

Manuela M. Veloso

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Academic Positions

- July 02 - present **Professor**, Computer Science Department, Carnegie Mellon University
July 99 - July 02 **Tenured Associate Professor**, Computer Science Department, Carnegie Mellon University
Aug 99 - Aug 00 **Visiting Associate Professor**, Electrical Engineering and Computer Science Department, AI Lab, Massachusetts Institute of Technology, on sabbatical leave from Carnegie Mellon University.
July 97 - July 99 **Associate Professor**, Computer Science Department, Carnegie Mellon University
Sep 92 - June 97 **Assistant Professor** Computer Science Department, Carnegie Mellon University
Aug 87 - Aug 92 Research Assistant in Computer Science, Carnegie Mellon University
Jan 85 - Jul 86 Teaching Assistant/Lecturer in Computer Science, Boston University
Oct 80 - Jul 84 Teaching Assistant/Lecturer in Electrical and Computer Engineering, Instituto Superior Técnico, Lisbon, Portugal

Education

- 1992 Ph.D. in Computer Science
School of Computer Science, Carnegie Mellon University, Pittsburgh
1986 M.A. in Computer Science
Computer Science Department, Boston University, Boston
1984 M.Sc. in Electrical and Computer Engineering
Electrical and Computer Engineering Department, Instituto Superior Técnico, Lisbon, Portugal
1980 Licenciatura in Electrical Engineering
Electrical and Computer Engineering Department, Instituto Superior Técnico, Lisbon, Portugal

Honors, Awards, and Service

- 2007 Program Chair of the International Joint Conference on Artificial Intelligence
2005 Program co-Chair of the National Conference of the American Association for Artificial Intelligence
April 2003 Fellow of AAAI, the American Association for Artificial Intelligence
July 2002 RoboCup-02: 1st place, Sony Legged-Robot League
August 2001 RoboCup-01: 2nd place, Sony Legged-Robot League
August 2000 RoboCup-00: 3rd place, Simulator League; 3rd place, Sony Legged-Robot League
July 1999 RoboCup-99: World Champion, Simulator League; 3rd place, Sony Legged-Robot League
July 1998 RoboCup-98: Tri-World Champion, Simulator, Small-Size Robot, and Sony Legged-Robot Leagues
September 1997 Allen Newell Excellence in Research Award
August 1997 RoboCup-97: World Champion Small-Size Robot League; 3rd place, Simulator League
June 1995 NSF Career Award
1994 - 1998 Finmeccanica Chair
May 1986 AT&T Information Systems Award for Outstanding Academic Achievement
1984 - 1987 Fellowship from the National Institute for Scientific Research, Portugal

Research Interests

My long-term research goal is the effective construction of autonomous agents where cognition, perception, and action are combined to address planning, execution, and learning tasks. My vision is that multiple intelligent robots with different sets of complementary capabilities will provide a seamless synergy of intelligence. Concretely, my research focuses on the continuous integration of reactive, deliberative planning, and control learning for teams of multiple agents acting in adversarial, dynamic, and uncertain environments. Of particular interest to me is learning, adversarial modeling, reuse, and abstraction in multiagent problems. My multiagent and multirobot research interests have been motivated by and experimented in the domain of robot soccer. I continue to investigate effective planning, execution, and learning algorithms for deterministic and nondeterministic multiagent domains within my main research projects CORAL (Collaborate, Observe, Reason, Act, and Learn), MAPEL (Multi-Agent Planning, Execution, and Learning), and the RoboSoccer and MultiRobot Labs. I further research on learning domain-specific planners

from example plans, effective BDD-based nondeterministic planning, planning and information retrieval, and control learning to automate the modeling and optimization of the performance of signal processing transforms.

Selected List of Publications:

1. M. Veloso, E. Pagello, and H. Kitano, editors. *RoboCup-99: Robot Soccer World Cup III*. Springer-Verlag Press, Berlin, August 2000.
2. Manuela M. Veloso. *Planning and Learning by Analogical Reasoning*. Springer Verlag, December 1994.
3. Sonia Chernova and Manuela Veloso. An Evolutionary Approach To Gait Learning For Four-Legged Robots. In *Proceedings of IROS'04*, Sendai, Japan, September 2004.
4. Scott Lenser and Manuela Veloso. State Identification From Robot Sensors Using Non-Parametric Statistics. In *Proceedings of IROS'04*, Sendai, Japan, September 2004.
5. Raju Patil, Paul Rybski, Taeko Kanade, and Manuela Veloso. People Detection and Tracking in High Resolution Panoramic Video Mosaics. In *Proceedings of IROS'04*, Sendai, Japan, September 2004.
6. Jeremy Searock, Brett Browning, and Manuela Veloso. Turning Segways into Soccer Robots. In *Proceedings of IROS'04*, Sendai, Japan, September 2004.
7. Brett Browning, Ling Xu, and Manuela Veloso. Skill Acquisition and Use for a Dynamically-Balancing Soccer Robot. In *Proceedings of the Nineteenth National Conference on Artificial Intelligence (AAAI-04)*, San Jose, July 2004.
8. Patrick Riley and Manuela Veloso. Advice Generation from Observed Execution: Abstract Markov Decision Process Learning. In *Proceedings of the Nineteenth National Conference on Artificial Intelligence (AAAI-04)*, San Jose, July 2004.
9. Douglas Vail and Manuela Veloso. Learning from accelerometer data on a legged robot. In *Proceedings of the 5th IFAC/EURON Symposium on Intelligent Autonomous Vehicles (IAV2004)*, Lisbon, Portugal, July 2004.
10. Michael Bowling, Brett Browning, and Manuela Veloso. Plays as team plans for coordination and adaptation. In *Proceedings of the 14th International Conference on Automated Planning and Scheduling (ICAPS-04)*, Vancouver, June 2004.
11. Rune M. Jensen, Manuela M. Veloso, and Randy E. Bryant. Fault Tolerant Planning: Toward Probabilistic Uncertainty Models in Symbolic Non-Deterministic Planning. In *Proceedings of the 14th International Conference on Automated Planning and Scheduling (ICAPS-04)*, Vancouver, June 2004.
12. William Uther and Manuela Veloso. TTree: Combining state and temporal abstraction in Semi-Markov decision problems. In *Adaptive Agents and Multi-Agent Systems*, volume LNAI 2636, pages 266–296. Springer, 2003.
13. Michael Bowling, Rune Jensen, and Manuela Veloso. Multiagent planning in the presence of multiple goals. In *Intelligent Planning*. John Wiley, 2003, forthcoming.
14. Douglas Vail and Manuela Veloso. Dynamic multi-robot coordination. In *Multi-Robot Systems: From Swarms to Intelligent Automata*, Volume II, A. Schultz, L. Parker, and F. Schneider (eds). pages 87–100, Kluwer Academic Publishers, 2003.
15. Manuela Veloso. Robot soccer: A Multi-Robot challenge. In *Multi-Robot Systems: From Swarms to Intelligent Automata*. Kluwer, 2002.
16. Michael Bowling and Manuela Veloso. Multiagent learning using a variable learning rate. *Artificial Intelligence*, 136:215–250, 2002.
17. Bryan Singer and Manuela Veloso. Automating the modeling and optimization of the performance of signal transforms. *IEEE Transactions on Signal Processing*, 2002.
18. Bryan Singer and Manuela Veloso. Learning to construct fast signal processing implementations. *Journal of Machine Learning Research*, 3:887–919, 2002.
19. G. A. Kaminka, M. M. Veloso, S. Schaffer, C. Sollitto, R. Adobbati, A. N. Marshal, A. Scholer, and S. Tejada. GameBots: The ever-challenging multi-agent research test-bed. *Communications of the ACM*, January 2002.

20. Astro Teller and Manuela Veloso. Internal reinforcement in a connectionist genetic programming approach. *Artificial Intelligence*, 120/2, July 2000.
21. Peter Stone and Manuela Veloso. Multiagent systems: A survey from a machine learning perspective. *Autonomous Robots*, 8(3):345–383, 2000.
22. Rune M. Jensen and Manuela M. Veloso. OBDD-based universal planning for synchronized agents in non-deterministic domains. *Journal of Artificial Intelligence Research*, 13:189–226, July 2000.
23. Peter Stone and Manuela Veloso. Task decomposition, dynamic role assignment, and low-bandwidth communication for real-time strategic teamwork. *Artificial Intelligence*, 110(2):241–273, June 1999.
24. Minoru Asada, Hiroaki Kitano, Itsuki Noda, and Manuela Veloso. RoboCup: Today and tomorrow – What we have have learned. *Artificial Intelligence*, 110:193–214, 1999.
25. Karen Zita Haigh and Manuela M. Veloso. Learning situation-dependent costs: Improving planning from probabilistic robot execution. *Robotics and Autonomous Systems*, 29 (2-3):145–174, 1999.
26. Peter Stone and Manuela Veloso. A layered approach to learning client behaviors in the RoboCup soccer server. *Applied Artificial Intelligence*, 12:165–188, 1998.
27. Peter Stone and Manuela Veloso. Towards collaborative and adversarial learning: A case study in robotic soccer. *International Journal of Human-Computer Systems*, 48, 1998.
28. Karen Zita Haigh and Manuela M. Veloso. Interleaving planning and robot execution for asynchronous user requests. *Autonomous Robots*, 5(1):79–95, March 1998.
29. Karen Z. Haigh, Jonathan Shewchuk, and Manuela M. Veloso. Exploring geometry in analogical route planning. *Journal of Experimental and Theoretical Artificial Intelligence*, 9:509–541, 1997.
30. Yury Smirnov, Sven Koenig, and Manuela M. Veloso. Heuristic-driven “treasure hunt” with linear performance guarantees. *Congress Numerantium Journal*, 117:193–205, 1996.
31. Manuela M. Veloso, Héctor Muñoz-Avila, and Ralph Bergmann. General-purpose case-based planning: Methods and systems. *AI Communications*, 9(3):128–137, 1996. Also in *Künstliche Intelligenz*, 1:22–28, 1996, in German (with reversed order of the authors).
32. Daniel Borrajo and Manuela Veloso. Lazy incremental learning of control knowledge for efficiently obtaining quality plans. *AI Review Journal. Special Issue on Lazy Learning*, 10:1–34, 1996.
33. Astro Teller and Manuela M. Veloso. Program evolution for data mining. *International Journal of Expert Systems*, 8(3):213–236, 1995.
34. Manuela M. Veloso and Peter Stone. FLECS: Planning with a flexible commitment strategy. *Journal of Artificial Intelligence Research*, 3:25–52, 1995.
35. Manuela M. Veloso, Jaime Carbonell, M. Alicia Pérez, Daniel Borrajo, Eugene Fink, and Jim Blythe. Integrating planning and learning: The PRODIGY architecture. *Journal of Experimental and Theoretical Artificial Intelligence*, 7(1):81–120, 1995.
36. Manuela M. Veloso and Jaime G. Carbonell. Derivational analogy in PRODIGY: Automating case acquisition, storage, and utilization. *Machine Learning*, 10:249–278, 1993.
37. P. Lima, T. Balch, M. Fujita, R. Rojas, M. Veloso, and H. Yanco. Robocup 2001. *IEEE Robotics and Automation Magazine*, 9(2):20 – 30, June 2002.
38. Michael Bowling and Manuela Veloso. Simultaneous adversarial multi-robot learning. In *Proceedings of IJ-CAI’03*, August 2003.
39. Patrick Riley and Manuela Veloso. Coaching advice and adaptation. In *Proceedings of AAMAS’03*, 2003, to appear.
40. Thuc Vu, Jared Go, Gal Kaminka, Manuela Veloso, and Brett Browning. MONAD: A flexible architecture for multi-agent control. In *Proceedings of AAMAS’03*, 2003, to appear.

41. Rune Jensen, Manuela Veloso, and Randy Bryant. Guided symbolic universal planning. In *Proceedings of ICAPS'03*, 2003, to appear.
42. James Bruce and Manuela Veloso. Fast and accurate vision-based pattern detection and identification. In *Proceedings of ICRA'03, the 2003 IEEE International Conference on Robotics and Automation*, Taiwan, May 2003, to appear.
43. Scott Lenser and Manuela Veloso. Automatic detection and response to environmental change. In *Proceedings of ICRA'03, the 2003 IEEE International Conference on Robotics and Automation*, Taiwan, May 2003.
44. James Bruce, Michael Bowling, Brett Browning, and Manuela Veloso. Multi-robot team response to a multi-robot opponent team. In *Proceedings of ICRA'03, the 2003 IEEE International Conference on Robotics and Automation*, Taiwan, May 2003, to appear.
45. James Bruce and Manuela Veloso. Real-time randomized path planning for robot navigation. In *Proceedings of IROS-2002*, Switzerland, October 2002.
46. Rune M. Jensen, Randy E. Bryant, and Manuela M. Veloso. SetA*: An efficient BDD-based heuristic search algorithm. In *Proceedings of AAI-2002*, Edmonton, Canada, August 2002.
47. Michael Bowling, Rune Jensen, and Manuela Veloso. A formalization of equilibria for multiagent planning. In *Proceedings of the AAI-2002 Workshop on Multiagent Planning*, Edmonton, Canada, August 2002.
48. Michael Bowling and Manuela Veloso. Scalable learning in stochastic games. In *Proceedings of the AAI-2002 Workshop on Game Theoretic and Decision Theoretic Agents*, Edmonton, Canada, August 2002.
49. William Uther and Manuela Veloso. TTree: Tree-based state generalization with temporally abstract actions. In *Proceedings of SARA-2002*, Edmonton, Canada, August 2002.
50. Patrick Riley, Manuela Veloso, and Gal Kaminka. Any team coaching. In *Proceedings of the First International Joint Conference on Autonomous Agents and Multi-Agent Systems*, Bologna, Italy, July 2002.
51. Paul Carpenter, Patrick Riley, Manuela Veloso, and Gal Kaminka. Integration of advice in an action-selection architecture. In *Proceedings of the RoboCup-2002 Symposium*, Fukuoka, Japan, June 2002.
52. Gal Kaminka, Mehmet Fidanboylu, Allen Chang, and Manuela Veloso. Learning the sequential coordinated behavior of teams from observations. In *Proceedings of the RoboCup-2002 Symposium*, Fukuoka, Japan, June 2002.
53. Patrick Riley, Manuela Veloso, and Gal Kaminka. An empirical study of coaching. In *Proceedings of DARS-2002, the Seventh International Symposium on Distributed Autonomous Robotic Systems*, Fukuoka, Japan, June 2002.
54. Brett Browning, Gal Kaminka, and Manuela Veloso. Principled monitoring of distributed agents for detection of coordination failure. In *Proceedings of DARS-2002, the Seventh International Symposium on Distributed Autonomous Robotic Systems*, Fukuoka, Japan, June 2002.
55. Brett Browning, Michael Bowling, and Manuela Veloso. Improbability filtering for rejecting false positives. In *Proceedings of 2002 IEEE International Conference on Robotics and Automation*, Washington, DC, May 2002.
56. Patrick Riley and Manuela Veloso. Planning for distributed execution through use of probabilistic opponent models. In *Proceedings of the Sixth International Conference on Artificial Intelligence Planning Systems, Best Paper Award*, Toulouse, France, April 2002.
57. Elly Winner and Manuela Veloso. Analyzing plans with conditional effects. In *Proceedings of the Sixth International Conference on Artificial Intelligence Planning Systems*, Toulouse, France, April 2002.
58. Laurie Hiyakumoto and Manuela Veloso. Towards planning and execution for information retrieval. In *Proceedings of AIPS'02 Workshop on Exploring Real-World Planning*, Toulouse, April 2002.
59. Rune M. Jensen, Randy E. Bryant, and Manuela M. Veloso. An efficient BDD-based A* algorithm. In *Proceedings of AIPS'02 Workshop on Planning via Model Checking*, Toulouse, April 2002.
60. Elly Winner and Manuela Veloso. Automatically acquiring planning templates from example plans. In *Proceedings of AIPS'02 Workshop on Exploring Real-World Planning*, Toulouse, April 2002.

61. Bryan Singer and Manuela M. Veloso. Stochastic search for signal processing algorithm optimization. In *Proceedings of SC2001 - Scientific Computing, 2001*, Denver, Colorado, November 2001.
62. Rune Jensen, Manuela Veloso, and Michael Bowling. Optimistic and strong cyclic adversarial planning. In *Proceedings of ECP-2001, European Conference on Planning*, Toledo, Spain, October 2001.
63. Michael Bowling and Manuela Veloso. Rational learning of mixed equilibria in stochastic games. In *Proceedings of IJCAI-2001*, pages 1021–1026, August 2001.
64. Michael Bowling and Manuela Veloso. Convergence of gradient dynamics with a variable learning rate. In *Proceedings of ICML-2001*, pages 27–34, Williams College, MA, June 2001.
65. Bryan Singer and Manuela Veloso. Learning to generate fast signal processing implementations. In *Proceedings of ICML-2001*, pages 529–536, Williams College, MA, June 2001.
66. Tucker Balch, Zia Kahn, and Manuela Veloso. Observing ants: Tracking and analyzing the behavior of live ant colonies. In *Proceedings of the Fifth International Conference on Autonomous Agents*, May 2001.
67. Scott Lenser, James Bruce, and Manuela Veloso. CMPack: A complete software system for autonomous legged soccer robots. In *Proceedings of the Fifth International Conference on Autonomous Agents*, May 2001. Best Paper Award in the Software Prototypes Track, Honorary Mention.
68. Patrick Riley and Manuela Veloso. Coaching a simulated soccer team by opponent model recognition. In *Proceedings of the Fifth International Conference on Autonomous Agents*, May 2001.
69. Markus Pueschel, Bryan Singer, Manuela Veloso, and José M.F. Moura. Fast automatic generation of DSP algorithms. In *Proceedings of the Special Session on Architecture-Specific Automatic Performance Tuning at the International Conference on Computational Science*, pages 97–106, April 2001.