelphia, August 1986, and the Planlunch Seminar, SRI International, Menlo Park, September 1986.