

ALYSSA PIERSON

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EDUCATION

PhD, Mechanical Engineering, Boston University	2017
Visiting Student, Stanford University	2016
MS, Mechanical Engineering, Boston University	2016
BS, Engineering, Harvey Mudd College	2010
Study Abroad: University of Western Australia	2009

EMPLOYMENT

Assistant Professor , Dept. of Mechanical Engineering, Boston University	Starting Jan 2021
Research Scientist , CSAIL, Massachusetts Institute of Technology	Dec 2018 - Present
Postdoctoral Associate , CSAIL, Massachusetts Institute of Technology	Feb 2017 - Dec 2018
Research Assistant , Dept. of Mechanical Engineering, Boston University	May 2012 - Jan 2017
Engineer , Graduate Development Program, Cobham, plc	Sep 2010 - May 2012

HONORS & AWARDS

- Best Conference Paper Finalist, ICRA 2016
- Clare Boothe Luce Fellowship, Boston University 2012 - 2014
- Dean's Fellowship, Boston University (declined) 2012
- Graduated with Distinction, Harvey Mudd College 2010
- Dean's List, Harvey Mudd College 2007 - 2010
- Valedictorian, Steamboat Springs High School, Colorado 2006

FUN FACTS

- Winner, MIT Postdoctoral Associate Science Karaoke 2019
- *Prosh* lead photoshopper, University of Western Australia 2009
 - Satirical newspaper to raise money for Perth charities. Raised over \$139,000 in 2009
- Avid skier, SCUBA diver (86 dives), and cyclist ∞

RESEARCH EXPERIENCE

Distributed Robotics Laboratory, CSAIL, MIT Feb 2017 - Present

Supervisors: Prof. Daniela Rus, Prof. Sertac Karaman

- Working on the Parallel Autonomy project within the Toyota-CSAIL Joint Research Center
- Design control algorithms for autonomous vehicles interacting and cooperating with human drivers
- Focus on modeling social behaviors for autonomous vehicles and socially-aware control policies
- Hardware implementations on autonomous wheelchair and 1/10th scale autonomous racecars

Multi-Robot Systems Lab, Boston University & Stanford University May 2012 - Jan 2017

Advisor: Prof. Mac Schwager

- Thesis: Analysis of multi-agent systems under varying degrees of trust, cooperation, and competition
- Design online control algorithms for nonlinear-distributed, and heterogeneous multi-robot systems
- Hardware implementations using variety of ground and aerial platforms: KMEL Nano+ quadrotors, Pololu m3pis, Oujabots, and Dexter Industries GoPiGo ground robots

Flight Analysis of a Turning Pigeon, Harvey Mudd College 2008 - 2011

Advisors: Prof. Lori Bassman, Dr. Ivo Ros

- Rigorous kinematic analysis of pigeon's body movements through 90° turn
- Project commissioned by Concord Field Station and Harvard University
- Analysis demonstrated pigeons generate upstroke lift and turn similar to helicopters during flight

MENTORING AND SERVICE

- Postdoctoral Affairs Visiting Committee Co-Chair, EECS, MIT 2019
- Undergraduate Research (UROP) Supervisor, MIT 2017 - Present
- Graduate Admissions Committee, EECS, MIT 2017, 2018
- Alumni Admissions Ambassador, Harvey Mudd College 2012-Present
- BU RISE Program Mentor, Boston University 2014
- FIRST Lego League Mentor, Lincoln Laboratory 2012
- Dormitory Affairs Committee Chair, Harvey Mudd College 2009 - 2010
- Honor Board Member, Harvey Mudd College 2008

STUDENTS MENTORED

Graduate Students

Wilko Schwarting (MIT) · Noam Buckman (MIT) · Aaron Ray (MIT) · Teddy Ort (MIT) · Brandon Araki (MIT)

Undergraduate Students

Leonardo Zamora (MIT) · Lucy Liao (MIT) · Nikhil Singhal (MIT) · Anshula Gandhi (MIT) · Lucas Coelo Figueiredo (UFMG)
· John Aleman (BU) · Frank Tarimo (BU) · Lili Gu (BU)

High School Students

Rebecca Wong (BU RISE) · Gadiel Sznaier-Camps (BU Academy)

PUBLICATIONS

*denotes student mentee co-author

Journal Publications

- [J1] W. Schwarting*, **A. Pierson**, J. Alonso-Mora, S. Karaman, and D. Rus. Social behavior for autonomous vehicles. *Proceedings of the National Academy of Sciences*, 116(50):24972–24978, 2019
- [J2] S. G. McGill, G. Rosman, T. Ort*, **A. Pierson**, I. Gilitschenski, B. Araki*, L. Fletcher, S. Karaman, D. Rus, and J. J. Leonard. Probabilistic risk metrics for navigating occluded intersections. *IEEE Robotics and Automation Letters*, 4(4):4322–4329, Oct 2019, with joint IROS option
- [J3] **A. Pierson** and M. Schwager. Controlling noncooperative herds with robotic herders. *IEEE Transactions on Robotics*, 34(2):517–525, April 2018
- [J4] **A. Pierson**, Z. Wang, and M. Schwager. Intercepting rogue robots: An algorithm for capturing multiple evaders with multiple pursuers. *IEEE Robotics and Automation Letters*, 2(2):530–537, April 2017
- [J5] **A. Pierson**, L.C. Figueiredo*, L. CA Pimenta, and M. Schwager. Adapting to sensing and actuation variations in multi-robot coverage. *The International Journal of Robotics Research*, 36(3):337–354, 2017
- [J6] I.G. Ros, M. Badger, **A. Pierson**, L. Bassman, and A. Biewener. Pigeons produce aerodynamic torques through changes in wing trajectory during low speed aerial turns. *Journal of Experimental Biology*, 218(3):480–490, 2015
- [J7] I.G. Ros, L. Bassman, M. Badger, **A. Pierson**, and A. Biewener. Pigeons steer like helicopters and generate down- and upstroke lift during low speed turns. *Proceedings of the National Academy of Sciences*, 108(50):19990–19995, 2011

Conference Publications

- [C1] **A. Pierson**, W. Schwarting*, S. Karaman, and D. Rus. Weighted buffered voronoi cells for distributed semi-cooperative behavior. *2020 IEEE International Conference on Robotics and Automation*, accepted
- [C2] N. Buckman*, **A. Pierson**, S. Karaman, and D. Rus. Generating visibility-aware trajectories for cooperative and proactive motion planning. *2020 IEEE International Conference on Robotics and Automation*, accepted

- [C3] S. G. McGill, G. Rosman, T. Ort*, **A. Pierson**, I. Gilitschenski, B. Araki*, L. Fletcher, S. Karaman, D. Rus, and J. J. Leonard. Probabilistic risk metrics for navigating occluded intersections. *IEEE Robotics and Automation Letters*, 4(4):4322–4329, Oct 2019, Joint RA-L and IROS paper, accepted into IROS proceedings.
- [C4] N. Buckman*, **A. Pierson**, W. Schwarting*, S. Karaman, and D. Rus. Sharing is caring: Socially-compliant autonomous intersection negotiation. In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, November 2019
- [C5] **A. Pierson**, W. Schwarting*, S. Karaman, and D. Rus. Learning risk level set parameters from data sets for safer driving. In *2019 IEEE Intelligent Vehicles Symposium (IV)*, pages 273–280, June 2019 **Selected for Oral Presentation (<10% of accepted papers)**
- [C6] **A. Pierson**, C. Vasile, A. Gandhi*, W. Schwarting*, S. Karaman, and D. Rus. Dynamic risk density for autonomous navigation in cluttered environments without object detection. In *2019 International Conference on Robotics and Automation (ICRA)*, pages 5807–5814, May 2019
- [C7] **A. Pierson**, W. Schwarting*, S. Karaman, and D. Rus. Navigating congested environments with risk level sets. In *2018 IEEE International Conference on Robotics and Automation (ICRA)*, pages 1–8, May 2018
- [C8] **A. Pierson** and D. Rus. Distributed target tracking in cluttered environments with guaranteed collision avoidance. In *2017 International Symposium on Multi-Robot and Multi-Agent Systems (MRS)*, pages 83–89, Dec 2017
- [C9] **A. Pierson**, Z. Wang, and M. Schwager. Intercepting rogue robots: An algorithm for capturing multiple evaders with multiple pursuers. *IEEE Robotics and Automation Letters*, 2(2):530–537, April 2017 Joint RA-L and ICRA paper, accepted into ICRA proceedings.
- [C10] **A. Pierson**, A. Ataei, I. C. Paschalidis, and M. Schwager. Cooperative multi-quadrotor pursuit of an evader in an environment with no-fly zones. In *2016 IEEE International Conference on Robotics and Automation (ICRA)*, pages 320–326, May 2016 **Best Conference Paper Finalist**
- [C11] **A. Pierson** and M. Schwager. Bio-inspired non-cooperative multi-robot herding. In *Robotics and Automation (ICRA), 2015 IEEE International Conference on*, May 2015
- [C12] **A. Pierson**, L. C. Figueiredo*, L. C. A. Pimenta, and M. Schwager. Adapting to performance variations in multi-robot coverage. In *Robotics and Automation (ICRA), 2015 IEEE International Conference on*, pages 415–420, May 2015
- [C13] **A. Pierson** and M. Schwager. Adaptive inter-robot trust for robust multi-robot sensor coverage. In *International Symposium on Robotics Research*, 2013
- [C14] I.G. Ros, M. Badger, **A. Pierson**, L. Bassman, and A. Biewener. Translational and rotational components of low speed turning in the pigeon *Columba livia*. In *Integrative and Comparative Biology*, volume 51, pages E117–E117. Oxford Univ Press Inc Journals Dept, 2001 Evans Rd, Cary, NC 27513 USA, 2011

Manuscripts Under Review

- [R1] W. Schwarting*, **A. Pierson**, S. Karaman, and D. Rus. Stochastic dynamic games in belief space, 2019. arXiv:1909.06963, under review at T-RO
- [R2] Z. Huang, W. Schwarting*, **A. Pierson**, H. Guo, M. Ang Jr., and D. Rus. Safe path planning with multi-model risk level sets. submitted

Thesis

A. Pierson. *Analysis of Multi-Agent Systems Under Varying Degrees of Trust, Cooperation, and Competition*. PhD Thesis, Boston University, January 2017.

Workshops and Poster Sessions

- “Autonomous Navigation in Cluttered Environments without Object Tracking,” Lightning Talk at the GW6 Research Summit, MIT, Sep 2019
- N. Buckman, A. Pierson, W. Schwarting, S. Karaman, and D. Rus. “Intersection Coordination of Mixed Autonomous

and Human Vehicles with Heterogeneous Social Preferences,” accepted for spotlight presentation at *Resilient Robot Teams: Composing, Acting, and Learning* workshop, ICRA, May 2019

- A. Pierson, W. Schwarting, S. Karaman, and D. Rus. “Risk Level Sets without Object Detection,” poster session, 3rd Annual TRI Joint Workshop, Jan 2019
- A. Pierson, W. Schwarting, S. Karaman, and D. Rus. “Navigating in Congestion with Risk Level Sets,” poster session, 2nd Annual TRI Joint Workshop, Dec 2017
- A. Pierson and M. Schwager. “Adaptive Trust in Multi-Robot Coverage Control,” invited poster session talk for Northeastern Robotics Colloquium, Oct 2013
- A. Pierson and M. Schwager. “Adaptive Trust in Multi-Robot Systems,” accepted for presentation at *Networked Multi-Agent Systems* workshop at ICRA, May 2013

INVITED TALKS

In addition to conference talks, below are invited talks about my research:

- “Designing Cooperative, Collaborative, and Competitive Multi-Robot Teams,” Northeastern University, Mar 2020
- “Designing Cooperative, Collaborative, and Competitive Multi-Robot Teams,” Boston University Mechanical Engineering Spring 2020 Seminar Series, Mar 2020
- “Designing Cooperative, Collaborative, and Competitive Multi-Robot Teams,” Colorado School of Mines, Jan 2020
- “Risk-Aware and Socially-Aware Autonomy,” 4th Annual TRI Joint Workshop, Jan 2020
- “Decision Making for Autonomous Systems in Cluttered Environments,” Singapore-MIT Alliance for Research and Technology (SMART) Future Urban Mobility Seminar, Aug 2019
- “Navigating Congested Environments with Risk Level Sets,” 3rd Annual TRI Joint Workshop, Jan 2019
- “Diver’s Ed for Autonomous Vehicles,” guest lecture for MIT Beaverworks Summer Institute, July 2018
- “Controlling Non-Cooperative Herds with Robotic Herders,” invited speaker for the *Swarms: From Biology to Robotics and Back* workshop at ICRA, May 2018
- “Socially-Compliant Behavior for Autonomous Driving,” 2nd Annual TRI Joint Workshop, Dec 2017
- “Intercepting Rogue Robots: An Algorithm for Capturing Multiple Evaders with Multiple Pursuers,” presentation at MIT Robocon, Feb 2017
- “Analysis of Multi-Agent Systems Under Varying Degrees of Trust, Cooperation, and Competition,” Distributed Robotics Lab, MIT, Dec 2016

WORK AND PROJECT EXPERIENCE

Cobham Graduate Development Program, Cobham, plc

2010 - 2012

- Rotation program to gain exposure across various Cobham business units
- Design Engineer, *Carleton Technologies, Orchard Park, NY*
 - Oxygen Life Support team, pneumatic devices, and PHANTOM products
- Program Manager, *Carleton Technologies, Orchard Park, NY*
 - Managed several engineering teams within the Space Actuation Systems group
- Design and Operations Engineer, *DTC Communications, Nashua, NH*
 - New product design and documentation for audio/video concealments group
- Project Manager, *DTC Communications, Nashua, NH*
 - Coordinated the transition of the Nashua facility to other Cobham locations

University of Iceland Global Clinic, Harvey Mudd College

2009 - 2010

- Joint project between Harvey Mudd and the University of Iceland, team leader for second semester
- Designed a small-scale Organic Rankine Cycle system to generate electricity from a low-temperature heat source for use as “backyard waste heat reclamation,” worked with 3M to test Novec fluid

Nike Clinic, Harvey Mudd College**2008**

- Designed prototype shoes that are manufactured as independent parts and assembled at the retail level
- Focus on consumer customization, small-scale manufacturing processes and design feasibility

Software QA Engineer Inter, Laserfiche**2008**

- Wrote test protocols and training seminars for QA engineers and help manuals for general users
- Tested the user interface of Laserfiche product suite to improve usability

SKILLS AND CERTIFICATIONS

- Programming languages: MATLAB (fluent), Python (fluent), ROS (proficient), C++ (proficient)
- AutoCAD, Solidworks, Adobe Creative Suite, VBA, Microsoft Office, LaTeX
- Wordpress and Drupal website building
- Metal/wood machine shop experience
- Engineer-In-Training (EIT) Certified

April 2010

PROFESSIONAL ACTIVITIES**Conference Organization:**

Program Committee, International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)	2020
Program Committee, International Symposium on Multi-Robot and Multi-Agent Systems (MRS)	2019
Associate Editor, International Conference on Intelligent Robots and Systems (IROS)	2019
Associate Editor, International Conference on Intelligent Robots and Systems (IROS)	2018

Journal Reviewer for:

Automatica · Autonomous Robots (AURO) · International Journal of Advanced Robotic Systems (IJARS) · IEEE Robotics and Automation Letters (RA-L) · IEEE Transactions on Automation Science and Engineering (T-ASE) · IEEE Transactions on Robotics (T-RO) · IEEE Transactions on Automatic Control (TAC)

Conference Reviewer for:

American Control Conference (ACC) · IEEE Conference on Decision and Control (CDC) · Distributed Autonomous Robotic Systems (DARS) · IEEE International Conference on Robotics and Automation (ICRA) · IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) · IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS) · Robotics: Science and Systems · Indian Control Conference (ICC) · Mediterranean Conference on Control and Automation (MED)

Professional Memberships

IEEE Member · IEEE Women in Engineering · IEEE Robotics and Automation Society · IEEE Young Professionals · IEEE Control Systems Society

REFERENCES

Available upon request.