

Curriculum Vitae

Brian P. Gerkey

Artificial Intelligence Center
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RESEARCH INTERESTS

multi-robot coordination • distributed algorithms • distributed & embedded systems • robot programming & simulation • sensor networks

EDUCATION

PhD, Computer Science, University of Southern California, August 2003. Dissertation advisor: Prof. Maja J Matarić. Dissertation: *On Multi-Robot Task Allocation*.

M.S., Computer Science, University of Southern California, May 2000.

B.S.E., Computer Engineering, magna cum laude, departmental honors, Tulane University, May 1998. Thesis advisor: Prof. James S. Jennings. Honors thesis: *Task Allocation for Heterogeneous Robots*. Secondary major in Mathematics. Minor in Robotics & Automation.

PROFESSIONAL

From Jul 2005 : *Computer Scientist*, SRI Artificial Intelligence Center.

Aug 2003 – Jun 2005: *Postdoctoral Scholar*, Stanford University Artificial Intelligence Laboratory. Advisor: Prof. Sebastian Thrun.

Jun 2003 – Jul 2003: *Postdoctoral Research Fellow*, University of Southern California Robotics Research Laboratory. Advisor: Prof. Maja J Matarić.

Aug 1998 – May 2003: *Research Assistant*, University of Southern California Robotics Research Laboratory. Advisor: Prof. Maja J Matarić.

Feb 2002 – Feb 2003: *Consultant*, Evolution Robotics, Inc., Pasadena, California. Supervisor: Dr. Paolo Pirjanian.

Jun 2001 – Jul 2001: *Consultant*, University of Southern California Information Sciences Institute. Supervisor: Dr. Kristina Lerman.

Feb 2001 – Mar 2001: *Consultant*, Phoenix International, Fargo, North Dakota. Supervisor: Dr. Noel W. Anderson.

May 1999 – Aug 1999: *Member of Technical Staff*, Artificial Intelligence Group, Jet Propulsion Laboratory, Pasadena, California. Supervisor: Dr. Tara Estlin.

Nov 1996 – May 1998: *Research Assistant*, Tulane University Mobile Robot Laboratory. Advisor: Prof. James S. Jennings.

May 1996 – Aug 1998: *Programmer*, Computerized Processes Unlimited, Inc., Metairie, Louisiana. Supervisor: Thomas J. Accardo.

TEACHING

Stanford: CS 225b, Robot Programming Laboratory. Gives undergraduates hands-on experience with physical robots, focusing on theory and implementation of navigation, localization, and path planning. Co-taught with Kurt Konolige Autumn 2006.

GRANTS AND CONTRACTS

DARPA contract for “Leaving Flatland: Fast autonomous navigation for UGVs in challenging terrain,” PI: B.Morisset, co-PI: B.Gerkey, total \$650,000, October 2007 –

NSF grant (IIS-0638794) for “Peer-to-Peer Transport and High-Level Interface for the Player/Stage System,” PI: B.Gerkey, total \$50,000, September 2006 – August 2007.

DARPA grant (DABT63-99-1-0015) for “A Software Framework for Reliable, Adaptive, Autonomous Robots (MARS),” supplement for development of the Player robot device server, PI: G. Sukhatme, co-PI: M. Matarić, key personnel: B. Gerkey and A. Howard, total \$100,000, June 2002 – August 2003.

HONORS

Intel Foundation Graduate Fellowship	2001–2002
Tau Beta Pi Honor Society	1997–present
Upsilon Pi Epsilon Honor Society	1996–1998
Tulane Engineering and Computer Science Honor Society	1995–1998
Tulane University Dean’s Honor Scholarship	1994–1998
Lockheed Leadership Fund Scholarship	1994–1998
Dixie Crows Scholarship	1994–1998
National Merit Scholar	1994
Georgia Scholar	1993–1994

Georgia Governor's Honor Program

1993

SERVICE

Senior Program Committees

- Player Summer School on Cognitive Robotics (PSSCR), Munich, Germany, 2007
- IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS), San Diego, California, 2007

Program Committees

- Natl. Conf. on Artificial Intelligence (AAAI), Chicago, Illinois, 2008
- Intl. Joint Conf. on Autonomous Agents & Multi Agent Systems (AAMAS), Estoril, Portugal, 2008
- AAAI Robot Competition and Exhibition, Chicago, Illinois, 2008
- Workshop on Wireless Multihop Communication for Networked Robots at Intl. Symp. on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt), Berlin, Germany, 2008
- Natl. Conf. on Artificial Intelligence (AAAI), Vancouver, Canada, 2007
- Intl. Joint Conf. on Autonomous Agents & Multi Agent Systems (AAMAS), Hakodate, Japan, 2006
- Intl. Conf. on Advanced Robotics (ICAR), Seattle, Washington, 2005
- Natl. Conf. on Artificial Intelligence (AAAI), Pittsburgh, Pennsylvania, 2005
- Robotics: Sciences and Systems, Cambridge, Massachusetts, 2005

Reviewing

Journals: Annals of Mathematics and Artificial Intelligence • Autonomous Robots • Computational Geometry – Theory and Applications • Control and Intelligent Systems • Journal of Artificial Intelligence Research • Journal of Autonomous Agents and Multi-Agent Systems • Journal of Field Robotics • Journal of Robotics and Autonomous Systems • IEEE Transactions on Automation Science and Engineering • IEEE Transactions on Robotics • IEEE Transactions on Robotics and Automation • IEEE Transactions on Systems, Man, and Cybernetics - Part A • IEEE Transactions on Systems, Man, and Cybernetics - Part B • Intelligent Service Robotics

Conferences: Natl. Conf. on Artificial Intelligence (AAAI) • Intl. Conf. on Advanced Robotics (ICAR) • Intl. Conf. on Autonomous Agents • Intl. Conf. on Intelligent Autonomous Systems (IAS) • Intl. Conf. on Field and Service Robotics (FSR) • Intl. Joint Conf. on Artificial Intelligence (IJCAI) • IEEE Computer Society Intl. Conf. on Computer Vision and Pattern Recognition (CVPR) • IEEE Intl. Conf. on Robotics and Automation (ICRA) • IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)

Other:

NSF review panel, March 2007

COMMUNITY SOFTWARE

Founding and lead developer on Player, part of the Player Project. Player is a language- and platform-independent robot device interface, which supports a wide variety of robots, peripherals, and algorithms. Stage and Gazebo are sensor-based multiple robot simulators, to which Player is also the interface. Player, Stage, and Gazebo are Free Software, released under the GNU General Public License, and they enjoy a significant and burgeoning user community. Software from this project has been downloaded over 98,000 times, is actively used in major academic, government, and industrial research labs around the world, and is also used in teaching undergraduate and graduate classes. The software is available from:

<http://playerstage.sourceforge.net>

PUBLICATIONS

Refereed Journal Articles

Brian P. Gerkey, Sebastian Thrun, and Geoff Gordon. Visibility-based pursuit-evasion with limited field of view. *Intl. Journal of Robotics Research* 25(4):299–316, Apr 2006.

Brian P. Gerkey and Maja J Matarić. A formal analysis and taxonomy of task allocation in multi-robot systems. *Intl. Journal of Robotics Research* 23(9):939–954, Sep 2004. Also Technical Report CRES-03-013.

Brian P. Gerkey and Maja J Matarić. Sold!: Auction methods for multi-robot coordination. *IEEE Transactions on Robotics and Automation*, special issue on Multi Robot Systems, 18(5):758–768, Oct 2002. Also Technical Report IRIS-01-399.

Book Chapters

Richard T. Vaughan and **Brian P. Gerkey**. Reusable Robot Software and the Player/Stage Project. In Davide Brugali, editor, *Software Engineering for Experimental Robotics*, pages 267–289, Springer Tracts on Advanced Robotics, Springer, 2007.

Davide Brugali, Gregory S. Broten, Antonio Cisternino, Diego Colombo, Jannik Fritsch, **Brian P. Gerkey**, Gerhard Kraetzschmar, Richard Vaughan, and Hans Utz. Trends in Robotic Software Frameworks, In Davide Brugali, editor, *Software Engineering for Experimental Robotics*, pages 259–266, Springer Tracts on Advanced Robotics, Springer, 2007.

Refereed Conference Papers

Jesse Butterfield, Odest Jenkins, and **Brian P. Gerkey**. Multi-robot Markov Random Fields. To appear in *Proc. of the Intl. Joint Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS 2008)*, Estoril, Portugal, May 12–16, 2008.

Kurt Konolige, Motilal Agrawal, Robert C. Bolles, Cregg Cowan, Martin Fischler, and **Brian P. Gerkey**. Outdoor Mapping and Navigation using Stereo Vision. In *Proc. of the Intl. Symp. on Experimental Robotics (ISER 2006)*, Rio de Janeiro, Brazil, July 6–10, 2006.

Toby H.J. Collett, Bruce A. MacDonald, and **Brian P. Gerkey**. Player 2.0: Toward a Practical Robot Programming Framework. In *Proc. of the Australasian Conf. on Robotics and Automation (ACRA 2005)*, Sydney, Australia, December 5–7, 2005.

Brian P. Gerkey, Sebastian Thrun, and Geoff Gordon. Visibility-based pursuit-evasion with limited field of view. In *Proc. of the Natl. Conf. on Artificial Intelligence (AAAI 2004)*, pages 20–27, San Jose, California, July 25–29, 2004.

Richard T. Vaughan, **Brian P. Gerkey**, and Andrew Howard. On device abstractions for portable, reusable robot code. In *Proc. of the IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, pages 2121–2427, Las Vegas, Nevada, October 2003. Also Technical Report CRES-03-009.

Brian P. Gerkey and Maja J Matarić. Multi-Robot Task Allocation: Analyzing the Complexity and Optimality of Key Architectures. In *Proc. of the IEEE Intl. Conf. on Robotics and Automation (ICRA)*, pages 3862–3868, Taipei, Taiwan, September 2003. Also Technical Report CRES-02-005.

Brian P. Gerkey, Richard T. Vaughan, and Andrew Howard. The Player/Stage Project: Tools for Multi-Robot and Distributed Sensor Systems. In *Proc. of the Intl. Conf. on Advanced Robotics (ICAR)*, pages 317–323, Coimbra, Portugal, June 2003.

Brian P. Gerkey, Maja J Matarić, and Gaurav S Sukhatme. Exploiting physical dynamics for concurrent control of a mobile robot. In *Proc. of the IEEE Intl. Conf. on Robotics and Automation (ICRA)*, pages 3467–3472, Washington D.C., May 2002.

Brian P. Gerkey and Maja J Matarić. Pusher-watcher: An approach to fault-tolerant tightly-coupled robot coordination. In *Proc. of the IEEE Intl. Conf. on Robotics and Automation (ICRA)*, pages 464–469, Washington D.C., May 2002. Also Technical Report IRIS-01-403.

Brian P. Gerkey, Richard T. Vaughan, Kasper Støy, Andrew Howard, Gaurav S Sukhtame, and Maja J Matarić. Most Valuable Player: A Robot Device Server for Distributed Control. In *Proc. of the IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, pages 1226–1231, Wailea, Hawaii, October 2001.

Brian P. Gerkey and Maja J Matarić. Principled communication for dynamic multi-robot task allocation. In D. Rus and S. Singh, editors, *Experimental Robotics VII, LNCIS 271*, pages 353–362. Springer-Verlag Berlin Heidelberg, 2001. Presented at the Intl. Symp. on Experimental Robotics (ISER), Waikiki, Hawaii, December 2000.

Refereed Workshop Papers

Radu Bogdan Rusu, Alexis Maldonado, Michael Beetz, and **Brian P. Gerkey**. Extending Player/Stage/Gazebo towards Cognitive Robots Acting in Ubiquitous Sensor-equipped Environments. In *Proc. of the ICRA Workshop on Network Robot Systems*, Rome, Italy, April 2007.

Brian P. Gerkey, Roger Mailler, and Benoit Morisset. Commbots: Distributed control of mobile communication relays. In *Proc. of the AAI Workshop on Auction Mechanisms for Robot Coordination (AuctionBots 2006)*, Boston, Massachusetts, July 2006.

Brian P. Gerkey, Sebastian Thrun, and Geoff Gordon. Parallel stochastic hill-climbing with small teams. In A.C. Schultz et al., editors, *Multi-Robot Systems: From Swarms to Intelligent Automata, Volume III*, pages 65–77, Kluwer Academic Publishers, the Netherlands, 2005.

Brian P. Gerkey and Maja J Matarić. A Framework for Studying Multi-Robot Task Allocation. In A.C. Schultz et al., editors, *Multi-Robot Systems: From Swarms to Intelligent Automata, Volume II*, pages 15–26, Kluwer Academic Publishers, the Netherlands, 2003. Presented at the Intl. Workshop on Multi-Robot Systems, Washinton, DC, May 2003.

Brian P. Gerkey, Richard T. Vaughan, Kasper Støy, Andrew Howard, Gaurav S Sukhtame, and Maja J Matarić. Most valuable player: A robot device server for distributed control. In *Proc of the Second Intl. Workshop on Infrastructure for Agents, MAS, and Scalable MAS at Autonomous Agents 2001*, Montreal, Canada, May 2001.

Refereed Conference Posters

Brian P. Gerkey and Maja J Matarić. Murdoch: Publish/Subscribe Task Allocation for Heterogeneous Agents. In *Proc. of Autonomous Agents*, pages 203–204, Barcelona, Spain, June 2000.

Invited Papers

Chris Jones, Dylan Shell, Maja J Matarić, and **Brian P. Gerkey**. Principled Approaches to the Design of Multi-Robot Systems. In *Proc of the Workshop on Networked Robotics, IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, Sendai, Japan, September 2004.

Brian P. Gerkey and Maja J Matarić. On role allocation in RoboCup. In Daniel Polani, Andrea Bonarini, Brett Browning, and Kazuo Yoshida, editors, *RoboCup 2003: Robot Soccer World Cup VII, LNCS 3020*, pages 43–53, Springer-Verlag Berlin Heidelberg, 2004.

Technical Reports, not otherwise published

Ashley Tews, Maja J Matarić, Gaurav S Sukhatme, and **Brian P. Gerkey**. “G’day Mate. Let me Introduce you to Everyone: An Infrastructure for Scalable Human-System Interaction”. Technical Report CRES-02-

004, Center for Robotics and Embedded Systems, School of Engineering, University of Southern California, September 2002.

Brian P. Gerkey, Kasper Støy, and Richard T. Vaughan. “Player robot server”. Technical Report IRIS-00-392, Institute for Robotics and Intelligent Systems, School of Engineering, University of Southern California, November 2000.

Unrefereed Workshop/Symposia Papers

Brian P. Gerkey and Maja J Matarić. Are (explicit) multi-robot coordination and multi-agent coordination really so different? In *Proc. of the AAAI Spring Symp. on Bridging the Multi-Agent and Multi-Robotic Research Gap*, pages 1–3, Palo Alto, California, March 2004.

Brian P. Gerkey and Maja J Matarić. A market-based formulation of sensor-actuator network coordination. In *Proc. of the AAAI Spring Symp. on Intelligent Embedded and Distributed Systems*, pages 21–26, Palo Alto, California, March 2002.

Dissertation / Thesis

Brian P. Gerkey. On Multi-Robot Task Allocation. PhD dissertation, Computer Science Department, Univ. of Southern California, Los Angeles, California, August 2003. Also Technical Report CRES-03-012.

Brian P. Gerkey. Task Allocation for Heterogeneous Robots. Undergraduate honors thesis, Department of Electrical Engineering and Computer Science, Tulane Univ., New Orleans, Louisiana, May 1998.

INVITED TALKS (excluding conference paper talks)

“On robot operating systems,” Willow Garage, Menlo Park, California, January 2008.

“Distributed problem-solving with multi-robot systems,” Science and Technology Expert Partnership (STEP) workshop on Advanced Robotics, McLean, Virginia, March 2007.

“On the military funding of robotics research,” Stanford National Forensics Institute, Palo Alto, California, Aug 2006.

“From the lab to the field: Robotics and AI research at SRI,” iRobot, Burlington, Massachusetts, Feb 2006.

“On emerging standards in robotics,” Technical meeting of the Object Management Group Robotics DSIG, Burlingame, California, December 2005.

“Sensing and acting under uncertainty: An overview of work in the Stanford Robot Learning Lab,” KAIST-Stanford Technology Workshop on Intelligent Robot Systems, Korean Advanced Institute of Science and Technology, Daejeon, Republic of Korea, December 2004.

“Clear the building: Pursuit-evasion with teams of robots,” Colloquium talk, Computer Science Dept., Washington University, St. Louis, Missouri, November 2004.

“The Player/Stage/Gazebo Project: Open Source tools for robotics research,” Colloquium talk, Computer Science Dept., Univ. of Nevada, Reno, Nevada, October 2004.

“Pursuit-Evasion with Limited Field of View,” Artificial Intelligence Center, SRI International, Menlo Park, California, May 2004.

“A Formal Analysis of Multi-Robot Task Allocation,” Computer Science Dept., Univ. of California, Santa Cruz, California, November 2003.

“Player/Stage/Gazebo: Open Source tools for research in multi-robot systems,” DARPA Workshop on Navigation, Locomotion, and Articulation, Washington, DC, November 2003.

“The Player/Stage Project: Making Good Free Software for Robotics Research,” Guest lecture, Computer Science Dept. / Intelligent Systems Laboratory, Univ. of New Orleans, Louisiana, April 2003.

“Player & Stage: Current Status and Future Directions,” DARPA Software for Distributed Robotics (SDR) Principal Investigators Meeting, Washington, DC, March 2003.

“Analyzing Multi-Robot Task Allocation,” Information Sciences Laboratory, HRL Labs, Malibu, California, October 2002.

“Task Allocation in Multi-Robot Systems,” Colloquium talk, Computer Science Dept., Harvey Mudd College, Claremont, California, October 2002.

“Player & Stage: Robot Device Interface & Multiple Robot Simulator,” for the DARPA Information Processing Technology Office, at the DARPATech Symposium, Anaheim, California, July 2002.

“Player & Stage: Robot Device Interface & Multiple Robot Simulator,” in the Robot Exhibition at Autonomous Agents, Montreal, Canada, May 2001.

PROFESSIONAL SOCIETY MEMBERSHIPS

Member, American Assoc. of Artificial Intelligence (AAAI)

Member, Institute of Electrical and Electronic Engineers (IEEE)

Member, IEEE Robotics and Automation Society

PERSONAL

Citizenship: USA