

# Jeremy Kubica

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## RESEARCH INTERESTS

My primary research interests are machine learning, data mining, and efficient large-scale scientific and statistical computation. I am interested in the development of new techniques and efficient algorithms and the application of these technologies to real-world problems.

## EDUCATION

- **Carnegie Mellon University**, Pittsburgh, PA 12/2005  
*Ph.D. Robotics*  
Thesis: "Efficient Discovery of Spatial Associations and Structure with Application to Asteroid Tracking"  
Advisor: Dr. Andrew Moore
- **Carnegie Mellon University**, Pittsburgh, PA 12/2003  
*M.S. Robotics*  
Advisor: Dr. Andrew Moore
- **Cornell University**, Ithaca, NY 05/2001  
*B.S. Computer Science*  
summa cum laude

## HONORS AND AWARDS

- **Hertz Foundation Graduate Fellowship** (2001-2006)
- **National Science Foundation Graduate Fellowship** (2001, declined)
- **Roger K. Berman Prize for Technical Presentation** (2000)
- **Lockheed Martin Scholar** (1998 - 1999)

## RESEARCH EXPERIENCE

- **Carnegie Mellon University**, Pittsburgh, PA 09/2001 - present  
*Research Assistant*  
I am a member of the Auton Lab researching efficient machine learning and data mining techniques for discovering structure in large noisy data sets. Specific research projects include:
  - **Spatial Structure Search**
  - **Large-scale asteroid tracking**
  - **Group detection and link analysis**

- **FX Palo Alto Laboratory (FXPAL)**, Palo Alto, CA 06/2001-08/2001  
*Undergraduate Research Intern*  
I worked in the Adaptive Systems Research Group researching the use of machine learning algorithms to generate control strategies for modular self-reconfigurable robots.
- **Xerox Palo Alto Research Center (PARC)**, Palo Alto, CA 05/2000-08/2000  
*Undergraduate Research Intern*  
I worked in the Modular Robotics Research Lab developing control strategies and algorithms for modular self-reconfigurable robotic systems.
- **Trintech**, Princeton, NJ 05/1999-08/1999  
*Undergraduate Research Intern*  
I performed initial research and development for a commercial internet product.

### TEACHING EXPERIENCE

- Course TA: **Advanced AI concepts** (15-780), Carnegie Mellon University. Spring 2003.
- Undergraduate Course Consultant: **Computers and Programming** (CS211), Cornell University. Spring 2000, Fall 2000, and Spring 2001.

### PROFESSIONAL SERVICE

#### **Professional Reviewing**

- IEEE Transactions on Signal Processing
- Neural Information Processing Systems (NIPS) 2005

#### **Departmental Committees**

- Robotics Institute Graduate Admissions Committee (2004, 2005)
- Robotics Graduate Student Organization (RoboOrg) - Treasurer (2002-2003)

### PUBLICATIONS

#### **Conference Papers:**

- [1] **Variable KD-Tree Algorithms for Spatial Pattern Search and Discovery.** J. Kubica, J. Masiero, A. Moore, R. Jedicke and A. J. Connolly. to appear in *Advances in Neural Information Processing Systems*, 2005.
- [2] **A Multiple Tree Algorithm for the Efficient Association of Asteroid Observations.** J. Kubica, A. Moore, A. J. Connolly, and R. Jedicke. *The Eleventh ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, August 2005. pp. 138-146.
- [3] **Efficiently Identifying Close Track/Observation Pairs in Continuous Timed Data.** J. Kubica, A. Moore, A. J. Connolly, and R. Jedicke. *Proc. SPIE Signal and Data Processing of Small Targets*, August 2005.
- [4] **Probabilistic Noise Identification and Data Cleaning.** J. Kubica and A. Moore. *The Third IEEE International Conference on Data Mining*. November, 2003: Melbourne, Florida. pp. 131-138
- [5] **Tractable Group Detection on Large Link Data Sets.** J. Kubica, A. Moore, and J. Schneider. *The Third IEEE International Conference on Data Mining*. November, 2003: Melbourne, Florida. pp. 573-576

- [6] **Finding Underlying Connections: A Fast Graph-Based Method for Link Analysis and Collaboration Queries.** J. Kubica, A. Moore, D. Cohn, and J. Schneider. *ICML 2003*. August, 2003: Washington DC. pp. 392-399
- [7] **Stochastic Link and Group Detection.** J. Kubica, A. Moore, J. Schneider, and Y. Yang. *The 2002 AAAI Conference*. July, 2002: Edmonton, Alberta, Canada. pp. 798-804
- [8] **Collaborating with a Genetic Programming System to Generate Modular Robotic Code.** J. Kubica and E. Rieffel. *The Genetic and Evolutionary Computing Conference (GECCO) 2002*. July, 2002: New York, NY. pp. 804-811
- [9] **On the General Reconfiguration Problem for Expanding Cube Style Modular Robots.** S. Vassilvitskii, J. Kubica, E. Rieffel, J. Suh, and M. Yim. *The International Conference of Robotics and Automation (ICRA)*. May, 2001: Washington DC, USA. pp. 801-808
- [10] **Creating a Smarter Membrane: Automatic Code Generation for Modular Self-Reconfigurable Robots.** J. Kubica and E. Rieffel. *The International Conference of Robotics and Automation (ICRA)*. May, 2002: Washington DC, USA. pp. 793-800
- [11] **Agent-based Control for Object Manipulation with Modular Self-reconfigurable Robots.** J. Kubica, A. Casal, and T. Hogg. *The International Joint Conference of Artificial Intelligence (IJCAI)*. August, 2001: Seattle, Washington. pp. 1344-1352
- [12] **Complex Behaviors from Local Rules in Modular Self-reconfigurable Robots.** J. Kubica, A. Casal, and T. Hogg. *The International Conference of Robotics and Automation (ICRA)*. May, 2001: Seoul, Korea. pp. 360-367 vol.1

#### Workshop Papers:

- [13] **A Comparison of Statistical and Machine Learning Algorithms on the Task of Link Completion.** A. Goldenberg, J. Kubica, P. Komarek, A. Moore and J. Schneider. *KDD Workshop on Link Analysis for Detecting Complex Behavior*. August, 2003: Washington DC.
- [14] **cGraph: A Fast Graph-Based Method for Link Analysis and Queries.** J. Kubica, A. Moore, D. Cohn, and J. Schneider. *Proceedings of the 2003 IJCAI Text-Mining and Link-Analysis Workshop*. August, 2003: Acapulco Mexico.

#### Technical Reports:

- [15] **Variable KD-Tree Algorithms for Efficient Spatial Pattern Search.** J. Kubica, J. Masiero, A. Moore, R. Jedicke and A. J. Connolly. Tech. Report TR-05-43, Robotics Institute, Carnegie Mellon University, September, 2005.
- [16] **Efficient Algorithms for the Identification of Potential Track/Observation Associations in Continuous Time Data.** J. Kubica, A. Moore, A. J. Connolly, and R. Jedicke. Tech. Report TR-05-10, Robotics Institute, Carnegie Mellon University, February, 2005.
- [17] **Fast and Robust Track Initiation Using Multiple Trees.** J. Kubica, A. Moore, A. J. Connolly, and R. Jedicke. Tech. Report TR-04-62, Robotics Institute, Carnegie Mellon University, November, 2004.
- [18] **Spatial Data Structures for Efficient Trajectory-Based Queries.** J. Kubica, A. Moore, A. J. Connolly, and R. Jedicke. Tech. Report TR-04-61, Robotics Institute, Carnegie Mellon University, November, 2004.
- [19] **K-Groups: Tractable Group Detection on Large Link Data Sets.** J. Kubica, A. Moore, and J. Schneider. Tech. Report TR-03-32, Robotics Institute, Carnegie Mellon University, September, 2003.

## PATENTS

- **"Self-Reconfigurable Robot,"** US Patent 6,725,128, T. Hogg, A. Casal, and J. Kubica.

## REFERENCES

- **Andrew Moore**, Carnegie Mellon University: Computer Science Department and Robotics Institute, [awm@cs.cmu.edu](mailto:awm@cs.cmu.edu)
- **Jeff Schneider**, Carnegie Mellon University: Robotics Institute, [Jeff.Schneider@cs.cmu.edu](mailto:Jeff.Schneider@cs.cmu.edu)
- **Martial Hebert**, Carnegie Mellon University: Robotics Institute, [hebert@ri.cmu.edu](mailto:hebert@ri.cmu.edu)
- **Andrew Connolly**, University of Pittsburgh: Department of Physics and Astronomy, [ajc@phyast.pitt.edu](mailto:ajc@phyast.pitt.edu)
- **Robert Jedicke**, University of Hawaii: Institute for Astronomy, [jedicke@IfA.Hawaii.Edu](mailto:jedicke@IfA.Hawaii.Edu)