

# Brian J. Reily

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- SUMMARY
- Expert in machine learning to address problems in human-robot teaming and multi-robot systems.
  - Proficient in ROS, OpenCV, Matlab, Python, C/C++, and L<sup>A</sup>T<sub>E</sub>X.

RESEARCH  
EXPERIENCE

**Human-Centered Robotics Lab** **January 2015 - Present**

Department of Computer Science, Colorado School of Mines (CSM)

- Developed novel methods for the understanding and control of large multi-robot systems.
- Proposed new methods for human activity recognition, incorporating information from teammates and nearby objects.
- Designed and built a multi-robot research platform, enabling the evaluation of methods to control and integrate sensing data of multiple robots.
- Developed computer vision-based methods for athlete evaluation for the United States Olympic Committee.
- Led a team competing in the inaugural Amazon Picking Challenge at ICRA 2015.

**Army Research Laboratory**

**May 2018 - August 2018**

Journeyman Research Fellow, Adelphi Laboratory

- Worked with ARL researchers to develop novel methods to model the internal structures of multi-robot systems.

RESEARCH  
INTERESTS

- Learning representations of multi-robot systems for human-robot interaction in order to enable effective control and an understanding of their structure.
- Enabling interaction and collaborative perception between robots.
- Utilizing regularized optimization to create interpretable methods that learn from small data.

EDUCATION

**Colorado School of Mines**, Golden, Colorado

**Ph.D in Computer Science**, GPA: 4.0/4.0

**January 2018 - Present**

DISSERTATION: “Representation Learning through Regularized Optimization for Human-Robot Teaming.”

**Colorado School of Mines**, Golden, Colorado

**M.S. in Computer Science**, GPA: 4.0/4.0

**September 2014 - May 2016**

THESIS: “Human Activity Recognition and Gymnastics Analysis Through Depth Imagery.”

**University of Virginia**, Charlottesville, Virginia

**B.A. in Computer Science**

**September 2006 - May 2009**

## PUBLICATIONS

- **Brian Reily** and Hao Zhang. “Team Assignment for Heterogeneous Multi-Robot Sensor Coverage through Graph Representation Learning.” *International Conference on Robotics and Automation (ICRA)*, Submitted 2020.
- **Brian Reily**, Terran Mott and Hao Zhang. “Game Theoretic Decentralized and Communication-Free Multi-Robot Navigation.” *International Conference on Robotics and Automation (ICRA)*, Submitted 2020.
- **Brian Reily**, Terran Mott and Hao Zhang. “Adaptation to Team Composition Changes for Heterogeneous Multi-Robot Sensor Coverage.” *International Conference on Robotics and Automation (ICRA)*, Submitted 2020.
- **Brian Reily** and Hao Zhang. “Simultaneous View and Feature Selection for Collaborative Multi-Robot Perception.” *International Conference on Robotics and Automation (ICRA)*, Submitted 2020.
- Lyujian Lu, Hua Wang, **Brian Reily**, Hao Zhang and Feiping Nie. “Robust Real-Time Behavior Recognition of Robot Teams.” *Robotics and Automation Letters (RA-L)*, Submitted 2020.
- **Brian Reily**, Christopher Reardon and Hao Zhang. “Leading Multi-Agent Teams to Multiple Goals While Maintaining Communication.” *Robotics: Science and Systems (RSS)*, 2020.
- **Brian Reily**, Qingzhao Zhu, Christopher Reardon, and Hao Zhang. “Simultaneous Learning from Human Pose and Object Cues for Real-Time Activity Recognition.” *International Conference on Robotics and Automation (ICRA)*, 2020.
- **Brian Reily**, Christopher Reardon, and Hao Zhang. “Representing Multi-Robot Structure through Multimodal Graph Embedding for the Selection of Robot Teams.” *International Conference on Robotics and Automation (ICRA)*, 2020.
- Peng Gao, **Brian Reily**, Savannah Paul, and Hao Zhang. “Visual Reference of Ambiguous Objects for Augmented Reality-Powered Human-Robot Communication in a Shared Workspace.” *International Conference on Virtual, Augmented, and Mixed Reality (VAMR)*, 2020.
- **Brian Reily**, Qingzhao Zhu, and Hao Zhang. “Activity Recognition by Learning from Human and Object Attributes.” *Workshop of International Conference on Robotics and Automation (ICRA)*, 2019.
- **Brian Reily**, Christopher Reardon, and Hao Zhang. “Graph Embedding for the Division of Robotic Swarms.” *Workshop of International Conference on Robotics and Automation (ICRA)*, 2019.
- **Brian Reily**, Peng Gao, Fei Han, Hua Wang, and Hao Zhang. “Real-Time Recognition of Team Behaviors by Multisensory Graph-Embedded Robot Learning.” *International Journal of Robotics Research (IJRR)*, Submitted October 2018.
- **Brian Reily**, Fei Han, Lynne Parker, and Hao Zhang. “Skeleton-Based Bio-Inspired Human Activity Prediction for Real-Time Human-Robot Interaction.” *Autonomous Robots (AuRo)*, vol. 42, pp. 1281-1298, 2018.
- **Brian Reily**, Hao Zhang, and William Hoff. “Real-Time Gymnast Detection and Performance Analysis With a Portable 3D Camera.” *Computer Vision and Image Understanding (CVIU)*, vol. 159, pp. 154-163, 2017.
- Fei Han\*, **Brian Reily\***, William Hoff, and Hao Zhang. “Space-Time Representation of People Based on 3D Skeletal Data: A Review.” *Computer Vision and Image Understanding (CVIU)*, vol. 158, pp. 85-105, 2017. \*Contributed equally to this work.

## AWARDS AND HONORS

- 2nd Place presentation (Computation and Electronics Session) at 2020 Graduate Research and Discovery Symposium (GRADS)
- Best poster finalist at CSM C-MAPP 2016
- Finalist at the Amazon Picking Challenge, ICRA 2015
- Honor Graduate of US Army Officer Candidate School
- Honor Graduate of US Army Basic Combat Training
- Distinguished Honor Graduate of US Army CBRN Operations School

TEACHING  
EXPERIENCE

**Teaching Assistant for CS498/598: Human Centered Robotics** **Spring 2019**

- Instructed students on the Robot Operating System (ROS) using simulation and physical robots.
- Assisted students in developing machine learning-based activity recognition with color-depth cameras.

**Teaching Assistant for CS473/573: Robot Planning and Manipulation** **Spring 2019**

- Assisted students in work based on Lisp, symbolic logic, SAT planning, and robot kinematics.

REVIEWING  
EXPERIENCE

<b>RA-L</b> <i>Robotics and Automation Letters</i>	<b>Nov 2019, Nov 2020</b>
<b>ISR</b> <i>Journal of Intelligent Service Robotics</i>	<b>Oct 2020</b>
<b>ICRA</b> <i>International Conference on Robotics and Automation</i>	<b>Nov 2019</b>
<b>TAAS</b> <i>Transactions on Autonomous and Adaptive Systems</i>	<b>Nov 2019</b>
<b>Humanoids</b> <i>International Conference on Humanoid Robots</i>	<b>Sep 2018, Aug 2019</b>
<b>TIP</b> <i>Transactions on Image Processing</i>	<b>Aug 2019</b>
<b>SSRR</b> <i>International Symposium on Safety, Security, and Rescue Robotics</i>	<b>Jun 2019</b>
<b>ICIAP</b> <i>International Conference on Image Analysis and Processing</i>	<b>Jun 2019</b>
<b>IROS</b> <i>International Conference on Intelligent Robots and Systems</i>	<b>May 2019</b>
<b>Sensors</b> <i>Affective and Immersive HCI via Effective Sensor and Sensing</i>	<b>Nov 2018</b>
<b>CVIU</b> <i>Computer Vision and Image Understanding</i>	<b>Nov 2016</b>

OTHER WORK  
EXPERIENCE

**United States Army** **2010 - 2013**  
**Transportation Officer**

BRIGADE TRANSPORTATION OFFICER

- Coordinated the movement of over 10000 soldiers in support of more than 150 training events around the world.
- Integrated assets from multiple brigades across the Army to successfully accomplish objectives.
- Supervised RFID tracking of more than \$100 million worth of equipment.
- Planned sustainment for 4 major training exercises; ensuring over 5000 soldiers were supplied with food, water, fuel, ammunition, and other essential supplies.

DISTRIBUTION PLATOON LEADER

- Supervised 25 employees and maintained accountability of over \$7 million worth of equipment, including more than 30 vehicles.
- Executed the successful issue and recovery of nearly \$5 million worth of supplies and ammunition to support training objectives.
- Managed over 50 successful convoys during simulated combat, transporting supplies through hostile territory.
- Tracked the arrival of over 300 pieces of equipment as the airfield control officer for 2 major training events.

ADDITIONAL TRAINING

- Officer Candidate School (Honor Graduate)
- Airborne Qualified
- Unit Movement Officer
- CBRN Operations Officer (Distinguished Honor Graduate)
- Environmental Compliance Officer