Amin Hani Atrash

Office Address: 3710 McClintock Ave
Ronald Tutor Hall, Room 423
Los Angeles, CA, 90089
Home Address: 25 Pacifica, Apt 5312
Irvine, CA 92618
Email: atrash@usc.edu
Web Page: http://robotics.usc.edu/~aatrash
Phone (US): (404) 519-3031
Citizenship: USA

Education

PhD in Computer Science – McGill University, May 2011
Dissertation: *A Bayesian Framework for Online Parameter Learning in POMDPs*
Advisor: Prof. Joelle Pineau

Master of Science in Computer Science – Georgia Institute of Technology, May 2003
Advisor: Prof. Sven Koenig

Bachelor of Science in Computer Science – Georgia Institute of Technology, June 1999

Work Experience

Postdoctoral Researcher – University of Southern California, *(Fall 2010 – Current)*
Interaction Lab, Prof. Maja Matarić

Research Scientist – BBN Technologies, Inc. (*Fall 2003 – Fall 2005)*

Research Experience

University of Southern California (*Postdoctoral Research, Fall 2010 – Present)*
- Dynamic Robot Operator Interface Design
- Reinforcement Learning in Human-Robot Interaction with Noisy Signals
- PATRICIA - Personal Affective Therapist for Rehabilitation of Individuals with Cognitive ImpAirments
- Recognition of Spatial Dynamics for Predicting Social Interaction

McGill University (*Research Assistant, Fall 2005 – Summer 2010*)
- Smartwheeler Autonomous Wheelchair
- Bayesian Reinforcement Learning for POMDPs
- Observation Space Reduction for POMDPs

BBN Technologies, Inc. (*Research Scientist, Fall 2003 – Fall 2005*)
- Multilingual Speech to Text

Georgia Institute of Technology (*Research Assistant, Fall 1999 – Spring 2003*)
- Georgia Tech Gesture Recognition Toolkit
- Gesture Recognition Using Body Worn Microphones and Accelerometers
- Probabilistic Planning and Execution for Behavior-Based Robotics

Georgia Institute of Technology (*Undergraduate Research, Fall 1998 – Fall 1999*)
- Learning and Planning for an Autonomous Pinball Machine

Naval Research Laboratory (*Internship, Summer 2001, Summer 2002*)
- GRACE – The Social Robot
- Continuous Localization in Urban Environment

Teaching Experience

University of Southern California
- Course Instructor, CS 445: Introduction to Robotics (*Fall 2012, Fall 2013, Spring 2015*) – Undergraduate course of 30 students. Includes a lab with Arduino-driven LEGO robot kits. Text: *The Robotics Primer* by M. Matarić.
- Course Instructor, CS 545: Introduction to Robotics (*Spring 2012, Spring 2013*) – graduate course of 70 students. Text: *Robotics: Modelling, Planning and Control* by B. Siciliano, L. Sciavicco, L. Villani, and G. Oriolo.

McGill University
- Course Instructor, CS 526: Probabilistic AI (*Spring 2007*) – Graduate course of 30 students. Text: *Reinforcement Learning: An Introduction* by R. Sutton and A. Barto.

Georgia Institute of Technology
- Teaching Assistant, CS 424: Intelligent Systems (*Fall 2002, Spring 2003*) – Undergraduate course of 60 students. Text: *Artificial Intelligence: A Modern Approach* by S. Russell and P. Norvig.

University of California Irvine
- Coordinator and Instructor of Robotics Camp at the Center for Autism and Neurodevelopmental Disorders *(Fall 2015)* – Working in collaboration with pediatricians and child behavior specialists to design and lead a robotics camps for children with neurodevelopmental disabilities. The goal of the camp is to use robotics education as a mechanism to encourage social interaction and teach social skills

K-12 STEM Outreach

Botball Robotics Competition
- Regional Workshop Instructor (*Spring 2012 – Present*) – Serving as instructor for two-day workshops introducing middle school and high school students to robot construction, robot programming, and preparation for the Botball competition.
- Volunteer (*Spring 2011 – Present*) – Assisting with organization, preparation, and judging at Botball regional tournaments.
- Workshop Instructor: *Risk vs. Reward: An Introduction to Decision-Making on Robots*, *Global Conference on Educational Robotics* (*Summer 2014*) – Designing of upcoming workshop for middle school and high school students, introducing basic principles of decision-making on robots.

Mentor
- Aiding middle school and high school robotics clubs. Teaching robot construction, basic electronics, and robot programming.
    - Palm Desert Charter Middle School Robotics Club *(Summer 2013 – Present)*
    - Palm Desert High School Robotics Club *(Spring 2014 – Present)*
    - St. Verena Coptic Church Robotics Club *(Fall 2013 – Present)*

Research Mentoring and Supervising

Masters Students

- **Boone Adkins** – (*Summer 2013 - Present*) Development of augmented human-robot collaborative environment, implementation of ontologies for robot operator interface design

- **Nakarin Kamkheaw** – (*Summer, Fall 2014)* Exploring the impact of time-induced stress on speech in collaborative environments

- **Celia Chen** – (*Fall 2014)* Development of probabilistic robotics curriculum for middle school students

Undergraduate Students

- **Andrea Lawler** – (*Fall 2012 – Present, Provost Research Fellow*) Explore use of "white lies" by robots on human-robot interaction

- **Brandon Carlson** – (*Fall 2013 – Present, Merit Research Scholar*) Mapping of natural input gesture modalities for robot control

- **Morelle Arian** – (*Fall 2011 – Spring 2013, Merit Research Scholar*) Analysis of human physiological data, development of probabilistic dialogue management system

- **Matias Altman** – (*Summer 2012, Viterbi Summer Undergraduate Research Experience*) Autonomous behaviors for augmented human-robot collaborative environment

- **Shruti Tripathi** – (*Summer 2012, Viterbi Undergraduate Research Experience India*) Human tracking for augmented human-robot collaborative environment

- **Aravindh Mahendran** – (*Summer 2011, Viterbi Summer Undergraduate Research Experience India*) Multi-kinect person registration and tracking

- **Jesse Rory Shevin** – (*Summer 2011)* Development of augmented human-robot collaborative environment

High School Students

- **Christopher Hernandez** – (*Summer 2012, Engineering for Health Academy*) Introduction to programming

- **Matthew Silvestre** – (*Summer 2013, Engineering for Health Academy*) Introduction to robot localization

Publications

PhD Dissertation

Atrash, A., "A Bayesian Framework for Online Parameter Learning in POMDPs ", McGill University, May 2011

Refereed Journal Articles

Boucher, P., **A. Atrash**, S. Kelouwani, W. Honoré, H. Nguyen, J. Villemure, F. Routhier, P. Cohen, L. Demers, R. Forget, J. Pineau, "Design and Validation of an Intelligent Wheelchair Towards a Clinically-Functional Outcome," *Journal of NeuroEngineering and Rehabilitation*, 2013. Vol.10(58). pp. 1-16.

Mead, R**., A. Atrash,** and M. Matarić. "Automated Proxemic Feature Extraction and Behavior Recognition: Applications in Human-Robot Interaction", *International Journal of Social Robotic,* 2013. Vol. 5(3)*.* pp. 367-378.

Pineau, J., R. West, **A. Atrash**, J. Villemure, F. Routhier. "On the Feasibility of Using a Standardized Test for Evaluating a Speech-Controlled Smart Wheelchair," *International Journal of Intelligent Control and Systems,* 2011. Vol. 16(2). pp. 121-128.

Atrash, A., R. Kaplow, J. Villemure, R. West, H. Yamani, J. Pineau. "Development and Validation of a Robust Interface for Improved Human-Robot Interaction". *International Journal of Social Robotics.* 2009. Vol. 1(4). pp. 345-356.

Simmons, R., D. Goldberg, A. Goode, M. Montemerlo, N. Roy, B. Sellner, C. Urmson, A. Schultz, M. Abramson, W. Adams, **A. Atrash**, M. Bugajska, M. Coblenz, M. MacMahon, D. Perzanowski, I. Horswill, R. Zubek, D. Kortenkamp, B. Wolfe, T. Milam, B. Maxwell, "GRACE – An Autonomous Robot for the AAAI Robot Challenge," *AI Magazine*, 2003. Vol 24(2). pp. 51-72.

Refereed Conference Papers

Greczek, J., **A. Atrash**, and M. Matarić. "A Computational Model of Graded Cueing: Robots Encouraging Behavior Change," *International Conference on Human-Computer Interaction*, Las Vegas, NV, 2013. pp. 582-586.

Mead, R., **A. Atrash**., and M. Matarić. "Proxemic Feature Recognition for Interactive Robots: Automating Metrics from the Social Sciences," *International Conference on Social Robotics*, Amsterdam, Netherlands, 2011. pp. 52-61.

Mead, R., **A. Atrash**, and M. Matarić. "Recognition of Spatial Dynamics for Predicting Social Interaction," *International Conference on Human-Robot Interaction*, Lausanne, Switzerland, 2011. pp. 201-202.

W. Honore, **A. Atrash**, P. Boucher, R. Kaplow, S. Kelouwani, H. Nguyen, J. Villemure, R. West, F. Routhier, P. Stone, C. Dufour, J.-P. Dussault, D. Rock, P. Cohen, L. Demers, R. Forget, J. Pineau. "Human-Oriented Design and Initial Validation of an Intelligent Powered Wheelchair," *Rehabilitation Engineering and Assistive Technology Society of North America,* Las Vegas, NV, 2010.

Kaplow, R., **A. Atrash**, and J. Pineau. "Variable Resolution Decomposition for Robotic Navigation Under a POMDP Framework," *International Conference on Robotics and Automation*, Anchorage, AK, 2010. pp. 369-376.

Atrash, A. and J. Pineau. "A Bayesian Reinforcement Learning Approach for Customizing Human-Robot Interfaces," *International Conference on Intelligent User Interfaces*, Sanibel Island, FL, 2009. pp. 355-360.

Lukowicz, P., J. Ward, H. Junker, M. Stager, G. Troster**, A. Atrash**, and T. Starner, "Recognizing Workshop Activities Using Body Worn Microphones and Accelerometers," *International Conference on Pervasive Computing,* Vienna, Austria, 2004, pp. 18-32.

Westeyn, T. and H. Brashear, **A. Atrash**, and T. Starner, "The Gesture Toolkit: Experiments in Gesture Recognition," *International Conference on Multimodal Interfaces*, Vancouver, BC, 2003. pp. 85-92.

Atrash, A., and S. Koenig, "Probabilistic Planning for Behavior-Based Robotics," *Florida Artificial Intelligence Research Society*, Key West, FL, 2001. pp. 531-535.

Refereed Workshop Papers

Mead, R., **A. Atrash,** and Matarić, M. (2012). "Representations of Proxemic Behavior for Human-Machine Interaction", *NordiCHI Workshop on Proxemics in Human-Computer Interaction*, Copenhagen, Denmar 2012.

Atrash, A., E. Mower, K. Shams, M. Matarić. "Recognition of Physiological Data for a Motivational Agent," *AAAI Spring Symposium on Computational Physiology,* Stanford, CA, 2011.

St. Clair, A., **A. Atrash**, R. Mead, and M. Matarić. "Speech, Gesture, and Space: Investigating Explicit and Implicit Communication in Multi-Human Multi-Robot Collaborations," *AAAI Spring Symposium on Multi-Robot Systems and Physical Data Structures*, Stanford, CA, 2011.

Pineau, J., R. West, **A. Atrash**, J. Villemure, F. Routhier. "Towards a Standardized Test for Intelligent Wheelchairs." *Performance Metrics for Intelligent Systems*. Baltimore, MD, 2010.

Atrash, A. and J. Pineau., "A Bayesian Method for Learning POMDP Observation Parameters for Robot Interaction Management Systems," *POMDP Practitioners Workshop: Solving Real-World POMDP Problems,* Toronto, Canada, 2010.

Pineau, J. and **A. Atrash**. "SmartWheeler: A Robotic Wheelchair Test-Bed for Investigating New Models of Human-Robot Interaction," *AAAI Spring Symposium on Multidisciplinary Collaboration for Socially Assistive Robotics*, Stanford, CA, 2007.

Pineau J. and **A. Atrash**. "Multi-modal Control of an Intelligent Wheelchair," *IROS Workshop on Assistive* Technologies. San Diego, CA, 2007.

Atrash, A. and J. Pineau. "Efficient Planning and Tracking in POMDPs with Large Observation Spaces," *AAAI Workshop on Empirical and Statistical Approaches for Spoken Dialogue Systems*. Boston, MA, 2006.

Abdou, S., R. Arvizo, **A. Atrash**, T. Colthurst, C. L. Kao, O. Kimball, J. Ma, J. Makhoul, S. Matsoukas, R. Prasad, D. Xu, B. Zhang. "The 2004 BBN Levantine Arabic and Mandarin CTS Transcription Systems.", *DARPA Effective Affordable Reusable Speech-to-text Workshop,* 2004.

Posters

Atrash, A., and A. Skinner. "Dynamic Robot Operator Interface Design (DROID) Agent," *DARPA Maximum Mobility and Manipulation (M3) Conference*, Atlanta, GA, 2013.

Mead, R., **A. Atrash**, and M. Matarić. "Automated Analysis of Proxemic Behavior: Leveraging Metrics from the Social Sciences," *RSS Workshop on Human-Robot Interaction: Perspectives and Contributions to Robotics from the Human Sciences*, Los Angeles, CA, 2011.

Pineau, J., **A. Atrash**, R. Kaplow, J. Villemure. "On the design and validation of an intelligent powered wheelchair: Lessons from the SmartWheeler project." *Center for Intelligent Machines Symposium on Brain, Body and Machine*, Montreal, Canada, 2010.

Grants

Co-Author and Primary Technical Contributor

- *DARPA Design of Robot Control Interfaces.* Phase II STTR for "Dynamic Robot Operator Interface Design (DROID) Assessment, Guidance & Engineering Tool," (D2-1200). PI: Cori Lathan (Anthrotronix, Inc.), Co-PI: M. Matarić (USC). Amount: $750,000 total ($250,000 USC portion), 08/2013-08/2015.
- *DARPA Design of Robot Control Interfaces.* Phase I STTR for "Robot Control Design Science," (D12A-002). PI: Cori Lathan (Anthrotronix, Inc.), Co-PI: M. Matarić (USC), Amount: $150,000 total ($50,000 USC portion), 02/2013-08/2013.

Significant Contributor

- *NSF National Robotics Initiative (NRI)* Small collaborative grant for "Spatial Primitives for Enabling Situated Human-Robot Interaction," (IIS-1208500). PI: M. Matarić (USC). Amount: $750,000 total, 07/2012–07/2015.
- *NSF Smart Health and Wellbeing (SHB)* Small grant for "Socially Assistive Human-Machine Interaction for Improved Compliance and Health Outcomes," (IIS-1117279). PI: M. Matarić (USC). Amount: $422,547 total, 12/2011-08/2014.

Service

Organizing Committees

- *Program Committee* – "Workshop on Collaborative Robots and Human Robot Interaction" International *Conference on Collaboration Technologies and Systems 2014.*
- *Workshop Co-organizer (with R. Mead), "*Probabilistic approaches for robot control in human-robot interaction*", International Conference on Human-Robot Interaction 2013.*
- *Program Committee* – "Workshop on Collaborative Robots and Human Robot Interaction 2013" *International Conference on Collaboration Technologies and Systems 2014*
- *Program Committee – "*Decision Making in Partially Observable, Uncertain Worlds: Exploring Insights from Multiple Communities," *International Joint Conference on Artificial Intelligence 2011*.

Personal

Citizenship: US
Gender: Male
Security Clearance: 2003-2005