

Wheeler Ruml

Department of Computer Science
University of New Hampshire
33 Academic Way, Durham, NH 03824-2619 USA
ruml at cs.unh.edu, +1-603-862-2683
<http://www.cs.unh.edu/~ruml>

Research Interests Artificial intelligence, robotics, operations research, cognitive science, information visualization.

Education HARVARD UNIVERSITY Ph.D. in Computer Science, 2002
Dissertation: *Adaptive Tree Search*. Advisor: Stuart M. Shieber.

HARVARD UNIVERSITY A.B. *cum laude* in Computer Science, 1993
Honors thesis: *Stochastic Approximation Algorithms for Number Partitioning*.

Honors Best Paper Presentation Award, Symposium on Combinatorial Search 2010
Personal letter of commendation from the President of R&D, Xerox Corporation 2006
PARC Golden Acorn Award for most valuable patent of the year (co-winner) 2005
Best Application Paper Award, Int'l Conf. on Automated Planning and Scheduling 2005
PARC Outstanding Performance Award 2003, 2005
Thomas T. Hoopes Prize for outstanding undergraduate scholarship and research 1993

Professional Experience UNIVERSITY OF NEW HAMPSHIRE
Assistant Professor July 2007–present
Founding and leading a research group in artificial intelligence, teaching courses in computer science, and advising students in the B.S., M.S., and Ph.D. programs.

PALO ALTO RESEARCH CENTER
Area Manager, Embedded Reasoning April 2005–June 2007
Technical and managerial leadership for a group of seven Ph.D.-level researchers in artificial intelligence and automatic control. Responsible for sponsor relationships (\$2.3M/year), hiring, discretionary budget (\$42K/year), and evaluation of potential patents.

Research Staff July 2002–March 2005
Initiated group research direction in artificial intelligence planning and time-bounded heuristic search. Designed and built core software for a major Xerox robotics project.

Edited Proceedings David Furcy, Sven Koenig, Wheeler Ruml, and Rong Zhou (eds), *Proceedings of the First International Symposium on Search Techniques in Artificial Intelligence and Robotics (STAIR-08)*, AAAI Press Technical Report WS-08-10, 184 pp., 2008.

Ian Miguel and Wheeler Ruml (eds), *Abstraction, Reformulation, and Approximation: Proceedings of the Seventh International Symposium*, Springer Lecture Notes in Artificial Intelligence, volume 4612, 418 pp., 2007.

Raja Bala, Linda Emberley, Patrick Mazeau, Howard Mizes, Emily Moore, Peter Odell, Sudhendu Rai, Palghat Ramesh, Cheryl Roland, Wheeler Ruml, and Tracie Zanders (eds), *Proceedings of the First Annual Xerox Innovation Group Research and Technology Conference*, 328 pp., 2006. (not distributed externally)

Wheeler Ruml and Frank Hutter (eds), *Learning for Search: Papers from the AAAI Workshop*, AAAI Press Technical Report WS-06-11, 154 pp., 2006.

**Refereed
Journal
Publications**

Wheeler Ruml, Minh Binh Do, Rong Zhou, and Markus P. J. Fromherz, “On-line Planning and Scheduling: An Application to Controlling Modular Printers,” *Journal of Artificial Intelligence Research*, 40, pp. 415–468, 2011.

Ethan Burns, Sofia Lemons, Wheeler Ruml, and Rong Zhou, “Best-First Heuristic Search for Multicore Machines,” *Journal of Artificial Intelligence Research*, 39, pp. 689–743, 2010.

Yi Shang, Wheeler Ruml, and Markus P. J. Fromherz, “Positioning using Local Maps,” *Ad Hoc Networks*, 4(2), pp. 240–253, 2006.

Wheeler Ruml, Alfonso Caramazza, Rita Capasso, and Gabriele Miceli, “Interactivity and Continuity in Language Production: An Investigation Using Italian Aphasics,” *Cognitive Neuropsychology*, 22(2), pp. 131–168, 2005.

Yi Shang, Wheeler Ruml, Ying Zhang, and Markus P. J. Fromherz, “Localization from Connectivity in Sensor Networks,” *IEEE Transactions on Parallel and Distributed Systems*, 15(11), pp. 961–974, 2004.

Alfonso Caramazza, Costanza Papagno, and Wheeler Ruml, “The Selective Impairment of Phonological Processing in Speech Production,” *Brain and Language*, 75(3), pp. 428–450, 2000.

Wheeler Ruml, Alfonso Caramazza, Jennifer R. Shelton, and Doriana Chialant, “Testing Assumptions in Computational Theories of Aphasia,” *Journal of Memory and Language*, 43(2), pp. 217–248, 2000.

Wheeler Ruml and Alfonso Caramazza, “An Evaluation of a Computational Model of Lexical Access: Comment on Dell et al. (1997),” *Psychological Review*, 107(3), pp. 609–634, 2000.

Wheeler Ruml, J. Thomas Ngo, Joe Marks, and Stuart Shieber, “Easily Searched Encodings for Number Partitioning,” *Journal of Optimization Theory and Applications*, 89(2), pp. 251–291, 1996. Also appeared as Harvard CS Technical Report TR-10-94r.

**Refereed
Conference
Publications**

Ethan Burns, J. Benton, Wheeler Ruml, Minh Do, and Sungwook Yoon, “Anticipatory On-line Planning,” *Proceedings of the Twenty-second International Conference on Automated Planning and Scheduling (ICAPS-12)*, 2012.

Scott Kiesel, Ethan Burns, Christopher Wilt, and Wheeler Ruml, “Integrating Vehicle Routing and Motion Planning,” *Proceedings of the Twenty-second International Conference on Automated Planning and Scheduling (ICAPS-12)*, 2012.

Jordan Thayer, Roni Stern, Ariel Felner, and Wheeler Ruml, “Faster Bounded-Cost Search Using Inadmissible Estimates,” *Proceedings of the Twenty-second International Conference on Automated Planning and Scheduling (ICAPS-12)*, 2012.

Matthew Hatem, Ethan Burns, and Wheeler Ruml, “Heuristic Search for Large Problems With Real Costs,” *Proceedings of the Twenty-fifth AAAI Conference on Artificial Intelligence (AAAI-11)*, 2011.

Jordan T. Thayer and Wheeler Ruml, “Bounded Suboptimal Search: A Direct Approach Using Inadmissible Estimates,” *Proceedings of the Twenty-second International Joint Conference on Artificial Intelligence (IJCAI-11)*, 2011.

Jordan T. Thayer, Austin Dionne, and Wheeler Ruml, “Learning Inadmissible Heuristics During Search,” *Proceedings of the Twenty-first International Conference on Automated Planning and Scheduling (ICAPS-11)*, 2011.

Bradford Larsen, Ethan Burns, Wheeler Ruml, and Robert C. Holte, “Searching Without a Heuristic: Efficient Use of Abstraction,” *Proceedings of the Twenty-fourth AAAI Conference on Artificial Intelligence (AAAI-10)*, 2010.

Sungwook Yoon, Wheeler Ruml, J. Benton, and Minh B. Do, “Improving Determinization in Hindsight for On-line Probabilistic Planning,” *Proceedings of the Twentieth International Conference on Automated Planning and Scheduling (ICAPS-10)*, 2010.

Silvia Richter, Jordan T. Thayer, and Wheeler Ruml, “The Joy of Forgetting: Faster Anytime Search via Restarting,” *Proceedings of the Twentieth International Conference on Automated Planning and Scheduling (ICAPS-10)*, 2010.

Ethan Burns, Seth Lemons, Wheeler Ruml, and Rong Zhou, “Suboptimal and Anytime Heuristic Search on Multi-Core Machines,” *Proceedings of the Nineteenth International Conference on Automated Planning and Scheduling (ICAPS-09)*, 2009.

Jordan T. Thayer and Wheeler Ruml, “Using Distance Estimates in Heuristic Search,” *Proceedings of the Nineteenth International Conference on Automated Planning and Scheduling (ICAPS-09)*, 2009.

Ethan Burns, Seth Lemons, Rong Zhou, and Wheeler Ruml, “Best-First Heuristic Search for Multi-Core Machines,” *Proceedings of the Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09)*, 2009.

Jordan Thayer and Wheeler Ruml, “Faster than Weighted A*: An Optimistic Approach to Bounded Suboptimal Search,” *Proceedings of the Sixteenth International Conference on Automated Planning and Scheduling (ICAPS-08)*, 2008.

Minh B. Do, Rong Zhou, and Wheeler Ruml, “Planning for Modular Printers: Beyond Productivity,” *Proceedings of the Sixteenth International Conference on Automated Planning and Scheduling (ICAPS-08)*, 2008.

Minh B. Do, Wheeler Ruml, and Rong Zhou, “On-line Planning and Scheduling: An Application to Controlling Modular Printers,” *Proceedings of the Twenty-Third AAAI Conference on Artificial Intelligence (AAAI-08)*, 2008.

Wheeler Ruml and Minh B. Do, “Best-first Utility-guided Search,” *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*, pp. 2378–2384, 2007.

Haitham Hindi and Wheeler Ruml, “Network Flow Modeling for Flexible Manufacturing Systems with Re-entrant Lines,” *Proceedings of the 45th IEEE Conference on Decision and Control (CDC-06)*, 2006.

Minh B. Do and Wheeler Ruml, “Lessons Learned in Applying Domain-independent Planning to High-speed Manufacturing,” *Proceedings of the Sixteenth International Conference on Automated Planning and Scheduling (ICAPS-06)*, pp. 370–373, 2006.

Wheeler Ruml, Minh B. Do, and Markus P. J. Fromherz, “On-line Planning and Scheduling for High-speed Manufacturing,” *Proceedings of the Fifteenth International Conference on Automated Planning and Scheduling (ICAPS-05)*, pp. 30–39, 2005. Winner of the Best Application Paper Award.

Hai Fang and Wheeler Ruml, “Complete Local Search for Propositional Satisfiability,” *Proceedings of the Nineteenth National Conference on Artificial Intelligence (AAAI-04)*, pp. 161–166, 2004.

Yi Shang and Wheeler Ruml, “Improved MDS-Based Localization,” *Proceedings of the 23rd Conference of the IEEE Communications Society (Infocom '04)*, pp. 2640–2651, 2004.

Yi Shang, Wheeler Ruml, Ying Zhang and Markus P. J. Fromherz, “Localization from Mere Connectivity,” *Proceedings of the Fourth ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc '03)*, pp. 201–212, 2003.

Wheeler Ruml, “Constructing Distributed Representations using Additive Clustering,” *Advances in Neural Information Processing Systems 14 (NIPS-01)*, pp. 107–114, 2001. A preliminary version appeared as “Assigning Features using Additive Clustering,” Harvard CS Technical Report TR-04-01.

Wheeler Ruml, “Incomplete Tree Search using Adaptive Probing,” *Proceedings of the Seventeenth International Joint Conference on Artificial Intelligence (IJCAI-01)*, pp. 235–341, 2001.

Brad Andalman, Kathy Ryall, Wheeler Ruml, Joe Marks, and Stuart Shieber, “Design Gallery Browsers Based on 2D and 3D Graph Drawing,” *Proceedings of the International Symposium on Graph Drawing (GD '97)*, Lecture Notes in Computer Science, vol. 1353, Springer-Verlag, pp. 322-329, 1998.

Joe Marks, Brad Andalman, Paul Beardsley, William Freeman, Sarah Gibson, Jessica Hodgins, Tom Kang, Brian Mirtich, Hanspeter Pfister, Wheeler Ruml, Kathy Ryall, Josh Seims, and Stuart Shieber, “Design Galleries: A General Approach to Setting Parameters for Computer Graphics and Animation,” *Proceedings of SIGGRAPH '97*, pp. 389–400, 1997.

**Refereed
Symposium
and Workshop
Publications**

Austin J. Dionne, Jordan T. Thayer, and Wheeler Ruml, “Deadline-Aware Search Using On-line Measures of Behavior,” *Proceedings of the Symposium on Combinatorial Search (SoCS-11)*, 2011.

Michael J. Leighton, Wheeler Ruml, and Robert C. Holte, “Faster Optimal and Suboptimal Hierarchical Search,” *Proceedings of the Symposium on Combinatorial Search (SoCS-11)*, 2011.

Christopher Wilt and Wheeler Ruml, “Cost-Based Heuristic Search is Sensitive to the Ratio of Operator Costs,” *Proceedings of the Symposium on Combinatorial Search (SoCS-11)*, 2011.

Kevin Rose, Ethan Burns, and Wheeler Ruml, “Best-first Search for Bounded-depth Trees,” *Proceedings of the Symposium on Combinatorial Search (SoCS-11)*, 2011.

David Biegelsen, Lara Crawford, Minh Do, Dave Duff, Craig Eldershaw, Markus Fromherz, Haitham Hindi, Greg Kott, Dan Larner, Barry Mandel, Steve Moore, Bryan Preas, Wheeler Ruml, Greg Schmitz, Lars Swartz, and Rong Zhou, “Integrated Parallel Printing Systems with Hypermodular Architecture,” *IS&T/SPIE Conference on Electronic Imaging, Symposium on Parallel Processing for Imaging Applications*, 2011.

Jordan Thayer and Wheeler Ruml, “Finding Acceptable Solutions Faster Using Inadmissible Information,” *Proceedings of the Symposium on Combinatorial Search (SoCS-10)*, 2010. Extended version available as UNH CS Technical Report 10-01, 17pp.

Wheeler Ruml, “The Logic of Benchmarking: A Case Against State-of-the-Art Performance,” *Proceedings of the Symposium on Combinatorial Search (SoCS-10)*, 2010.

David M. Bond, Niels A. Widger, Wheeler Ruml and Xiaoxun Sun, “Real-Time Search in Dynamic Worlds,” *Proceedings of the Symposium on Combinatorial Search (SoCS-10)*, 2010.

Jordan Thayer and Wheeler Ruml, “Anytime Heuristic Search: Frameworks and Algorithms,” *Proceedings of the Symposium on Combinatorial Search (SoCS-10)*, 2010.

Christopher Wilt, Jordan Thayer and Wheeler Ruml, “A Comparison of Greedy Search Algorithms,” *Proceedings of the Symposium on Combinatorial Search (SoCS-10)*, 2010.

Ethan Burns, Sofia Lemons, Wheeler Ruml, and Rong Zhou, “Parallel Best-First Search: The Role of Abstraction,” *Proceedings of the AAAI-10 Workshop on Abstraction, Reformulation, and Approximation (WARA-10)*, 2010.

Seth Lemons, J. Benton, Wheeler Ruml, Minh B. Do, and Sungwook Yoon, “Continual On-line Planning as Decision-Theoretic Incremental Heuristic Search,” *Proceedings of the AAAI Spring Symposium on Embedded Reasoning*, 2010.

Ethan Burns, Seth Lemons, Wheeler Ruml, and Rong Zhou, “Parallel Best-First Search: Optimal and Suboptimal Solutions,” *Proceedings of the International Symposium on Combinatorial Search (SoCS-09)*, 2009.

Silvia Richter, Jordan T. Thayer, and Wheeler Ruml, “The Joy of Forgetting: Faster Anytime Search via Restarting,” *Proceedings of the International Symposium on Combinatorial Search (SoCS-09)*, 2009.

Jordan T. Thayer, Wheeler Ruml, and Jeff Kreis, “Using Distance Estimates in Heuristic Search: A Re-evaluation,” *Proceedings of the International Symposium on Combinatorial Search (SoCS-09)*, 2009.

Allen Hubbe, Wheeler Ruml, Sungwook Yoon, J. Benton, and Minh B. Do, “On-line Anticipatory Planning,” *Proceedings of the ICAPS-08 Workshop on A Reality Check for Planning and Scheduling Under Uncertainty*, 2008.

Jordan T. Thayer, Wheeler Ruml, and Ephrat Bitton, “Fast and Loose in Bounded Suboptimal Heuristic Search,” *Proceedings of the First International Symposium on Heuristic Search in Artificial Intelligence and Robotics (STAIR-08)*, pp. 120–126, 2008.

Minh B. Do, Rong Zhou, and Wheeler Ruml, “Beyond Planning for Productivity,” *Proceedings of the Second Xerox Innovation Group Research and Technology Conference*, 6 pp., 2008. (not distributed externally)

J. Benton, Minh B. Do, and Wheeler Ruml, “A Simple Testbed for On-line Planning,” *Proceedings of the ICAPS-07 Workshop on Moving Planning and Scheduling Systems into the Real World*, 8 pp., 2007. Also appeared in the *Proceedings of the Second International Competition on Knowledge Engineering for Planning and Scheduling (ICKEPS-07)*.

Wheeler Ruml, “Tightly Integrated Parallel Printing: An Overview”, *Proceedings of the First Annual Xerox Innovation Group Research and Technology Conference*, pp. 84–85, 2006. (not distributed externally)

Minh B. Do, Wheeler Ruml, and Rong Zhou, “Beyond Scheduling: Using On-line Planning to Control Printers,” *Proceedings of the First Annual Xerox Innovation Group Research and Technology Conference*, pp.91–94, 2006. (not distributed externally)

Wheeler Ruml and Elisabeth H. Crawford, “Best-first Utility-Guided Search,” *Working Notes of the IJCAI-05 Workshop on Planning and Learning in A Priori Unknown or Dynamic Domains*, pp. 103–109, 2005.

Ying Lu, Lara S. Crawford, Wheeler Ruml, Markus P. J. Fromherz, “Feedback Control for Real-Time Solving,” *Working Notes of the CP-04 Workshop on Constraint Solving under Change and Uncertainty (Changes-04)*, pp. 21–35, 2004.

Wheeler Ruml and Markus P. J. Fromherz, “On-line Planning and Scheduling in a High-speed Manufacturing Domain,” *Proceedings of the ICAPS-04 Workshop on Integrating Planning into Scheduling*, pp. 60–66, 2004.

Wheeler Ruml, “Heuristic Search in Bounded-depth Trees: Best-Leaf-First Search,” *Working Notes of the AAAI-02 Workshop on Probabilistic Approaches in Search*, pp. 45–51, 2002. Preliminary version appeared as Harvard CS Technical Report TR-01-02.

Wheeler Ruml, “Using Prior Knowledge with Adaptive Probing,” *Proceedings of the 2001 AAAI Fall Symposium on Using Uncertainty Within Computation (AAAI Technical Report FS-01-04)*, pp. 116–120, 2001.

Wheeler Ruml, “Stochastic Tree Search: Where to Put the Randomness?,” *Proceedings of the IJCAI-01 Workshop on Stochastic Search*, pp. 43–47, 2001.

Wheeler Ruml, “Learning to Search Trees,” selected for oral presentation at *The AAAI-2000 Workshop on Leveraging Probability and Uncertainty in Computation*, 2000.

Wheeler Ruml, “Alan W. Biermann, *Great Ideas in Computer Science*” (book review), *Mind and Machines*, 9(3), pp. 417–421, 1999.

Joe Marks, Wheeler Ruml, Stuart Shieber, and Tom Ngo, “A Seed-Growth Heuristic for Graph Bisection,” *Proceedings of Algorithms and Experiments '98*, pp. 76–87, 1998. Also appeared as Harvard CS Technical Report TR-01-98.

Theses

Wheeler Ruml, *Adaptive Tree Search*. Ph.D. thesis, Harvard University, May, 2002, 144 pp.

Wheeler Ruml, *Stochastic Approximation Algorithms for Number Partitioning*. Undergraduate honors thesis and Harvard CS Technical Report TR-17-93, April, 1993, 79 pp.

Unrefereed Publications

Ethan Burns and Wheeler Ruml, “On-line Tree Size Prediction using Incremental Models,” UNH CS Technical Report 11-01, 14pp.

Christopher Wilt, Jordan Thayer, and Wheeler Ruml, “Selecting a Greedy Search Algorithm,” UNH CS Technical Report 10-07, 18pp.

Jordan Thayer and Wheeler Ruml, “Finding Acceptable Solutions Faster Using Inadmissible Information,” UNH CS Technical Report 10-01, 19pp.

Wheeler Ruml, Adam Ginsburg, and Stuart Shieber, “Speculative Pruning for Boolean Satisfiability,” Harvard CS Technical Report TR-02-99, 18 pp.

Wheeler Ruml, Joe Marks, Stuart Shieber, and Tom Ngo, “Seed-Growth Heuristics for Graph Bisection,” Harvard CS Technical Report TR-10-99, 33 pp.

Grants

Time-Aware Heuristic Search June 2012–May, 2017
NSF Career Program, \$498,403.

International Collaboration Supplement Summer, 2011
NSF Robust Intelligence Program, \$18,508.

Research Experiences for Undergraduates Supplement Summer, 2011
NSF Robust Intelligence Program, \$16,000.

Time-aware Optimization for Battlespace Management June, 2010–June, 2012
DARPA Computer Science Study Group Program, \$396,120.

A Symposium on Combinatorial Search July, 2009–June, 2010
Co-PIs: Sven Koenig, Rong Zhou. NSF Robust Intelligence Program, \$30,971.

International Development Grant Summer, 2009
UNH Center for International Education, \$500.

Lightweight Metareasoning for Ubiquitous Optimization March, 2009–May, 2010
DARPA Computer Science Study Group Program, \$99,220.

Combinatorial Search Algorithms as Rational Agents September, 2008–August, 2012
NSF Robust Intelligence Program, \$448,192.

A Symposium Series on Heuristic Search and Its Applications June, 2008–May 2009
Co-PIs: David Furcy, Sven Koenig, Rong Zhou. NSF Robust Intelligence Program, \$14,646.

Patents

Two disclosures filed with the UNH Office for Research Partnerships and Commercialization, December, 2011.

Sungwook Yoon, Wheeler Ruml, Minh B. Do, J. Benton, “AI Planning-based Quasi-Montecarlo Simulation Method for Probabilistic Planning,” filed March, 2010.

Wheeler Ruml, Minh B. Do, Rong Zhou, and Haitham Hindi, “System and Method for Real-Time System Control Using Precomputed Plans,” US patent 7,925,366, issued April, 2011.

Minh B. Do, Wheeler Ruml, and Rong Zhou, “Model-Based Planning with Multi-Capacity Resources,” filed May 2007. Also filed in Europe.

Wheeler Ruml, Minh B. Do, and Rong Zhou, “System and Method for On-Line Planning Utilizing Multiple Planning Queues,” filed May 2007. Also filed in Japan.

Wheeler Ruml, “System and Method for Bounded Sub-Optimal Problem-Solving,” US patent 7,966,336, issued June, 2011. Also filed in Japan.

Wheeler Ruml and Minh B. Do, “System and Method for Exception Handling Using Flexible Replanning,” filed May, 2007. Also filed in Japan.

Wheeler Ruml, Robert M. Lofthus, and Minh B. Do, “Model-Based Planning Using Query-Based Model Components,” US patent 7,689,311, issued March, 2010. Also filed in Japan.

Wheeler Ruml, “System and Method for Solving Multiple Interacting State-Space Search Problems,” filed December 2007.

Meera Sampath, Markus P. J. Fromherz, Dusan G. Lysy, Rajinderjeet S. Minhas, Naveen Sharma, William J. Hannaway, Wheeler Ruml, “Fault Management for a Printing System,” filed September, 2006.

Haitham Hindi and Wheeler Ruml, “System and Method for Manufacturing System Design and Shop Scheduling Using Network Flow Modeling,” filed February, 2006.

Wheeler Ruml and Elisabeth H. Crawford, “System and Method for Time-aware Path Finding,” US patent 7,389,279, issued June, 2008.

Lara S. Crawford, Haitham A. Hindi, Markus P. J. Fromherz, Craig Eldershaw, Wheeler Ruml, and Kimon D. Roufas, “Distributed Control Systems and Methods that Selectively Activate Respective Coordinators for Respective Tasks,” US patent 7,873,962 issued January, 2011.

Wheeler Ruml and Markus P. J. Fromherz, “System and Method for Production Planning Utilizing On-line State-space Planning,” US patent 7,451,132, issued November, 2008.

Yi Shang and Wheeler Ruml, “Node Localization in Communication Networks,” US patent 7,457,860, issued November, 2008.

Wheeler Ruml, Robert M. Lofthus, Ronald J. Root, Markus P. J. Fromherz, and Marc W. Webster, “Exception Handling in Manufacturing Systems Combining On-line Planning and Predetermined Rules,” US patent 7,043,321, issued May, 2006. Also filed in Europe and Japan.

Wheeler Ruml and Markus P. J. Fromherz, “System and Method Utilizing Temporal Constraints to Coordinate Multiple Planning Sessions,” US patent 6,898,475, issued May, 2005. Also filed in Europe and Japan. Co-winner of 2005 PARC Golden Acorn Award for most valuable patent of the year.

Wheeler Ruml, Joseph Marks, Kathleen Ryall, and Stuart M. Shieber, “User Interface for Creation of Image Generation and Transformation Functions,” US patent 6,421,050, issued July, 2002. Also filed in Europe and Japan.

Invited

Invited Talks

External

“Planning Algorithms: When Optimal Just Isn’t Good Enough”

Presentations

University of Massachusetts, Lowell, November 2011

“Search Algorithms as Agents”

Symposium on Combinatorial Search, July 2011

- “Best-first Graph Search on Multicore Machines”
Dagstuhl Seminar on Graph Search Engineering, November 2009
- “Job Hunting in Industry and Academia”
ICAPS Doctoral Consortium, September 2008, May 2010
- “Planning Under Time Pressure”
Williams College, October 2007
- “Heuristic Search and Rational Agents”
University of New Hampshire, March 2007
Worcester Polytechnic Institute, February 2007
Pomona College, February 2007
- “Learning to Search Trees”
Stanford University, March 2006
- “On-line Planning for High-speed Manufacturing”
University of Nebraska, Lincoln, November 2005
University of Alberta, Edmonton, November 2005
- “Best-first Search for Combinatorial Optimization”
University of California, Berkeley, April 2002
SRI International, April 2002
Palo Alto Research Center, April 2002
- “Computational Modeling of Lexical Access”
U.S. Army Research Laboratory, Aberdeen Proving Ground, February, 2000

Tutorials

- “Using Solution Length Estimates in Heuristic Search”
presented with Jordan Thayer at the International Conference on Automated Planning and Scheduling (ICAPS), June 2011
- “A Survey of Suboptimal Search Algorithms”
presented with Jordan Thayer at the International Conference on Automated Planning and Scheduling (ICAPS), June 2011

Panel Presentations

- Symposium on Combinatorial Search, 2010 (moderator)
ICAPS Workshop on Planning and Learning, 2007
ICAPS Workshop on Planning Under Uncertainty and Execution Control for Autonomous Systems, 2006
AAAI Fall Symposium on Using Uncertainty Within Computation, 2001

Teaching Experience

UNIVERSITY OF NEW HAMPSHIRE

Instructor

- | | |
|---|----------------------------------|
| Algorithms | Fall 2010–2011 |
| Combinatorial Search and Heuristic Optimization | Fall 2008–2009, Spring 2011–2012 |
| Classic Papers in Artificial Intelligence | Fall 2008 |
| Introduction to Artificial Intelligence | Spring 2008–2012 |
| Undergraduate Presentation Seminar | Fall 2007, Spring 2008 |

Guest Lecturer

- | | |
|----------------------------------|----------------|
| Introduction to Computer Science | Fall 2009–2010 |
| Graduate Research Seminar | Fall 2007–2010 |

PALO ALTO RESEARCH CENTER

Guest Lecturer

Foundations of Constraint Processing (University of Nebraska, Lincoln) Fall 2005

HARVARD UNIVERSITY

Instructor

Introduction to Artificial Intelligence Fall 2001

Co-lecturer

Introduction to Artificial Intelligence Fall 1999, 2000

Guest Lecturer

Introduction to Computer Science II (Harvard Summer School) Summer 1998, 1999

Theory of Computation (Harvard University) Fall 1997

Theory of Computation (Harvard Extension School) Fall 1997

Students Supervised

UNIVERSITY OF NEW HAMPSHIRE

MS Theses

Jarad Cannon, *Robot Motion Planning Using Real-time Heuristic Search* Fall 2010–Fall 2011

Kevin Rose, *Real-time Sampling-based Motion Planning with Dynamic Obstacles*
Summer 2010–Fall 2011

Austin Dionne, *Heuristic Search Under a Deadline* Summer 2010–Spring 2011

MS Projects

Jake Mandel, Scheduling for Quality Summer–Fall 2009

Graduate Research

Chris Sexton, Greedy search Fall 2011–present

Scott Kiesel, Combining tasking and routing Fall 2010–present

Matt Hatem, External-memory search Fall 2010–present

Mike Leighton, Hierarchical search Summer 2010–present

Chris Wilt, Beam search Summer 2009–present

David Bond, Real-time search Spring –Fall 2009

Ethan Burns, Multi-core search, adaptive search Fall 2008–present

Sofia Lemons, Multi-core search, continual planning Fall 2008–2010

Jake Mandel, Multi-body planning, heuristic error Fall 2007, Fall 2008–Spring 2009

Jordan Thayer, Time-aware shortest-path search Summer 2007–present

Undergraduate Honors Theses

Kevin Rose, *Best-first Search for Solving Constraint Satisfaction Problems* Spring 2009–2010

Undergraduate Research

Chris Hebert, Cooperative pathfinding Spring 2012–present

Jennifer Baker, Real-time search Fall 2010–2011

Allen Hubbe, Modeling heuristic error Summer 2008

Austin Dionne, Shortest-path search under a deadline Fall 2007–Spring 2008

Mentoring Programs

International Joint Conference on Artificial Intelligence (IJCAI) 2011

International Conference on Automated Planning and Scheduling (ICAPS) 2007, 2008, 2010

PhD Committee

Dan Pineo, *The Application of Computational Modeling to Data Visualization* December, 2010

PALO ALTO RESEARCH CENTER

Graduate Interns

J. Benton (Arizona State), On-line continual planning Summer 2006

Elisabeth Crawford (Carnegie Mellon), Time-aware search Summer 2004
 Hai Fang (Yale), Complete local search Summer–Fall 2003

Undergraduate Interns

Ephrat Bitton (Berkeley), Fast shortest-path search Summer 2006–Spring 2007
 Kevin Canini (Cornell), Data structures for temporal planning Summer 2005
 Daniel Hsu (Berkeley), Local search algorithms Summer 2003

Mentoring Program

International Conference on Automated Planning and Scheduling (ICAPS) 2004, 2005

HARVARD UNIVERSITY

Senior Theses

Gaby Pollack, Cognitive modeling of brain-damaged picture naming Spring 1999–Spring 2000
 Ellis Verosub, Heuristic search for protein folding Spring 1997–Spring 1998
 Nailah Robinson, Analysis of algorithms for boolean satisfiability Spring 1997–Spring 1998
 Adam Ginsburg, Heuristic search for boolean satisfiability Fall 1996–Spring 1997

Undergraduate Research

Paul Gusmorino, Visualization for combinatorial optimization Fall 2001
 Lea Sullivan, Estimating probabilities for human naming errors Fall 2000–Spring 2001
 Jeffrey Enos, Heuristic tree search algorithms Spring 2000
 Jeffrey Shneidman, Heuristic tree search algorithms Spring 2000
 Kevin Cheung, Stochastic search algorithms Spring 2000
 Emil Gilliam, Local search algorithms for additive clustering Fall 1999
 Joseph Turian, Move strategies for local search Fall 1998–Spring 1999
 Pavel Vasilyev, Heuristic search and geometric embedding Fall 1997–Fall 1999
 Angelos Kottas, Cognitive modeling of brain-damaged picture naming Fall 1997–Winter, 1999
 Joshua Von Korff, Cross-validation for clustering Fall 1997–Spring 1998

**Professional
 Activities**

Steering Committee

International Symposium on Combinatorial Search (SoCS), 2008–present.
 Co-founder; President, 2011–present; Co-treasurer, 2010–present.

Conference Organization

Co-chair, International Symposium on Combinatorial Search (SoCS-09), 2009.
 Co-chair, International Symposium on Search Techniques in Artificial Intelligence and Robotics (STAIR-08), 2008.
 Co-chair, Seventh International Symposium on Abstraction, Reformulation, and Approximation (SARA-07), 2007.
 Organizing committee, International Knowledge Engineering Competition for Planning and Scheduling, 2007.
 Organizing committee, First Annual Xerox Innovation Group Research and Technology Conference, 2006. (attendance restricted to employees)
 Co-chair, AAAI-06 Workshop on Learning for Search, 2006.

Editorial Board

Journal of Artificial Intelligence Research, 2006–2012.

Grant Reviewing

L'Agence Nationale de la Recherche (France)
 National Science Foundation
 Natural Sciences and Engineering Research Council of Canada
 U.S. Army Research Office
 U.S.–Israel Binational Science Foundation

Manuscript Reviewing

Morgan Kaufmann Publishers

Journal Reviewing

Ad Hoc Networks
 Advances in Artificial Intelligence
 AI Communications
 Artificial Intelligence
 Cognitive Neuropsychology
 Computer Networks
 Constraints
 IBM Journal of Research and Development
 IEEE Transactions on Mobile Computing
 International Journal on Artificial Intelligence Tools
 Journal of Artificial Intelligence Research
 Journal of Automated Reasoning
 Journal of Combinatorial Optimization
 Journal of Heuristics
 Journal of Machine Learning Research
 Journal of Mathematical Modelling and Algorithms
 Journal of Scheduling
 Operations Research
 Psychological Review
 Robotics and Autonomous Systems
 Telecommunication Systems

Conference Reviewing

AAAI Conference on Artificial Intelligence (senior program committee 2011, 2012)
 European Conference on Artificial Intelligence
 IEEE International Conference on Robotics and Automation
 IEEE/RSJ International Conference on Intelligent Robots and Systems
 IEEE Wireless Communications and Networking Conference
 International Conference on Automated Planning and Scheduling
 International Conference on Autonomous Agents and Multiagent Systems
 International Conference on Machine Learning
 International Federation of Automatic Control World Congress
 International Florida Artificial Intelligence Research Society Conference
 International Joint Conference on Artificial Intelligence (senior program committee 2009, 2011)
 International Symposium on Artificial Intelligence and Mathematics
 International Workshop on Parallel and Distributed Methods in Verification
 Learning and Intelligent Optimization
 Symposium on Abstraction, Reformulation, and Approximation
 Symposium on Combinatorial Search
 Workshop of the UK Planning and Scheduling Special Interest Group
 and various other international workshops

Dissertation Reviewing

External examiner, University of Auckland, New Zealand

Membership

Association for Computing Machinery
 Association for the Advancement of Artificial Intelligence (life member)

**University
 Activities***Department*

Faculty search committee, Spring 2011.
 Graduate program committee, 2007–present.
 Video colloquium, founder and organizer, 2007–present.

University
Undergraduate research advisory committee, 2007–2011.

Citizenship U.S.A.