

# Tom Williams

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*Assistant Professor, Colorado School of Mines*  
*Director, MIRRORLab*

## Research Interests

- Mission: Developing genuinely helpful language-enabled intelligent agents  
Interests: Artificial intelligence (AI); human-robot interaction (HRI); Cognitive science and systems; natural language understanding and pragmatics; augmented reality; robot ethics;

## Education

- 2013 – 2017 **Ph.D., Computer Science: Cognitive Science**, *Tufts University*.  
Dissertation: Situated Natural Language Interaction in Uncertain and Open Worlds  
Committee: Matthias Scheutz (Chair), Jan P. de Ruiters, Anselm Blumer, Candace Sidner
- 2011 – 2013 **M.S., Computer Science**, *Tufts University*.
- 2007 – 2011 **B.A., Computer Science**, *Hamilton College*.

## Employment

- Aug. 2017 → **Assistant Professor**, *Colorado School of Mines*.  
Spring 2017 **Teaching Fellow**, *Tufts University*.  
Sum. 2016 **Visiting Researcher**, *University of Bremen*.

## Honors and Awards

### *Paper Awards & Nominations*

- 2018 **Best Paper Award Nominee**, (*Top 10 in 217 Submissions*), ACM/IEEE Human-Robot Interaction (HRI 2018), Williams, Thames, Novakoff, & Scheutz.  
“Thank You for Sharing that Interesting Fact!”: Effects of Capability and Context on Indirect Speech Act Use in Task-Based Human-Robot Dialogue

### *Honors and Awards to Me*

- 2019 **Early Career Faculty Award**, NASA.  
2019 **Young Investigator Award**, AFOSR.  
2018 **New and Future AI Educator Award**, *Invited second year participant*, EAAI.  
2017 **New and Future AI Educator Award**, EAAI.  
2015 **Teaching Fellowship**, Tufts Graduate Institute for Teaching.  
**Doctoral Consortia**, YRRSDS 2014, HRI 2015, AAAI 2016.

### *Honors and Awards to Students*

- 2020 **Ryan Blake Jackson**, *Best Poster Award*, CS@Mines C-MAPP 2020.  
2020 **Nhan Tran**, *Accepted Participant*, HRI Pioneers.

- 2020 **Ryan Blake Jackson**, *New and Future AI Educator Award*, EAAI.
- 2020 **Thomas Bennett**, *Accepted Participant*, AAAI Undergraduate Consortium.
- 2019 **Ryan Blake Jackson**, *Accepted Participant*, HRI Pioneers.
- 2019 **Ryan Blake Jackson**, *Accepted Participant*, AIES Student Program.
- 2019 **Nhan Tran**, *Accepted Participant*, AAAI Student Outreach Workshop, AAAI/EAAI.
- 2018 **Ruchen Wen**, *Accepted Participant*, CRA-W Graduate Cohort.
- 2018 **Ruchen Wen**, *Best Talk Runner Up*, Rocky Mountain Celebration of Women in Computing.
- 2018 **Nhan Tran**, *Outstanding Undergraduate Researcher*, Department of Computer Science, Colorado School of Mines.
- 2018 **Nhan Tran**, *Accepted Participant*, AAAI Student Outreach Workshop, AAAI/EAAI.

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## Publications

### *Journal Articles*

- [J1] Qin Zhu, Tom Williams, Blake Jackson, and Ruchen Wen. “Blame-Laden Moral Rebukes and the Morally Competent Robot: A Confucian Ethical Perspective”. In: *Science and Engineering Ethics* (2020).
- [J2] Tom Williams, Fereshta Yazdani, Prasanth Suresh, Matthias Scheutz, and Michael Beetz. “Dempster-Shafer Theoretic Resolution of Referential Ambiguity”. In: *Autonomous Robots* (2018).
- [J3] Gordon Briggs, Tom Williams, and Matthias Scheutz. “Enabling Robots to Understand Indirect Speech Acts in Task-Based Interactions”. In: *Journal of Human-Robot Interaction (JHRI)* (2017).
- [J4] Tom Williams. “A Consultant Framework for Natural Language Processing in Integrated Robot Architectures”. In: *IEEE Intelligent Informatics Bulletin (IIB)* (2017), pp. 10–14.
- [J5] Tom Williams and Matthias Scheutz. “The State-of-the-Art in Autonomous Wheelchairs Controlled through Natural Language: A Survey”. In: *Robotics and Autonomous Systems (RAS)* (2017).
- [J6] Tom Williams, Priscilla Briggs, and Matthias Scheutz. “Covert Robot-Robot Communication: Human Perceptions and Implications for Human-Robot Interaction”. In: *Journal of Human-Robot Interaction (JHRI)* (2015).

### *Book Chapters*

- [B1] Matthias Scheutz, Thomas Williams, Evan Krause, Bradley Oosterveld, Vasanth Sarathy, and Tyler Frasca. “An Overview of the Distributed Integrated Cognition Affect and Reflection DIARC Architecture”. In: *Cognitive Architectures*. Ed. by Maria Isabel Aldinhas Ferreira, João S.Sequeira, and Rodrigo Ventura. Intelligent Systems, Control and Automation: Science and Engineering book series. Springer, 2019.
- [B2] Tom Williams and Matthias Scheutz. “Reference in Robotics: A Givenness Hierarchy Theoretic Approach”. In: *The Oxford Handbook of Reference*. Ed. by Jeanette Gundel and Barbara Abbott. Oxford University Press, 2019.
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*Refereed Conference Papers*

- [C1] Ryan Blake Jackson, Tom Williams, and Nicole M. Smith. “Exploring the Role of Gender in Perceptions of Robotic Noncompliance”. In: *Proceedings of the 15th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. 23.6% acceptance rate, 2020.
- [C2] Ruchen Wen, Mohammed Aun Siddiqui, and Tom Williams. “Dempster-Shafer Theoretic Learning of Indirect Speech Act Comprehension Norms”. In: *Proceedings of the 34th AAAI Conference on Artificial Intelligence*. 20.6% acceptance rate, 2020.
- [C3] Tom Williams, Leanne Hirshfield, Nhan Tran, Trevor Grant, and Nicholas Woodward. “Using Augmented Reality to Better Study Human-Robot Interaction”. In: *Proceedings of the 12th International Conference on Virtual, Augmented, and Mixed Reality (VAMR)*. 2020.
- [C4] Tom Williams, Qin Zhu, and Daniel Grollman. “An Experimental Ethics Approach to Robot Ethics Education”. In: *Proceedings of the 10th Symposium on Educational Advances in Artificial Intelligence*. 2020.
- [C5] Tom Williams, Qin Zhu, Ruchen Wen, and Ewart J. de Visser. “The Confucian Matador: Three Defenses Against the Mechanical Bull”. In: *Proceedings of the Companion of the 15th ACM/IEEE International Conference on Human-Robot Interaction (alt.HRI)*. 19% acceptance rate, 2020.
- [C6] Ryan Blake Jackson, Ruchen Wen, and Tom Williams. “Tact in Noncompliance: The Need for Pragmatically Apt Responses to Unethical Commands”. In: *Proceedings of the AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)*. 15% acceptance rate (oral), 2019.
- [C7] Ryan Blake Jackson and Tom Williams. “Language-Capable Robots may Inadvertently Weaken Human Moral Norms”. In: *Proceedings of the Companion of the 14th ACM/IEEE International Conference on Human-Robot Interaction (alt.HRI)*. 25% acceptance rate, 2019.
- [C8] Tom Williams, Matthew Bussing, Sebastian Cabrol, Elizabeth Boyle, and Nhan Tran. “Mixed Reality Deictic Gesture for Multi-Modal Robot Communication”. In: *Proceedings of the 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. 24% acceptance rate, 2019.
- [C9] Tom Williams, Matthew Bussing, Sebastian Cabrol, Ian Lau, Elizabeth Boyle, and Nhan Tran. “Investigating the Potential Effectiveness of Allocentric Mixed Reality Deictic Gesture”. In: *Proceedings of the 11th International Conference on Virtual, Augmented, and Mixed Reality (VAMR)*. 2019.
- [C10] Qin Zhu, Tom Williams, and Ruchen Wen. “Confucian Robot Ethics”. In: *Computer Ethics - Philosophical Enquiry*. 2019.
- [C11] Ryan Blake Jackson and Tom Williams. “Robot: Asker of Questions and Changer of Norms?”. In: *Proceedings of the International Conference on Robot Ethics and Standards*. 2018.
- [C12] Daniel Kasenberg, Vasanth Sarathy, Thomas Arnold, Matthias Scheutz, and Tom Williams. “Quasi-Dilemmas for Artificial Moral Agents”. In: *Proceedings of the International Conference on Robot Ethics and Standards*. 2018.
- [C13] Tom Williams, Blake Jackson, and Jane Lockshin. “A Bayesian Analysis of Moral Norm Malleability during Clarification Dialogues”. In: *Proceedings of the 40th annual meeting of the Cognitive Science Society (COGSCI)*. 2018.
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- [C14] Tom Williams, Daria Thames, Julia Novakoff, and Matthias Scheutz. ““Thank You for Sharing that Interesting Fact!”: Effects of Capability and Context on Indirect Speech Act Use in Task-Based Human-Robot Dialogue”. In: *Proceedings of the 13th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. 23% acceptance rate; Best Paper Nominee, 2018.
- [C15] Tom Williams, Ravenna Thielstrom, Evan Krause, Bradley Oosterveld, and Matthias Scheutz. “Augmenting Robot Knowledge Consultants with Distributed Short Term Memory”. In: *International Conference on Social Robotics*. 2018.
- [C16] Tom Williams, Nhan Tran, Josh Rands, and Neil T. Dantam. “Augmented, Mixed, and Virtual Reality Enabling of Robot Deixis”. In: *Proceedings of the 10th International Conference on Virtual, Augmented, and Mixed Reality (VAMR)*. 2018.
- [C17] Maxwell Bennett, Tom Williams, Daria Thames, and Matthias Scheutz. “Differences in Interaction Patterns and Perception for Teleoperated and Autonomous Humanoid Robots”. In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2017.
- [C18] Tom Williams, Collin Johnson, Matthias Scheutz, and Benjamin Kuipers. “A Tale of Two Architectures: A Dual-Citizenship Integration of Natural Language and the Cognitive Map”. In: *Proceedings of the 16th International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*. 26% acceptance rate, 2017.
- [C19] Tom Williams and Matthias Scheutz. “Referring Expression Generation Under Uncertainty: Algorithm and Evaluation Framework”. In: *Proceedings of the 10th International Conference on Natural Language Generation (INLG)*. 2017.
- [C20] Tom Williams and Matthias Scheutz. “Resolution of Referential Ambiguity in Human-Robot Dialogue Using Dempster-Shafer Theoretic Pragmatics”. In: *Proceedings of Robotics: Science and Systems (RSS)*. 39.7% acceptance rate, 2017.
- [C21] Tom Williams, Saurav Acharya, Stephanie Schreitter, and Matthias Scheutz. “Situated Open World Reference Resolution for Human-Robot Dialogue”. In: *Proceedings of the 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. 25% acceptance rate, 2016.
- [C22] Tom Williams and Matthias Scheutz. “A Framework for Resolving Open-World Referential Expressions in Distributed Heterogeneous Knowledge Bases”. In: *Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI)*. 26% acceptance rate, 2016.
- [C23] Tom Williams, Gordon Briggs, Bradley Oosterveld, and Matthias Scheutz. “Going Beyond Command-Based Instructions: Extending Robotic Natural Language Interaction Capabilities”. In: *Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence (AAAI)*. 27% acceptance rate, 2015.
- [C24] Tom Williams and Matthias Scheutz. “A Domain-Independent Model of Open-World Reference Resolution”. In: *Proceedings of the 37th annual meeting of the Cognitive Science Society (COGSCI)*. 2015.
- [C25] Tom Williams and Matthias Scheutz. “POWER: A Domain-Independent Algorithm for Probabilistic, Open-World Entity Resolution”. In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2015.
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- [C26] Evan Krause, Michael Zillich, Tom Williams, and Matthias Scheutz. “Learning to Recognize Novel Objects in One Shot through Human-Robot Interactions in Natural Language Dialogues”. In: *Proceedings of the Twenty-Eighth AAAI Conference on Artificial Intelligence (AAAI)*. 28% acceptance rate, 2014.
- [C27] Tom Williams, Priscilla Briggs, Nathaniel Pelz, and Matthias Scheutz. “Is Robot Telepathy Acceptable? Investigating Effects of Nonverbal Robot-Robot Communication on Human-Robot Interaction”. In: *Proceedings of the 23rd IEEE Symposium on Robot and Human Interactive Communication (RO-MAN)*. 2014.
- [C28] Tom Williams, Rafael C Núñez, Gordon Briggs, Matthias Scheutz, Kamal Premaratne, and Manohar N Murthi. “A Dempster-Shafer Theoretic Approach to Understanding Indirect Speech Acts”. In: *Advances in Artificial Intelligence– Proceedings of the 14th Ibero-American Conference on AI (IBERAMIA)*. 26% acceptance rate for Natural-Language Processing track, 2014.
- [C29] Tom Williams, Rehj Cantrell, Gordon Briggs, Paul Schermerhorn, and Matthias Scheutz. “Grounding Natural Language References to Unvisited and Hypothetical Locations”. In: *Proceedings of the Twenty-Seventh AAAI Conference on Artificial Intelligence (AAAI)*. 29% acceptance rate, 2013.
- [C30] Leanne Hirshfield, Rebecca Gulotta, Stuart Hirshfield, Sam Hincks, Matthew Russell, Rachel Ward, Tom Williams, and Robert Jacob. “This is your brain on interfaces: enhancing usability testing with functional near-infrared spectroscopy”. In: *Proceedings of the annual conference on Human factors in computing systems (CHI)*. 23% acceptance rate, 2011.
- [C31] Leanne Hirshfield, Stuart Hirshfield, Sam Hincks, Matthew Russell, Rachel Ward, and Tom Williams. “Trust in Human-Computer Interactions as Measured by Frustration, Surprise, and Workload”. In: *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems (FAC)*. 2011.

### *Refereed Workshop and Symposium Papers*

- [W1] Jared Hamilton, Nhan Tran, and Tom Williams. “Tradeoffs Between Effectiveness and Social Perception when using Mixed Reality to Supplement Gesturally Limited Robots”. In: *Proceedings of the 3rd International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2020.
- [W2] Adam Stogsdill, Thao Phung, and Tom Williams. “Investigating Confidence-Based Category Transition of Spatial Gestures”. In: *2nd Workshop on Natural Language Generation for Human-Robot Interaction at HRI 2020*. 2020.
- [W3] Nhan Tran, Kai Mizuno, Trevor Grant, Thao Phung, Leanne Hirshfield, and Tom Williams. “Exploring Mixed Reality Robot Communication Under Different Types of Cognitive Load”. In: *Proceedings of the 3rd International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2020.
- [W4] Nicholas Woodward, Teresa Nguyen, Lixiao Zhu, Carter Fowler, Taewoo Kim, Stacia Near, Stephen Thoemmes, and Tom Williams. “Exploring Interaction Design Considerations for Trustworthy Language-Capable Robotic Wheelchairs in Virtual Reality”. In: *Proceedings of the 3rd International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2020.
- [W5] Ryan Blake Jackson and Tom Williams. “On Perceiving Robots as Social and Moral Agents”. In: *Proceedings of the 2019 HRI Workshop on the Dark Side of Human-Robot Interaction*. 2019.
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- [W6] Ruchen Wen, Ryan Blake Jackson, Tom Williams, and Qin Zhu. “Towards A Role Ethics Approach to Command Rejection”. In: *Proceedings of the 2019 HRI Workshop on the Dark Side of Human-Robot Interaction*. 2019.
- [W7] Tom Williams, Matthew Bussing, Sebastian Cabrol, and Ian Lau. “Toward Allocentric Mixed-Reality Deictic Gesture”. In: *Proceedings of the 2st International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2019.
- [W8] Tom Williams, Daniel Szafir, and Tathagata Chakraborti. “The Reality-Virtuality Interaction Cube”. In: *Proceedings of the 2st International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2019.
- [W9] Maxwell Bennett, Tom Williams, Daria Thames, and Matthias Scheutz. “Investigating Interactions with Teleoperated and Autonomous Humanoids Using a Suit-Based VR Teleoperation Interface”. In: *Proceedings of the 1st International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2018.
- [W10] Leanne Hirshfield, Tom Williams, Natalie Sommer, Trevor Grant, and Senem Velipasalar Gursoy. “Workload-Driven Modulation of Mixed-Reality Robot-Human Communication”. In: *Workshop on Modeling Cognitive Processes from Multimodal Data at the International Conference on Multimodal Interaction*. 2018.
- [W11] Nahn Tran, Josh Rands, and Tom Williams. “A Hands-Free Virtual-Reality Teleoperation Interface for Wizard-of-Oz Control”. In: *Proceedings of the 1st International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2018.
- [W12] Tom Williams. “Who Should I Run Over?": Long-Term Ethical Implications of Natural Language Generation”. In: *Proceedings of the 2018 HRI Workshop on Longitudinal Human-Robot Teaming*. 2018.
- [W13] Tom Williams. “A Framework for Robot-Generated Mixed-Reality Deixis”. In: *Proceedings of the 1st International Workshop on Virtual, Augmented, and Mixed Reality for HRI (VAM-HRI)*. 2018.
- [W14] Tom Williams, Evan Krause, Bradley Oosterveld, and Matthias Scheutz. “Towards Givenness and Relevance-Theoretic Open World Reference Resolution”. In: *Proceedings of the Robotics: Science and Systems Workshop on Models and Representations for Natural Human-Robot Communication*. 2018.
- [W15] Qin Zhu, Tom Williams, and Blake Jackson. “Blame-Laden Moral Rebukes and the Morally Competent Robot: A Confucian Ethical Perspective”. In: *Proceedings of the Workshop on Brain-Based and Artificial Intelligence*. 2018.
- [W16] Lars Kunze, Tom Williams, Nick Hawes, and Matthias Scheutz. “Spatial Referring Expression Generation for HRI: Algorithms and Evaluation Framework”. In: *Proceedings of the AAAI Fall Symposium on AI for HRI (AI-HRI)*. 2017.
- [W17] Tom Williams and Matthias Scheutz. “Referring Expression Generation Under Uncertainty in Integrated Robot Architectures”. In: *Proceedings of the Robotics: Science and Systems Workshop on Human-Centered Robotics: Interaction, Physiological Integration and Autonomy*. 2017.
- [W18] Tom Williams and Matthias Scheutz. “Resolution of Referential Ambiguity Using Dempster-Shafer Theoretic Pragmatics”. In: *Proceedings of the AAAI Fall Symposium on AI for HRI (AI-HRI)*. 2016.
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- [W19] Tom Williams, Stephanie Schreitter, Saurav Acharya, and Matthias Scheutz. “Towards Situated Open-World Reference Resolution”. In: *Proceedings of the AAAI Fall Symposium on AI for HRI (AI-HRI)*. 2015.
- [W20] Matthias Scheutz, Gordon Briggs, Rehj Cantrell, Evan Krause, Tom Williams, and Richard Veale. “Novel Mechanisms for Natural Human-Robot Interactions in the DIARC Architecture”. In: *Proceedings of the 2013 AAAI Workshop on Intelligent Robotic Systems*. 2013.

### *Doctoral Consortia*

- [DC1] Tom Williams. “Architectural Mechanisms for Situated Natural Language Understanding in Uncertain and Open Worlds”. In: *Proceedings of the 2016 AAAI Doctoral Consortium*. 38% acceptance rate, 2016.
- [DC2] Tom Williams. “Towards More Natural Human-Robot Dialogue”. In: *Proceedings of the 6th Pioneers Workshop at HRI 2015*. 2015.
- [DC3] Tom Williams. “Position Paper”. In: *Proceedings of the 10th Young Researchers’ Roundtable on Spoken Dialog Systems*. 2014.

### *Theses*

- [T1] Tom Williams. “Situated Natural Language Interaction in Uncertain and Open Worlds”. PhD thesis. Tufts University, 2017.

### *Other Publications*

- [O1] Aaron Adler, Prithviraj Dasgupta, Nick DePalma, Mohammed Eslami, Richard G. Freedman, John E. Laird, Christian Lebiere, Katrin Lohan, Ross Mead, Mark Roberts, Paul S. Rosenbloom, Emmanuel Senft, Frank Stein, Tom Williams, Kyle Hollins Wray, Fusun Yuman, and Shlomo Zilberstein. “Reports on the 2018 AAAI Fall Symposium Series”. In: *AI Magazine* 40.2 (2019), pp. 66–72.
- [O2] Tom Williams, Daniel Szafir, and Tathagata Chakraborti. “The Reality-Virtuality Interaction Cube: A Framework for Conceptualizing Mixed-Reality Interaction Design Elements for HRI”. In: *Late Breaking Reports of the 14th ACM/IEEE International Conference on Human-Robot Interaction*. 2019.
- [O3] Neil T. Dantam, Tom Williams, and Hao Zhang. “Combinatorial Inference of Multi-modal Observations”. In: *Extended Abstracts of the IEEE/RSJ International Conference on Robotics and Automation (ICRA)*. 2018.
- [O4] Ryan Blake Jackson and Tom Williams. “Challenges in Responding to Malicious Robot-Directed Commands”. In: *Extended Abstracts of the Robotics: Science and Systems Workshop on Adversarial Robotics*. 2018.
- [O5] Tom Williams. “Toward Ethical Natural Language Generation for Human-Robot Interaction”. In: *Companion Proceedings of the 13th ACM/IEEE International Conference on Human-Robot Interaction (HRI): Late Breaking Reports*. 2018.
- [O6] Tom Williams, Evan Krause, Bradley Oosterveld, Ravenna Thielstrom, and Matthias Scheutz. “Towards Robot Knowledge Consultants Augmented with Distributed Short Term Memory”. In: *Extended Abstracts of the Robotics: Science and Systems Workshop on Models and Representations for Natural Human-Robot Communication*. 2018.
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- [O7] Tom Williams, Daniel Szafr, Tathagata Chakraborti, and Heni Ben Amor. “The 1st International Workshop on Virtual, Augmented, and Mixed Reality for Human-Robot Interaction”. In: *AI Magazine* 39.4 (2018), pp. 64–66.
- [O8] Tom Williams, Daniel Szafr, Tathagata Chakraborti, and Heni Ben Amor. “Virtual, Augmented, and Mixed Reality for Human-Robot Interaction”. In: *Companion of the 2018 ACM/IEEE International Conference on Human-Robot Interaction*. ACM. 2018, pp. 403–404.
- [O9] Patricia Alves-Oliveira, Richard G Freedman, Dan Grollman, Laura Herlant, Laura Humphrey, Fei Liu, Ross Mead, Frank Stein, Tom Williams, and Shomir Wilson. “Reports on the 2016 AAAI Fall Symposium Series”. In: *AI Magazine* 38.2 (2017), pp. 86–90.
- [O10] Eric Eaton, Sven Koenig, Claudia Schulz, Francesco Maurelli, John Lee, Joshua Eckroth, Mark Crowley, Richard Freedman, Rogelio Cardona-Rivera, Tiago Machado, and Tom Williams. “Blue Sky Ideas in Artificial Intelligence Education from the EAAI’17 New and Future AI Educator Program”. In: *Educational Advances in Artificial Intelligence*. 2017.
- [O11] Tom Williams. “Dissertation Briefing: Situated Natural Language Interaction in Uncertain and Open Worlds”. In: *AI Matters*. 2017.
- [O12] Tom Williams, Stephanie Schreitter, Saurav Acharya, and Matthias Scheutz. “Towards Situated Open World Reference Resolution”. In: *Late Breaking Papers at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2015.
- [O13] Stuart Hirshfield, Colden Prime, and Tom Williams. *A Next-Generation Model for Live Cyber Forensics*. Tech. rep. Rome, NY: AFRL Rome Laboratory, Aug. 2008.
- [O14] Stuart Hirshfield, Colden Prime, and Tom Williams. *A New Model for Live Cyber-Forensics*. Tech. rep. Rome, NY: AFRL Rome Laboratory, Aug. 2007.

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## Research Grants and Gifts

### Federal Grants

- 2019 **Young Investigator Award: Calibrated Norm Violation Response in Human-Machine Teaming**, *AFOSR*, Investigators: Thomas Williams (PI), Amount: \$445,000.
  - 2019 **Early Career Fellowship: Performance of Autonomy and Identity for Trust- and Workload-Sensitive Interaction with Distributed Autonomous Systems**, *NASA*, Investigators: Thomas Williams (PI), Amount: \$599,296.
  - 2019 **Engineering Online Learning Pathways in Advanced Manufacturing and Data Science**, *National Science Foundation*, Investigators: Samuel Spiegel (PI), Jennifer Blacklock, Craig Brice, Thomas Williams, Sebnem Duzgun, Whitney Trainor-Guitton, Wendy Fisher, Branden Kappes, Amount: \$1,999,802.
  - 2019 **CHS: SMALL: APERTURE: Augmented Reality and Physio-Enhanced Robotic Gesture**, *National Science Foundation*, Investigators: Thomas Williams (PI), Leanne Hirshfield, Amount: \$257,349 (\$498,349 total).
  - 2019 **CHS: SMALL: Collaborative Research: Role-Based Norm Violation Response in Human-Robot Teams**, *National Science Foundation*, Investigators: Thomas Williams (PI), Qin Zhu, Chad Tossell, Elizabeth Phillips, Ewart de Visser, Amount: \$250,502 (\$499,967 total).
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- 2019 **S&AS: FND: Context-Aware Ethical Autonomy for Language Capable Robots**, *National Science Foundation*, Investigators: Thomas Williams (PI), Hao Zhang, Neil Dantam, Amount: \$570,000.
- 2018 **CRI: II-New: Infrastructure for Robust Interactive Underground Robots**, *National Science Foundation*, Investigators: Thomas Williams (PI), Qi Han, Hao Zhang, Neil T. Dantam, Amount: \$451,102.
- 2018 **Prediction of Human Emotional and Cognitive States by Machine Agents to Promote Shared Situational Awareness**, *USAF A*, Investigators: Hao Zhang (PI), Thomas Williams, Amount: \$74,943.

### Institutional Grants

- 2019 **Tech Fee CS-03: Educational Robots for Interactive Robotics Courses**, *Colorado School of Mines*, Investigators: Thomas Williams (PI), Amount: \$25,500.
- 2018 **Tech Fee CS-01: Educational Robots for CS-ME Teaching Lab**, *Colorado School of Mines*, Investigators: Neil Dantam (PI), Kevin Moore, Andrew Petruska, Thomas Williams, Hao Zhang, Xiaoli Zhang, Amount: \$56,200.

### Selected Press Coverage

**Radical AI Podcast**, 2020, Episode 001.

Featured Guest: “Can a Machine Ever be Moral? Robot Politeness and Persuasion with Tom Williams”

**Mines Newsroom**, 2020.

Award Interview for “Improving the human-robot relationship, one successful conversation at a time”

**Mines Newsroom**, 2018.

Award Interview for “Edgar Mine to serve as lab for underground robotics research”

**Denver Post**, 2018.

Opinion sought for “Boulder’s Misty Robotics unveils its first personal robot, but not just anyone can buy it”

**IEEE Spectrum**, 2018.

Research covered in “How Not to Order Water from a Robot Waiter”

**The Next Web**, 2018.

Research covered in “Robots would prefer you to be rude”

### Talks

#### Invited Talks

**Robotics Colloquium Speaker**, *February 2020*.

University of Washington, Seattle, WA

“Pierre Menard and the Mechanical Bull”

**Colloquium Speaker: QBE Program**, *January 2020*.

Colorado School of Mines, Golden, CO

“Pierre Menard and the Mechanical Bull”

**Colloquium Speaker**, *November 2019*.

University of Rochester, Rochester, NY

“Pierre Menard and the Mechanical Bull”

**Colloquium Speaker, August 2019.**

University of Miami, Miami, FL  
“COME TO THIS TALK, HUMANS”

**Colloquium Speaker, April 2019.**

Colorado College, Colorado Springs, CO  
“COME TO THIS TALK, HUMANS”

**Invited Speaker, August 2018.**

IEEE RO-MAN Workshop on Human Robot Interaction: From Service to Industry (HRI-SI 2018),  
Nanjing, China  
“New Directions for Reference in Robotics”

**Colloquium Speaker, June 2018.**

Misty Robotics, Boulder, CO  
“Expanding the Frontiers of Reference in Robotics”

**Panel Speaker, March 2018.**

1st International Workshop on Virtual, Augmented, and Mixed Reality for Human-Robot Interac-  
tion, Chicago, IL  
“Virtual, Augmented and Mixed Reality in Robotics: Progress, Opportunities, Challenges”

**Colloquium Speaker, March 2018.**

University of Alabama, Tuscaloosa, AL  
“Natural Language Pragmatics and Human-Robot Interaction: Empirical, Algorithmic, and Ethical  
Dimensions”

**Colloquium Speaker, February 2018.**

Mississippi State University, Mississippi State, MS  
“Natural Language Pragmatics and Human-Robot Interaction: Empirical, Algorithmic, and Ethical  
Dimensions”

**Panel Speaker, November 2017.**

Tufts University, Medford, MA  
“President’s Council Panel on Student Research”

**JHRI Session Invited Speaker, March 2017.**

ACM/IEEE International Conference on Human-Robot Interaction, Vienna, Austria  
“Covert Robot-Robot Communication: Human Perceptions and Implications for Human-Robot  
Interaction”

**Colloquium Speaker, April 2017.**

MIT Lincoln Laboratory, Lexington, MA  
“A Tale of Two Architectures: A Dual-Citizenship Integration of Natural Language and the  
Cognitive Map”

**Colloquium Speaker, April 2017.**

University of Massachusetts Amherst, Amherst, MA  
“Genuine Helpers: Enabling Natural Language Capabilities for Interactive Robots”

**Colloquium Speaker, July 2016.**

MITRE Corporation, Bedford, MA  
“Against Robot Telepathy: the Why and How of Verbal Robot-Robot Communication”

**Other Seminars****Guest Lecture, April 2019.**

Human-Robot Interaction, University of Colorado Boulder, Boulder, CO  
“Indirect Speech Acts”

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**Lab Seminar Speaker, May 2018.**

Human Robot Interaction Lab, Tufts University, Medford, MA  
 “Tutorial: Consultant Framework, POWER, and PIA”

**Lab Seminar Speaker, April 2018.**

United States Air Force Academy, Colorado Springs, CO  
 “Expanding the Frontiers of Reference in Robotics”

**Lab Seminar Speaker, June 2016.**

Intitute for Artificial Intelligence, Universität Bremen, Bremen, Germany  
 “Natural Language Understanding for Human-Robot Interaction”

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## Professional Service

### Program Committee Work

**Program Committee Co-Chair.**

AAAI Fall Symposium on AI for HRI (AI-HRI) 2016

HRI Pioneers Workshop 2016

**Senior Program Committee Member.**

AAAI Conference on Artificial Intelligence (AAAI) 2018

**Program Committee Member.**

International Conference on Social Robotics (ICSR) 2020, 2019

Virtual, Augmented, and Mixed Reality 2019,2018

ICAPS Robotics Track 2019,2018

ACL 2019

AAMAS 2019

AAAI 2020

CORL 2019

EMNLP 2019

Educational Advances in Artificial Intelligence (EAAI) 2020

HRI Pioneers Workshop 2020,2019,2018,2017

ACL/EMNLP Workshop on NLP and Robotics (ROBO-NLP) 2017

AAAI Fall Symposium on AI for HRI (AI-HRI) 2018

HRI Workshop on Virtual, Augmented, and Mixed Reality for Human-Robot Interaction (VAM-HRI) 2019

HRI Workshop on The Dark Side of Human-Robot Interaction: Ethical Considerations and Community Guidelines for the Field of HRI 2019

### Referee Service

**Funding Agency Panelist.**

National Science Foundation (NSF), 2019, 2018

**Referee for Journal Articles.**

ACM Computing Surveys, 2018

ACM Transactions on Interactive Intelligent Systems, 2018

ACM Transactions on Human-Robot Interaction, 2018, 2019

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Journal of Memory and Language, 2018  
Robotics and Automation Letters, 2018  
International Journal of Robotics Research, 2018, 2016, 2015  
Sensors, 2017  
Cognitive Systems Research, 2016  
Autonomous Robots, 2015

**External Referee for Conference Proceedings.**

Annual Conference of the Cognitive Science Society (COGSCI), 2019  
ACM Conference on Designing Interactive Systems (DIS), 2019  
International Conference on Social Robotics (ICSR), 2018  
ACM User Interface Software and Technology Symposium (UIST), 2018  
ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2020,2019,2018,2017,2016  
Late-Breaking Reports of the ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2019  
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017,2016,2015  
IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 2016, 2019  
IEEE International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EPIROB), 2016

**External Referee for Workshop and Symposia Proceedings.**

AAAI Fall Symposium on Artificial Intelligence for Human-Robot Interaction (AI-HRI) 2019, 2017, 2015

**Referee for Workshop Proposals.**

Robotics: Science and Systems (RSS), 2016

**Workshop and Symposium Organization**

**Workshop**, *Virtual, Augmented, and Mixed Reality for Human-Robot Interaction (VAM-HRI)*, Lead Organizer.

Co-organizers: Dan Szafr (CU Boulder), Tathagata Chakraborti (ASU), Eric Rosen (Brown), Serena Booth (MIT), Ong Soh Khim (NUS), Thomas Groechel (USC). *International Conference on Human-Robot Interaction, held in Cambridge, UK, in March 2020*

**Workshop**, *The Dark Side of Human-Robot Interaction: Ethical Considerations and Community Guidelines for the Field of HRI*.

Co-organizers: Kerstin Haring (USAFA), Michael Novitzky (MIT), Paul Robinette (MIT), Ewart de Visser (USAFA), Allan Wagner (Penn State). *International Conference on Human-Robot Interaction, held in Daegu, Korea, in March 2019*

**Workshop**, *Virtual, Augmented, and Mixed Reality for Human-Robot Interaction (VAM-HRI)*, Lead Organizer.

Co-organizers: Dan Szafr (CU Boulder), Tathagata Chakraborti (ASU), Elizabeth Phillips (USAFA). *International Conference on Human-Robot Interaction, held in Daegu, Korea, in March 2019*

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**Workshop**, *Virtual, Augmented, and Mixed Reality for Human-Robot Interaction (VAM-HRI)*, Lead Organizer.

Co-organizers: Dan Szafir (CU Boulder), Tathagata Chakraborti (ASU), Heni Ben-Amor (ASU). *International Conference on Human-Robot Interaction, held in Chicago, IL, in March 2018*

**Symposium**, *Interactive Learning in Artificial Intelligence for Human-Robot Interaction (AI-HRI)*, Finance Chair.

Co-organizers: Kalesha Bullard (Georgia Tech), Nick de Palma (FutureWei Technologies), Richard G. Freedman (UMass Amherst / SIFT), Bradley Hayes (CU Boulder), Luca Iocchi (Sapienza), Katrin Lohan (Heriot-Watt), Ross Mead (Semio), Emmanuel Senft (Plymouth U). *AAAI Fall Symposium, held in Arlington, VA, in October 2018*

**Symposium**, *Artificial Intelligence for Human-Robot Interaction (AI-HRI)*.

Co-organizers: Elin A. Topp (Lund U), Laura M. Hiatt (NRL), Luca Iocchi (Sapienza), Kalesha Bullard (Georgia Tech), Emmanuel Senft (Plymouth U), Tian Zhou (Purdue), Marc Hanheide (U Lincoln), Frank Broz (Heriot-Watt), Dan Grollman (Sphero), Katrin Lohan (Heriot-Watt), Ross Mead (Semio). *AAAI Fall Symposium, held in Arlington, VA, in November 2017*

**Symposium**, *Artificial Intelligence for Human-Robot Interaction (AI-HRI)*, Program Committee Co-Chair.

Co-organizers: Ross Mead (Semio), Dan Grollman (Sphero), Tiago Ribeiro (U Lisbon), Patricia Alves-Oliveira (U Lisbon), Richard Freedman (UMass Amherst), Nick DePalma (MIT), Gordon Briggs (NRL), Frank Broz (Heriot-Watt), Katrin Lohan (Heriot-Watt), Bradley Hayes (MIT). *AAAI Fall Symposium, held in Arlington, VA, in November 2016*

**Workshop**, *HRI Pioneers*, Program Committee Co-Chair.

Co-organizers: Jill Greczek (USC), Tiago Ribeiro (U Lisbon), Hee-Tae Jung (UMass Amherst), Sam Spaulding (MIT), Chris Crawford (U Florida), Maria Vanessa aus der Wieschen (U Southern Denmark), Hee Rin Lee (Indiana U), Jung Ju Choi (Ewha Womens U), Igor Zubrycki (Politechnika Lodzka). *International Conference on Human-Robot Interaction, held in Christchurch, New Zealand, in March 2016*

## Conference Organization

**Program Committee Co-Chair.**

International Conference on Social Robotics (ICSR) 2020

**Publications Chair.**

International Conference on Human-Robot Interaction (HRI) 2020

**Local Arrangements Chair.**

International Conference on Human-Robot Interaction (HRI) 2021

**Program Board.**

Virtual, Augmented, and Mixed Reality (VAMR) 2019, 2018

**Session Chair.**

Virtual, Augmented, and Mixed Reality (VAMR) 2019, Paper Session Organizer and Chair: Augmented Reality for Human-Robot Interaction

Virtual, Augmented, and Mixed Reality (VAMR) 2018, Paper Session Chair: Virtual reality in Psychotherapy and Mental Health

Symposium on Educational Advances in Artificial Intelligence (EAAI) 2018, Special Track Organizer and Chair: Best Practices for Running an AI Research Group

AAAI Conference on Artificial Intelligence (AAAI) 2018, Paper Session Chair: Language and Learning

### Other Service

**Faculty Mentor**, *AIES Student Program*, AAI Conference on AI, Ethics, and Society (AIES), 2019.

**Puzzle Contributor**, “*My Favorite Marvin*”, AI Matters, 2017.

**Puzzle Contributor**, *Fun and Games Night*, AAI Conference on Artificial Intelligence (AAAI), 2015.

### Professional Society Membership

**IEEE RAS, AAI, ACM, ASEE.**

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## University Service

Tenure Track Faculty Search Chair, 2019-2020

Board of Student Media, 2017-2019

Bachelor of Science in Engineering: Robotics and Automation Focus Area: Faculty Mentor, 2018-2019

Computer Science: Graduate Student Committee, 2017-2019

Computer Science: Teaching Faculty Search Committee, 2017-2018

Faculty Liason: Board of Computer Science Graduate Students, 2017-2019

Faculty Advisor: Mines Robotics Club, 2017-2019

CS@Mines Puzzle Challenge 2017-2018

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## Advising

### Doctoral Advisees

Ryan Jackson, 2018–Present

Poulomi Pal, 2019–Present

Thao Phung, 2020–Present

Ruchen Wen, 2018–Present

### Masters Advisees

Nhan Tran, 2018–Present

Lixiao Zhu, 2019–Present

### Undergraduate MIRRORLab Members

Tommy Bennett (Undergraduate, CS), 2018–Present

Morgan Cox (Undergraduate, CS), 2019–Present

Will Culpepper (undergraduate, CS), 2019–Present

Carter Fowler (Undergraduate, CS), 2018–Present

Jared Hamilton (Undergraduate, CS), 2019–Present

Torin Johnson (Undergraduate, CS), 2019–Present

Alex Leto (Undergraduate, CS), 2019–Present

Teresa Nguyen (Undergraduate, CS), 2018–Present

Levi Ortega (undergraduate, CS), 2019–Present

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Sonia Jo RunningRabbit (Undergraduate, CS), 2019–Present  
Jon Serrano (undergraduate, CS), 2019–Present  
Adam Stogsdill (undergraduate, CS), 2018–Present  
Nicholas Woodward (undergraduate, CS), 2019–Present

#### Graduated & Past Doctoral and Masters Advisees

Kellyn Larson (Masters, CS), 2018–2019  
Stacia Near (Masters, CS), 2017–2019  
Jane Lockshin (Masters, CS) 2018–2019  
Jose Perez Rodriguez (Masters, CS) 2019–2019

#### Graduated & Past Non-Advisee MIRRORLab Members

Mingyuan Han (Masters, PE), 2018–2019  
Aun Siddiqui (Masters, MechE), 2017–2019  
Prasanth Sengadu Suresh (Masters, MechE), 2017–2018  
Akshay Swaminathan (Masters, CS), 2017–2018

#### Graduated & Past Advisees (Undergraduate)

Ian Lau (Undergraduate, CS), 2018–2019  
Elizabeth Boyle (Undergraduate, CS), 2018–2019  
Matthew Bussing (Undergraduate, CS), 2017–2019  
Sebastian Cabrol (Undergraduate, CS), 2018–2019  
Adrian Estrada (Undergraduate, CS), 2019–Present  
Ryan Fite (Undergraduate, CS), 2017–2019  
Andrea Golden-Lasher (Undergraduate, CS), 2019–2019  
Lex Graham (Undergraduate, CS), 2019–2019  
Taewoo Kim (Undergraduate, CS), 2018–2019  
Jason Mattney (Undergraduate, CS), 2019–2019  
Kai Mizuno (Undergraduate, CS), 2019–2019  
Stephen Thoemmes (undergraduate, CS), 2018–2019  
Alison Artzberger (Undergraduate, CS), 2018–2018  
Marcelo Gonzales (Undergraduate, CS), 2017–2018  
Joey Lovato (Undergraduate, CS), 2018–2018  
Joshua Rands (Undergraduate, CS), 2017–2018

#### Thesis Committee Member

**Qingzhao Zhu**, *PhD*; *Advisor: Hao Zhang*, Department of Computer Science, Colorado School of Mines, TBD.

Title: TBD

**Lingfeng Tao**, *PhD*; *Advisor: Xiaolei Zhang*, Department of Mechanical Engineering, Colorado School of Mines, TBD.

Title: TBD

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**Nan Jiang**, *PhD*; *Advisor: Dejun Yang*, Department of Computer Science, Colorado School of Mines, TBD.

Title: TBD

**Zhiling Zhang**, *MS Thesis*; *Advisor: Hao Zhang*, Department of Computer Science, Colorado School of Mines, 2020 (Anticipated).

Title: —

**Shneka Muthu Kumara Swamy**, *PhD Thesis*; *Advisor: Qi Han*, Department of Computer Science, Colorado School of Mines, 2022 (Anticipated).

Title: TBD

**Riley Miller**, *MS Thesis*; *Advisor: Chuan Yue*, Department of Computer Science, Colorado School of Mines, 2020 (Anticipated).

Title: Micro-Task Skill Inference for Crowd Workers

**Arun Kaashyap Arunachalam**, *MS Thesis*; *Advisor: Hua Wang*, Department of Computer Science, Colorado School of Mines, 2019 (Anticipated).

Title: TBD

**Ergin Isleyen**, *PhD Thesis*; *Advisor: Sebnem Duzgun*, Department of Mining Engineering, Colorado School of Mines, TBD.

Title: TBD

**Lyu Jian Lu**, *PhD Thesis*; *Advisor: Hua Wang*, Department of Computer Science, Colorado School of Mines, 2020 (Anticipated).

Title: TBD

**Khurram Gulzar**, *PhD Thesis*; *Advisor: Ville Kyrki*, Department of Electrical Engineering and Automation, Aalto University, 2019.

Title: Gesture Execution and Planning for Anchoring between Multi-Embodiment Decentralized Robots from Demonstrations

**Jiayi Liu**, *PhD Thesis*; *Advisors: William Hoff and Hao Zhang*, Department of Computer Science, Colorado School of Mines, 2019 (Anticipated).

Title: Object Understanding and Camera Localization

**Kai Liu**, *PhD Thesis*; *Advisor: Hua Wang*, Department of Computer Science, Colorado School of Mines, 2019 (Anticipated).

Title: Non-negative Matrix Factorizations: Foundations, Methods, Algorithms, and Applications

**Saad Elbeleidy**, *Masters Thesis*; *Advisor: Hua Wang*, Department of Computer Science, Colorado School of Mines, 2018.

Title: Converting Data from Multi-Instance to Single-Instance Representations using P-Order Laplacian Projections

### Qualification Exam Committee

**Akshit Sharma**, *Advisor: Bo Wu*, Department of Computer Science, Colorado School of Mines, 2020.

**Ruchen Wen**, (*Advisor*), Department of Computer Science, Colorado School of Mines, 2019.

**Ryan Blake Jackson**, (*Advisor*), Department of Computer Science, Colorado School of Mines, 2019.

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**Ahmed Alshehri**, *Advisor: Chuan Yue*, Department of Computer Science, Colorado School of Mines, 2018.

**Connor Holmes**, *Advisor: Bo Wu*, Department of Computer Science, Colorado School of Mines, 2018).

**Sriram Siva**, *Advisor: Hao Zhang*, Department of Computer Science, Colorado School of Mines, 2018.

**Wei Han**, *Advisor: Bo Wu*, Department of Computer Science, Colorado School of Mines, 2017.

**Warren Watkinson**, *Advisor: Bo Wu*, Department of Computer Science, Colorado School of Mines, 2017.

## Teaching

### Courses Taught

Term	School	Course #	Course Title	Responses	Evaluation
Spring 2020 <sup>2</sup>	Mines	CSCI/HASS 498/598	Robot Ethics	–	–
Fall 2019	Mines	CSCI 498/598	Human-Robot Interaction	10	4.9/5.0
Fall 2019	Mines	CSCI/EENG 437/507	Computer Vision	44	4.36/5.0
Spring 2019 <sup>1</sup>	Mines	CSCI/HASS 498/598	Robot Ethics	15	3.5/5.0
Fall 2018	Mines	CSCI/EENG 437/507	Computer Vision	65	4.19/5.0
Spring 2018	Mines	CSCI 598B	Linguistic Human-Robot Interaction	10	4.00/5.0
Fall 2017	Mines	CSCI/EENG 437/507	Computer Vision	29	4.59/5.0
Spring 2017	Tufts	COMP 131	Artificial Intelligence	31	3.70/5.0
Fall 2015 <sup>2</sup>	Tufts	COMP 131	Artificial Intelligence	16	4.63/5.0

<sup>1</sup> Co-taught with Qin Zhu

<sup>2</sup> Co-taught with Anselm Blumer

### Teaching Assistance

Term	School	Course #	Course Title	Course Lead
Fall 2014	Tufts	COMP 150-PR	Probabilistic Robotics	Anselm Blumer
Fall 2013	Tufts	COMP 50	Problem Solving by Computer	Norman Ramsey
Spring 2011	Hamilton	CS 105	Explorations in CS	Stuart Hirshfield
Fall 2010	Hamilton	CS 110	Introduction to CS	Alistair Campbell and Mark Bailey
Spring 2010	Hamilton	CS 110	Introduction to CS	Mark Bailey
Fall 2009	Hamilton	CS 110	Introduction to CS	Alistair Campbell

### Curriculum Development

**Human-Robot Interaction**, *Colorado School of Mines*.

**Robot Ethics**, *Colorado School of Mines*.

**Linguistic Human-Robot Interaction**, *Colorado School of Mines*.

The course explores the capabilities necessary for autonomous robots to participate in natural language dialogue with human partners, including language and gesture understanding, action selection and execution, language and gesture generation, and integrated robot architectures.

**Artificial Intelligence**, *Tufts University*.

This course is an introductory survey of artificial intelligence (AI). The course covers the history, theory, and computational methods of artificial intelligence, to enable students to (1) identify the major classical and modern AI paradigms, and explain how they relate to each other; (2) analyze the structure of a given problem such that they can choose an appropriate paradigm in which to frame that problem; and (3) implement a wide variety of both classical and modern AI algorithms.

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## Outreach

### Public Talks and Presentations

**Panelist**, *Artificial Intelligence Symposium* , Foothills Art Center, 2019.

Public outreach conversation on AI, Morality, and Video games

**Panelist**, *A Study in Chrome: The Ethics of Silverside*, PAX East, 2015.

Organized and participated in a panel introducing robot ethics to members of the public.

**Presenter**, Open House, AAAI Conference on Artificial Intelligence, 2015.

Presented a poster to members of the public.

### Targeted Programs

**Volunteer**, AAAI Connections, AAAI Conference on Artificial Intelligence, 2017.

Outreach program targeted at K-12 students from underserved communities and their parents.

**Faculty Mentor**, PATHS Program, Colorado School of Mines, 2017-2019.

NSF-Funded scholarship program for academically talented, low-income students in Colorado to study Computer Science at the Colorado School of Mines.

**Lab Tour Host**, DECTech Program, Colorado School of Mines, 2018.

Hosted 60 middle school girls on tours of the MIRRORLab.

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