

# James Bruce

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## Research Interests:

My primary area of interest is in real-time robotics, specifically motion planning and machine vision for autonomous robots.

## Education:

Aug 2000 – present	Carnegie Mellon University (Pittsburgh, Pennsylvania, USA) 5th year Ph.D Student, Computer Science Department Expected graduation: Spring 2006
Aug 1996 – May 2001	Carnegie Mellon University (Pittsburgh, Pennsylvania, USA) Bachelor of Science in Computer Science, with double major in Cognitive Psychology Cumulative GPA: 4.0 / 4.0
Sep 1992 – Jun 1996	C-PP West High School (Painted Post, New York, USA)

## Experience:

*Carnegie Mellon University, Pittsburgh, PA. Jan 1999-present*

Work on multiple robotics projects, including RoboCup robotic soccer robots. Initially entered as an undergraduate student (first paid, later for course credit); Work now continues as a graduate student. Member of CMPack Sony Legged league in 1999, 2000, 2001, and CMDragons/CMRoboDragons RoboCup F180 team from 2001-2005.

*Sony Corporation, Tokyo, Japan Aug 2003-Oct 2003*

Developed a 3D-aware path planner for the QRIO humanoid robot. Also tested 3D world model, and suggested improvements; Work resulted in being listed as fourth inventor on a currently pending US patent.

*Microsoft Corporation, Seattle, WA. Summer 1998*

Software development engineer, Windows NT Imaging group. Wrote demonstration applications for third-party developers demonstrating the use of an advanced image capture API intended for a future versions Windows. Also provided initial work for automatically determining objective regions for flatbed scanners.

*Pittsburgh Supercomputing Center, Pittsburgh, PA. Oct 1996-Jan 1999*

Assistant to operations system administrator. Performed account and system management tasks for multiple supercomputing platforms. (www.psc.edu)

## Recent Professional Activities:

RoboCup 2006 Technical Committee member  
RoboCup 2006 Local Organizing Committee member

## Professional Membership:

May 2000 – present      Phi Beta Kappa Honor Society  
Nov 2002 – present      IEEE Student Member

## Selected Publications:

James Bruce and Manuela Veloso. "Safe Multi-robot Navigation within Dynamics Constraints". In *Proceedings of the IEEE, Special Issue on Multi-Robot Systems*, 2006 (to appear)

James Bruce and Manuela Veloso. "Real-Time Randomized Path Planning for Robot Navigation". In *Proceedings of IROS-2002*, Switzerland, October 2002.

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

James Bruce, Tucker Balch, and Manuela Veloso. "Fast and Inexpensive Color Image Segmentation for Interactive Robots". In *Proceedings of IROS-2000*, Japan, October 2000.

Brett Browning, James Bruce, Michael Bowling, and Manuela Veloso. STP: Skills, tactics and plays for multi-robot control in adversarial environments. *IEEE Journal of Control and Systems Engineering*, 219:33-52, 2005.

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.

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. Honorary mention for Best Paper Award, Software Prototypes Track.

## Teaching Experience:

Jan 2004 – May 2004      Teaching Assistant for 15-493 Computer Game Programming  
Jan 2003 – May 2003      Teaching Assistant for 15-385 Computer Vision  
Jan 1999 – May 1999      Teaching Assistant for 15-412 Operating Systems

## Open Source Code Releases:

### *CMVision Realtime Color Vision Library*

Version 1.0 release Oct 1999, Version 2.0 released Mar 2002. Released under GPL. CMVision is a C++ for realtime vision applications, which contains 3D color thresholding, the fastest known portable implementation of multi-color connected components calculation, and calculation of region statistics. It has been used in at least 16 projects around the world, 14 of which are mobile robot applications. It was used in the RoboCup world champion teams CMPack 2002 in the Sony Legged League and CS Friburg 2001 in the Middle Size League. A modified version is in use in the commercially sold Sony Aibo robot. (<http://www.cs.cmu.edu/~jbruce/cmvision/>)

### *CMDragons 2002 Code Release*

Released Sep 2002, under GNU GPL. CMDragons became the first team in the RoboCup small size league to release all software related to their team, including a robust robot vision/tracking system, soccer playing system, real-time path planning, graphical control interface, and associated support/calibration software. (<http://www.cs.cmu.edu/~coral/download/index.html>)

### *CMPack 2002 Code Release*

Released Oct 2002, under GNU GPL. CMPack, along with German-Team, became the first two RoboCup Sony Legged League teams to release their entire codebase to the general public. Using Sony's Open-R SDK, anyone can compile and run CMPack's code on a Sony Aibo robot. Several other RoboCup teams, as well as Aibo enthusiasts, are using this code. The major parts of the code contributed by James Bruce are the low level vision system, the motion and legged locomotion subsystem, inverse kinematics, and vector library. (<http://www.cs.cmu.edu/~coral/download/index.html>)

## Technical Skills:

Experience with artificial intelligence, real-time machine vision, tuning and optimization, system level programming, network programming, scripting and automation. Also have experience dealing with the refinement and modification of large programming projects.

*Programming Languages:* C/C++, Standard ML, OCAML, Prolog, Pascal, Verilog,  
Alpha / MIPS / x86 Assembly

*Operating Systems:* Unix, Linux, Windows 9x / NT / 2k, OpenVMS  
Extensive experience administering Debian GNU/Linux

## Personal Information:

Born: May 1978

Citizenship: United States of America

Languages: Native English speaker, 1 year college-level Japanese instruction

Hobbies: Inline skating, snowboarding, badminton, game programming