

Work : Robotics Institute, Carnegie Mellon University, 5000 Forbes Ave Pittsburgh, PA 15213 412. 268. 9923
Home : 4054 Mintwood St Pittsburgh, PA 15224 412. 401. 4064
bargall@ri.cmu.edu

EDUCATION

Ph.D. Candidate in Robotics, Robotics Institute, Carnegie Mellon University, Pittsburgh PA, *2004-present*
Expected Defense: Spring 2009

Advisors : Brett Browning, Ph.D. and Manuela Veloso, Ph.D.
Thesis Topic : Machine learning and human advice for the development of robot motion control policies.
Selected Courses : Statistical Techniques in Robotics; Machine Learning; Planning, Learning and Execution; Artificial Intelligence; Kinematics, Dynamics and Control; Manipulation; Sensors and Sensing; Mobile Robot Design; Mathematics Fundamentals for Robotics

Visiting Graduate Student, Carnegie Mellon University Qatar Campus, Doha Qatar, *Spring 2007*

M.S. in Robotics, Robotics Institute, Carnegie Mellon University, Pittsburgh PA, *December 2006*

B.S. in Mathematical Sciences, MCS, Carnegie Mellon University, Pittsburgh PA, *May 2002*

Concentration : Computational and Applied Mathematics
Minors : Biological Sciences and Music

Visiting Undergraduate Student, National University of Ireland Galway, Galway Ireland, *Fall 2000*

RESEARCH EXPERIENCE

My research interests focus on integrating human advice into machine learning techniques that build robot motion control policies, within the broader goals of robot autonomy and heterogeneous team coordination.

Learning with Teacher Advice, *June 2005 – present*, CORAL Research Group, Carnegie Mellon University, Pittsburgh PA. The development of robot motion control policies from demonstration learning, focusing on novel policy improvement techniques which synthesize new data from human teacher advice and student executions. Ph.D. thesis research topic. Role: Lead algorithm development, robot operation and hardware maintenance, robot and simulation code software development in C++ and Matlab.

Boeing Treasure Hunt, *September 2004 – present*, CORAL Research Group, Carnegie Mellon University, Pittsburgh PA, and in collaboration with other Carnegie Mellon and Boeing research groups. Heterogeneous teams of humans and robots, each with some capability unique to them and required of the task, coordinate in pursuit of treasure. Role: Segway robot operation and single behavior control policy development in C++.

Automation of Industrial Vehicles, *Summer 2008*, Autonomous Systems Laboratory, ICT Centre, CSIRO, Brisbane, Australia. Automation of a hot metal carrier forklift used in the aluminium smelting industry, with a focus on practical learning approaches that inject intelligence and enrich the robot's skill base. Role: Learning algorithm design and software development in Matlab and C++.

Segway Soccer, *September 2004 – 2006*, CORAL Research Group, Carnegie Mellon University, Pittsburgh PA. Teams of humans and robots organize and cooperate in soccer competitions against other human-robot teams (Robocup Segway Soccer league). Role: Development of single robot behavior control policies and software in C++, robot operation and hardware maintenance.

Neuroscience Research with fMRI, *August 2002 – July 2004*, Laboratory of Brain and Cognition, NIMH, NIH, Bethesda MD. Investigations into human brain regions of audio-visual processing overlap. Role: Acquisition and analysis of functional MRI scan data (software used: AFNI, SUMA, and Matlab).

Development of Data Visualization Software for fMRI, *August 2002 – July 2004*, Laboratory of Brain and Cognition, and in collaboration with the Scientific and Statistical Computing Core, NIMH, NIH, Bethesda MD. Development within an fMRI data visualization software suite (SUMA); in particular, development of a method for inter-subject cortical surface averaging across subjects. Role: Algorithm and software development, in C.

Computational Biology REU Summer Program, *Summer 2001*, Penn State Erie, The Behrend College, Erie PA. Studied and expanded upon multiple biological models. Role: Model tuning.

Undergraduate Research: Mathematical Modeling, *Spring 2001*, Carnegie Mellon University, Pittsburgh PA. Development of a mathematical model for traffic flow. Role: Model development.

PROFESSIONAL EXPERIENCE

Research Intern, *Summer 2008*, Autonomous Systems Laboratory, ICT Centre, CSIRO, Brisbane, Australia. Design and development of a self-supervised learning approach for enriching a robot's skill base; software development in Matlab and C++ for implementation on a large autonomous industrial robot.

Teaching Assistant, *Spring 2007*, Carnegie Mellon University Qatar Campus, Doha Qatar. Introduction to robot programming, in Java. Selected lecture writing and presentation, selected lab and homework design, grading criterion determination and application for the evaluation of student work.

Computational Biologist, *September 2003 – July 2004*, Laboratory of Brain and Cognition, NIMH, NIH, Bethesda MD. Collection and analysis of fMRI data; software development.

Post-Baccalaureate IRTA Fellow, *August 2002 - September 2003*, Laboratory of Brain and Cognition, NIMH, NIH, Bethesda MD. Collection and analysis of fMRI data; software development.

AWARDS and HONORS

Robotics Institute Ph.D. Fellowship, *August 2004*, Carnegie Mellon University, Pittsburgh PA.

Post-Baccalaureate IRTA Fellowship, *August 2002*, National Institutes of Health, Bethesda MD.

College Honors, *May 2002*, Carnegie Mellon University, Pittsburgh PA, granted with B.S. Degree.

Deans List, *Spring 2000 and Fall 2001*, Carnegie Mellon University, Pittsburgh PA.

Mathematics and Statistics Award, Second Place, *May 2001*, Meeting of the Minds undergraduate research competition, Carnegie Mellon University, Pittsburgh PA.

JOURNAL PUBLICATIONS

B. D. Argall, M. Veloso, and B. Browning. Learning Robot Motion Control from Demonstration and Human Advice. *Under submission*.

B. D. Argall, S. Chernova, M. Veloso, and B. Browning. A Survey of Robot Learning from Demonstration. *To appear, Robotics and Autonomous Systems*.

B. D. Argall, Z. S. Saad, and M. S. Beauchamp. Simplified Intersubject Averaging on the Cortical Surface Using SUMA. *Human Brain Mapping*, 27(1):14-27, 2006.

Z. S. Saad, R. C. Reynolds, B. D. Argall, S. Japee, and R. W. Cox. SUMA: An Interface For Surface-Based Intra- And Inter-Subject Analysis With AFNI, In *Proceedings of the IEEE International Symposium on Biomedical Imaging*, pages 1510-1513, 2004.

M. S. Beauchamp, K. E. Lee, B. D. Argall, and A. Martin. Integration of Auditory and Visual Information about Objects in Superior Temporal Sulcus. *Neuron*, 41:809-823, 2003.

B. D. Argall, E. Cheleshkin, J. M. Greenberg, C. Hinde, and P.J. Lin. A rigorous Treatment of a Follow-the-Leader Traffic Model with Traffic Lights Present. *SIAM Journal on Applied Mathematics*, 63(1):149-168, 2002.

REFEREED CONFERENCE PUBLICATIONS

B. Argall, B. Browning, and M. Veloso. Automatic Weight Learning for Multiple Data Sources when Learning from Demonstration. *To appear, in Proceedings IEEE International Conference on Robotics and Automation*, Kobe, Japan, May, 2009.

B. Argall, B. Browning, and M. Veloso. Learning Robot Motion Control with Demonstration and Advice-Operators. In *Proceedings IEEE/RSJ International Conference on Intelligent Robots and Systems*, Nice, France, September 2008.

M.B. Dias, B. Kannan, B. Browning, E.G. Jones, B. Argall, M.F. Dias, M.B. Zinck, M. Veloso and A. Stentz. Sliding Autonomy for Peer-to-Peer Robot Teams. In *Proceedings 10th International Conference on Intelligent Autonomous Systems 2008*, Baden Baden, Germany, July 2008.

B. Argall, B. Browning, and M. Veloso. Learning to Select State Machines using Expert Advice on an Autonomous Robot. In *Proceedings IEEE International Conference on Robotics and Automation*, Rome, Italy, April 2007.

B. Argall, B. Browning, and M. Veloso. Learning by Demonstration with Critique from a Human Teacher. In *Proceedings Second Annual Conference on Human-Robot Interactions*, Washington D.C., March 2007.

E.G. Jones, B. Browning, M.B. Dias, B. Argall, M. Veloso and A. Stentz. Dynamically Formed Heterogeneous Robot Teams Performing Tightly-Coordinated Tasks. In *Proceedings IEEE International Conference on Robotics and Automation*, Orlando, Florida, May 2006.

B. Argall, Y. Gu, B. Browning, and M. Veloso. The First Segway Soccer Experience: Towards Peer-to-Peer Human-Robot Teams. In *Proceedings First Annual Conference on Human-Robot Interactions*, Salt Lake City, Utah, March 2006. (Also Carnegie Mellon University Technical Report, CMU-CS-05-161, 2005.)

B. D. Argall, Z. S. Saad, A. Martin, M. S. Beauchamp. A Comparison between Surface and Volume-based Averaging Techniques for Cross-Subject fMRI Analysis. *33rd Meeting for the Society for Neuroscience*, Abs. 863.12, 2003.

M. S. Beauchamp, K. Lee, B. D. Argall, A. Martin. Regions in Temporoparietal Junction and Posterior Superior Temporal Gyrus That Integrate Auditory and Visual Information about Complex Objects. *Cognitive Neuroscience Society Annual Meeting*, Abs. 319, 2003.

M.S. Beauchamp, K. Lee, B. D. Argall, A. Martin. A Region in Posterior Superior Temporal Sulcus that Integrates Auditory and Visual Information about Complex Objects. *9th International Conference on Functional Mapping of the Human Brain*, Abs. 64, 2003.

Z. S. Saad, B. D. Argall, M. S. Beauchamp, S. Japee, R. W. Cox. Standard Cortical Surface Models for Node-Based Cross-Subject Analysis. *33rd Meeting for the Society for Neuroscience*, Abs. 863.21, 2003.

Z. S. Saad, B. D. Argall, M. S. Beauchamp, S. A. Japee, R. W. Cox. Standard Meshes for Inter- and Intra-Subject Surface-based Analysis with Minimal Interpolation. *9th International Conference on Functional Mapping of the Human Brain*, Abs. 1145, 2003.

PROFESSIONAL ACTIVITIES

Journal Reviewer: Journal of Field Robotics (*April 2006-present*), Autonomous Robots (*2009*).

Community Service: Conference reviewer for *AAAI Spring Symposium (2009)*, *ICRA (2006-2008)*, *IROS (2008)*, *HRI (2007-2008)*, *AAAI (2005, 2006)*, *AAMAS (2005, 2006)*, and *Robocup (2006)*. General conference volunteer at *ICRA (2007)*, *HRI (2006, 2007)*, and *Grace Hopper Celebration of Women in Computing (2006)*. Judge for the *FIRST LEGO League tournament (2008)* and the *Pittsburgh Regional Science and Engineering Fair (2008)*.

Society Member: IEEE (*2007*), Society for Neuroscience (*2002-2004*).

OTHER ACTIVITIES

Community Service: Volunteer with Planned Parenthood of Western Pennsylvania (Pittsburgh PA, *2005-present*), Birmingham Free Health Clinic (Pittsburgh PA, *2006*), Washington Free Health Clinic (Washington D.C., *2003-2004*), Carnegie Mellon University Preceptorship Program (Pittsburgh PA, *2001*), and St. Mary's Ozaukee Hospital ER (Mequon WI, *2000*).

Other Interests: Singer with the Mendelssohn Choir of Pittsburgh (Pittsburgh PA, *2004-2008*), singer with the Master Chorale of Washington (Washington D.C., *2003-2004*), high school academic tutor (*2003-2004*).