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

RESEARCH EXPERIENCE

Research Scientist, CSAIL, MIT — Dec 2018 – 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
- Hardware implementations on autonomous wheelchair and 1/10th scale autonomous racecars
- Supervise graduate and undergraduate student research

Postdoctoral Associate, CSAIL, MIT — Feb 2017 – Dec 2018

- Prior role before promotion to research scientist, primarily worked on Parallel Autonomy project
- Focus on modeling social behaviors for autonomous vehicles and socially-aware control policies

Research Assistant, Multi-Robot Systems Lab, Boston University & Stanford University — 2012 – 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, Ouijabots, and Dexter Industries GoPiGo ground robots
- Work performed at Boston University and as Stanford University as a visiting student (2016)

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
- Analysis demonstrated pigeons generate upstroke lift and turn similar to helicopters during flight

HONORS & AWARDS

- Best Conference Paper Finalist, International Conference on Robotics and Automation 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 2006

WORK 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

Software QA Engineer Intern, 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.

PROJECT EXPERIENCE

University of Iceland Global Clinic, Harvey Mudd College — 2009 – 2010

- Joint project between Harvey Mudd and the University of Iceland, team leader 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 shoes that are manufactured as independent parts and assembled at the retail level
- Focus on consumer customization, small-scale manufacturing processes and design feasibility

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 Interviewer for Admissions, 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

SKILLS & CERTIFICATIONS

- MATLAB, Python, ROS, some C++
- 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

FUN FACTS

- Winner, MIT Posdoctoral Association 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 (80+ dives), and cyclist ∞

PUBLICATIONS

Journal Publications

[J1] S. McGill, G. Rosman, T. Ort, A. Pierson, I. Gilitschenski, B. Araki, L. Fletcher, S. Karaman, D. Rus, and J. Leonard, "Probabilistic Risk Metrics for Navigating Occluded Intersections," *IEEE Robotics and Automation Letters (RA-L)* with joint IROS option, Accepted.

[J2] A. Pierson and M. Schwager, "Controlling Non-Cooperative Herds with Robotic Herders," *IEEE Transactions on Robotics (T-RO)*, 2018, vol. 34, Issue 2.

[J3] A. Pierson, Z. Wang, and M. Schwager, "Intercepting Rogue Robots: An Algorithm for Capturing Multiple Evaders with Multiple Pursuers," *IEEE Robotics and Automation Letters (RA-L)* with joint ICRA option, 2017, vol. 2, no. 2

[J4] A. Pierson, L. Figueiredo, L. Pimenta, and M. Schwager, "Adapting to Sensing and Performance Variations in Multi-Robot Coverage," *International Journal of Robotics Research (IJRR)*, 2017, vol. 36, Issue 3.

[J5] I. Ros, M. Badger, A. Pierson, L. Bassman, A. Biewener, "Pigeons produce aerodynamic torques through changes in wing trajectory during low speed aerial turns," *Journal of Experimental Biology*, Dec 2014, vol. 218, no. 3, pp. 480-490.

[J6] I. Ros, M. Badger, A. Pierson, L. Bassman, A. Biewener, "Translational and Rotational Components of Low Speed Turning in the Pigeon *Columba livia*," *Integrative and Comparative Biology*, 2011, vol. 51.

[J7] I. Ros, L. Bassman, M. Badger, A. Pierson, A. Biewener, "Pigeons steer like helicopters and generate down- and upstroke lift during low speed turns," *Proceedings of the National Academy of Sciences*, Dec 2011, vol. 108, no. 50.

Conference Publications

[C1] S. McGill, G. Rosman, T. Ort, A. Pierson, I. Gilitschenski, B. Araki, L. Fletcher, S. Karaman, D. Rus, and J. Leonard, "Probabilistic Risk Metrics for Navigating Occluded Intersections," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* Joint RA-L and IROS paper, accepted into IROS proceedings.

[C2] N. Buckman, A. Pierson, W. Schwarting, S. Karaman, and D. Rus, "Sharing is Caring: Socially-Compliant Autonomous Intersection Negotiation," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* Accepted.

[C3] A. Pierson, W. Schwarting, S. Karaman, and D. Rus, "Learning Risk Level Set Parameters from Data Sets for Safer Driving," *IEEE International Symposium on Intelligent Vehicles (IV)*, June 2019. Selected for Oral Presentation (<10% of accepted papers)

[C4] 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," *IEEE International Conference on Robotics and Automation (ICRA)*, May 2019.

[C5] A. Pierson, W. Schwarting, S. Karaman, and D. Rus, "Navigating Congested Environments with Risk Level Sets," *IEEE International Conference on Robotics and Automation (ICRA),* May 2018.

- Patent pending, US application number 62,672,244

[C6] A. Pierson and D. Rus, "Distributed Target Tracking in Cluttered Environments with Guaranteed Collision Avoidance," *IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS)*, Dec 2017.

[C7] A. Pierson, Z. Wang, and M. Schwager, "Intercepting Rogue Robots: An Algorithm for Capturing Multiple Evaders with Multiple Pursuers," *IEEE International Conference on Robotics and Automation (ICRA)*, May 2017. Joint ICRA and RA-L paper, accepted into ICRA proceedings.

[C8] A. Pierson, A. Ataei, I. Paschalidis, and M. Schwager, "Cooperative Multi-Quadrotor Pursuit of an Evader in an Environment with No-Fly Zones," In *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, May 2016. Best Conference Paper Finalist.

[C9] A. Pierson and M. Schwager, "Bio-Inspired Non-Cooperative Multi-Robot Herding," In *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, May 2015.

[C10] A. Pierson, L. Figueiredo, L. Pimenta, and M. Schwager, "Adapting to Performance Variations in Multi-Robot Coverage," In *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, May 2015.

[C11] A. Pierson and M. Schwager, "Adaptive Inter-Robot Trust for Robust Multi-Robot Sensor Coverage," In *Proceedings of the International Symposium of Robotics Research (ISRR)*, Dec 2013.

Manuscripts Under Review

[R1] W. Schwarting, A. Pierson, S. Karaman, J. Alonso-Mora, and D. Rus, "Social Behavior for Autonomous Vehicles"

[R2] W. Schwarting, A. Pierson, S. Karaman, and D. Rus, "Stochastic Dynamic Games in Belief Space"

Thesis

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

INVITED TALKS

In addition to conference paper talks, I have given the following public presentations:

- "Driver's Ed for Autonomous Vehicles," lecture for MIT Beaverworks Summer Institute, July 2018
- "Controlling Non-Cooperative Herds with Robotic Herders," invited talk for the *Swarms: From Biology to Robotics and Back* workshop at ICRA, May 2018
- "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.
- "Adaptive Trust in Multi-Robot Coverage Control," invited poster session talk for Northeastern Robotics Colloquium, Oct 2013
- "Adaptive Trust in Multi-Robot Systems," presentation at Networked Multi-Agent Systems Workshop, *Intl. Conf. on Robotics and Automation,* May 2013

PROFESSIONAL MEMBERSHIPS

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

PUBLICATION REVIEWING

Associate Editor for:

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018 and IROS 2019)

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) • Indian Control Conference (ICC) • Mediterranean Conference on Control and Automation (MED) • IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS)

REFERENCES

Available upon request.