

Brian P. Gerkey

CEO

Open Source Robotics Foundation

CONTACT

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EDUCATION

PhD, Computer Science, University of Southern California, Aug 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.

EXPERIENCE

Jul 2012– : *CEO*, Open Source Robotics Foundation.

Apr 2009–May 2012: *Director of Open Source Development*, Willow Garage.

Feb 2008–Apr 2009: *Research Scientist*, Willow Garage.

Jul 2005–Feb 2008: *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.

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.

OPEN SOURCE ROBOT SOFTWARE

I have developed and delivered open source robot software since 2000. In that time, I have, with the help of many others, built the two largest communities of software development for robotics: Player and ROS. These communities have had a significant impact on robotics research and education, and are beginning to be leveraged in commercial robotics products. In recognition of this work, I was selected by Technology Review as one the “35 top innovators under 35 (TR35)” in 2011.

ROS / PR2:

Software lead for the Willow Garage PR2 robot and architect / developer on ROS. The goal of the PR2 project is to accelerate research in mobile manipulation and foster development of personal robots by providing an open, capable hardware and software system. The PR2 software is built on ROS, an open source robot operating system designed specifically to support mobile manipulation platforms, and to encourage and facilitate code sharing and reuse among researchers and application developers. ROS is used in robotics projects worldwide, from education to research to product development. ROS and all PR2 software are available from:

<http://www.ros.org>

Player:

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 open source software, released under the GNU GPL/LGPL, and they enjoy a significant and burgeoning user community. Software from this project has been downloaded over 200,000 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>

SERVICE

Editorial / Advisory Boards

- Member of the Editorial Board for *SpringerBriefs in Intelligent Systems*, May 2013 – current
- Co-editor for *Autonomous Robots special issue on Open Source Software-Supported Robotics Research*, 2012
- Member of the Scientific Advisory Board for the *NIH Center for Biomedical Computation (Symbios)*, Jun 2011 – current
- Advisor for *Best Practices in Robotics (BRICS)*, part of the Cognitive Systems and Robotics Initiative from the European Union Seventh Framework Programme FP7, Oct 2010
- Member of the Industrial Advisory Committee for *RoboEarth*, part of the Cognitive Systems and Robotics Initiative from the European Union Seventh Framework Programme FP7, Jul 2010 – current

- Member of the Editorial Board, *Autonomous Robots*, Jan 2010 – current
- Member of the Editorial Board, *Journal of Software Engineering for Robotics (JOSER)*, Feb 2009 – current

Organizing / Senior Program Committees

- Chair of the Organizing Committee, ROSCon (ROS Developers' Conference), Stuttgart, Germany, 2013
- Chair of the Organizing Committee, ROSCon (ROS Developers' Conference), St. Paul, Minnesota, 2012
- Senior Program Committee, Intl. Joint Conf. on Artificial Intelligence (IJCAI), Barcelona, Spain, 2011
- Associate Editor, IEEE Intl. Conf. on Robotics and Automation (ICRA), Shanghai, China, 2011
- Co-organizer, ROS Fall School Cognition-Enabled Mobile Manipulation, Munich, Germany, 2010
- Associate Editor, IEEE Intl. Conf. on Robotics and Automation (ICRA), Anchorage, Alaska, 2010
- Co-organizer, Robotics: Sciences and Systems (RSS) Workshop on Mobile Manipulation in Human Environments, Seattle, Washington, 2009
- Co-organizer, Player Summer School on Cognitive Robotics (PSSCR), Munich, Germany, 2007
- Senior Program Committee, IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS), San Diego, California, 2007

Program Committees

- Distributed Autonomous Robotics Systems (DARS), Lausanne, Switzerland, 2010
- Distributed Autonomous Robotics Systems (DARS), Tsukuba, Japan, 2008
- 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
- Wireless Multihop Communication for Networked Robots (WMCNR), 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 (RSS), Cambridge, Massachusetts, 2005

Reviewing

Journals: Annals of Mathematics and Artificial Intelligence • Artificial Intelligence • Automatica • 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 Evolutionary Computing • 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 • Intl. Journal of Computer Applications in Technology • Intl. Journal of Control • Intl. Journal of Robotics Research • Robotica

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) • IEEE Intl. Symp. on Robot and Human Interactive Communications (RO-MAN)

Other: National Science Foundation • Danish National Advanced Technology Foundation

JOURNAL ARTICLES

Geoffrey Biggs, Radu Bogdan Rusu, Toby H.J. Collett, **Brian P. Gerkey**, and Richard T. Vaughan. And all the robots merely Players. *IEEE Robotics & Automation Magazine*, in press, Oct 2011.

Kurt Konolige, Motilal Agrawal, Morten Rufus Blas, Robert C. Bolles, **Brian P. Gerkey**, Joan Solá, and Aravind Sundaresan. Mapping, Navigation, and Learning for Off-Road Traversal. *Journal of Field Robotics* 26(1):88–113, Jan 2009.

Radu Bogdan Rusu, **Brian P. Gerkey**, and Michael Beetz. Robots in the kitchen: Exploiting ubiquitous sensing and actuation. *Robotics and Autonomous Systems* 56(10):844–856, Oct 2008.

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.

Brian P. Gerkey and Maja J Matarić. Sold!: Auction methods for multi-robot coordination. *IEEE Transactions on Robotics and Automation*, 18(5):758–768, Oct 2002.

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 Exper-*

imental Robotics, pages 259–266, Springer Tracts on Advanced Robotics, Springer, 2007.

CONFERENCE PAPERS

Eitan Marder-Eppstein, Eric Berger, Tully Foote, **Brian P. Gerkey**, and Kurt Konolige. The Office Marathon: Robust Navigation in an Indoor Office Environment. In *Proc. of the IEEE Intl. Conf. on Robotics and Automation (ICRA)*, Anchorage, Alaska, May 2010.

Wim Meeussen, Melonee Wise, Stuart Glaser, Sachin Chitta, Conor McGann, Patrick Michelich, Eitan Marder-Eppstein, Marius Muja, Eruhimov, Victor, Tully Foote, John Hsu, Radu Bogdan Rusu, Bhaskara Marthi, Gary Bradski, Kurt Konolige, **Brian P. Gerkey**, and Eric Berger. Autonomous Door Opening and Plugging In with a Personal Robot. In *Proc. of the IEEE Intl. Conf. on Robotics and Automation (ICRA)*, Anchorage, Alaska, May 2010.

Radu Bogdan Rusu, Ioan Alexandru Sutan, **Brian P. Gerkey**, Sachin Chitta, Michael Beetz, and Lydia E. Kavraki. Real-time Perception-Guided Motion Planning for a Personal Robot. In *Proc. of the IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, pages 4245–4252, St. Louis, Missouri, Oct 2009.

Jesse Butterfield, Odest Jenkins, and **Brian P. Gerkey**. Multi-robot Markov Random Fields. In *Proc. of the Intl. Joint Conf. on Autonomous Agents and Multi-Agent Systems (AAMAS 2008)*, pages 1211–1214, 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, Jul 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, Dec 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, Jul 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, Oct 2003.

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, Sep 2003.

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, Jun 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.

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, Oct 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, Dec 2000.

WORKSHOP PAPERS

Conor McGann, Eric Berger, Jonathan Bohren, Sachin Chitta, **Brian P. Gerkey**, Stuart Glaser, Bhaskara Marthi, Wim Meeussen, Tony Pratkanis, Eitan Marder-Eppstein, and Melonee Wise. Model-based, Hierarchical Control of a Mobile Manipulation Platform. In *Proc. of the ICAPS Workshop on Planning and Plan Execution for Real-World Systems*, Thessaloniki, Greece, Sep 2009.

Morgan Quigley, Ken Conley, **Brian P. Gerkey**, Josh Faust, Tully Foote, Jeremy Leibs, Rob Wheeler, and Andrew Y. Ng. ROS: an open-source Robot Operating System. In *Proc. of ICRA Workshop on Open Source Software*, Kobe, Japan, May 2009.

Brian P. Gerkey and Kurt Konolige. Planning and Control in Unstructured Terrain. In *Proc. of the ICRA Workshop on Path Planning on Costmaps*, Pasadena, California, May 2008.

Brian P. Gerkey and Motilal Agrawal. Break on through: Tunnel-based exploration to learn about outdoor terrain. In *Proc. of the ICRA Workshop on Path Planning on Costmaps*, Pasadena, California, May 2008.

Jesse Butterfield, Karthik Dantu, **Brian P. Gerkey**, Odest Chadwicke Jenkins, and Gaurav S. Sukhatme. Autonomous Biconnected Networks of Mobile Robots. In *Proc. of the WiOpt Workshop on Wireless Communications in Networked Robotics (WMCNR 2008)*, pages 640–646, Berlin, Germany, Apr 2008.

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, Apr 2007.

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

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, Sep 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

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, Sep 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, Nov 2000.

UNREFEREED 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, Mar 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, Mar 2002.

THESES

Brian P. Gerkey. On Multi-Robot Task Allocation. PhD dissertation, Computer Science Department, Univ. of Southern California, Los Angeles, California, Aug 2003.

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**

“What our robots need from you,” Intl. Solid-State Circuits Conf. (ISSCC) Panel Discussion: What’s Next in Robots? Sensing, Processing, Networking Toward Human Brain and Body, San Francisco, California, Feb 2012.

“What is ROS?” Southwest Research Institute, San Antonio, Texas, Jan 2012.

“Community and the cloud: Toward a robot app ecosystem,” Ministry of Knowledge Economy Workshop on Cloud Robotics, Seoul, Korea, Nov 2011.

“Building the robotics commons,” MIT Lincoln Laboratory, Lexington, Massachusetts, Oct 2011.

“A common language for robots,” Technology Review Conference on Emerging Technology (emtech), Cambridge, Massachusetts, Oct 2011.

“Technology Transfer: A Willow Perspective,” European Clearing House for Open Robotics Development (ECHORD) Workshop on European Efforts in Strengthening the Academia-Industry Collaboration, San Francisco, California, Sep 2011.

“Personal Robotics and Open Source: An Introduction to ROS,” O’Reilly Open Source Convention (OSCON), Portland, Oregon, Jul 2011.

“Long-term Autonomy in Office Environments,” Robotics: Science and Systems (RSS) Workshop on Autonomous Long-term Operation in Novel Environments (ALONE), Los Angeles, California, Jun 2011.

“Cloud Robotics,” Tech Talk (with Ryan Hickman, Ken Conley, and Damon Kohler), Google I/O, San Francisco, California, May 2011.

“Building blocks for Mobile Manipulation,” Plenary, Intl. Conf. on Simulation, Modeling and Programming for Autonomous Robots (SIMPAR), Darmstadt, Germany, Nov 2010.

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

“Distributed problem-solving with multi-robot systems,” Science and Technology Expert Partnership (STEP) workshop on Advanced Robotics, McLean, Virginia, Mar 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, Dec 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, Dec 2004.

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

“The Player/Stage/Gazebo Project: Open Source tools for robotics research,” Colloquium talk, Computer Science Dept., Univ. of Nevada, Reno, Nevada, Oct 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, Nov 2003.

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

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

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

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

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

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

PERSONAL

Citizenship: USA