Aaquib Tabrez

Curriculum Vitae

Postdoctoral Fellow
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Research Interests

I work at the intersection of explainability and human-robot interaction. In my research, I leverage and enhance human-machine communication to achieve value alignment and foster appropriate trust within human-robot teams. My broad interests include Explainable AI, Reinforcement Learning, Multimodal Human-Machine Communication, and Human-Robot Interaction.

Education

2019 – 2024 **University of Colorado, Boulder**, *GPA: 4.0*, Ph.D. Candidate, *Computer Science*.
Advisor: Prof. Bradley Hayes
Collaborative AI and Robotics Lab (CAIRO)
Dissertation: *Mediating Trust and Influence in Human-Robot Teams via Multimodal Communication and Explanation for Mental Model Alignment* (Link to Dissertation)
Committee: Profs. Bradley Hayes*, Alessandro Roncone, Daniel Szafir, Nisar Ahmed, & Sonia Chernova

2017–2019 **University of Colorado, Boulder**, *GPA: 4.0*, MS, *Mechanical Engineering*.

2010–2014 **National Institute of Technology Karnataka, India**, *B.Tech*, *Mechanical Engineering*.

Awards and Recognition

2024 **People's Choice Award - 3MT Competition**.
Won the People's Choice Award at the 2024 CU Boulder Three Minute Thesis (3MT) competition, receiving the highest number of audience votes.

2023 **Annual Research Expo'23 Poster Presentation Award**.
Received best research poster presentation award at the CU Boulder's Annual Research Expo '23.

2022 **Robotics: Science and Systems (RSS) Pioneers**.
Selected for workshop bringing together top early career researchers in robotics.

2022 **Best Student Paper Award Runner-up at AAMAS**.
For the paper "Descriptive and Prescriptive Visual Guidance to Improve Shared Situational Awareness in Human-Robot Teaming".

2022 **Won Spring 2022 Annual Research Expo Event**.
Received the best poster presentation award at the Spring 2022 Annual Research Expo from CU Boulder.

2020 **IBM PhD Fellowship Finalist**.
One of three students nominated by the CS department at CU Boulder.

2019 **Best Paper Award Finalist for Technical Advances at ACM/IEEE HRI**.
For the paper "Explanation-based Reward Coaching to Improve Human Performance via Reinforcement Learning".

2019 **Human-Robot Interaction (HRI) Pioneers**.
Selected for workshop bringing together top early career researchers in HRI.

2019 **Awtar and Teji Singh Graduate Fellowship**.
A $5,000 fellowship for early career PhD students demonstrating a strong academic and research record.

2016 **Yuva Prerna Yatra Fellowship**.
Selected as a social entrepreneur fellow to travel, study, and support local entrepreneurs in the Himalayas, leveraging regional resources to foster prosperity.

Papers in Submission

Asterisk (*) denotes shared first authorship

no paper link **Title omitted for blind review**.
Aaquib Tabrez, Ryan Leonard, Bradley Hayes.
In submission: Robotics: Science and Systems (RSS), 2024

Journal Articles

paper link **A survey of Mental Modeling Techniques in Human-Robot Teaming**.
Aaquib Tabrez, Matthew B. Luebbers, Bradley Hayes.
Springer-Nature Current Robotics Reports, 2020

Conference Publications

paper link **Recency Bias in Task Performance History Affects Perceptions of Robot Competence and Trustworthiness**.
Matthew B. Luebbers*, **Aaquib Tabrez***, Kanaka Samagna Talanki, Bradley Hayes.
To appear: Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2024

paper link **Autonomous Justification for Enabling Explainable Decision Support in Human-Robot Teaming**.
Aaquib Tabrez*, Matthew B. Luebbers*, Kyler Ruvane*, and Bradley Hayes.
Robotics: Science and Systems (RSS), 2023

paper link **Descriptive and Prescriptive Visual Guidance to Improve Shared Situational Awareness in Human-Robot Teaming**.
Aaquib Tabrez*, Matthew B. Luebbers*, Bradley Hayes.
International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2022
Best Student Paper Runner-up (Top 2 of 629 submissions).

paper link **Asking the Right Questions: Facilitating Semantic Constraint Specification for Robot Skill Learning and Repair**.
Aaquib Tabrez*, Jack Kawell*, Bradley Hayes.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021

paper link **Explanation-based Reward Coaching to Improve Human Performance via Reinforcement Learning**.
Aaquib Tabrez, Shivendra Agrawal, Bradley Hayes.
ACM/IEEE International Conference on Human Robot Interaction (HRI), 2019
Best Technical Paper Runner-up.

Workshop Publications

paper link **Hierarchical Multi-Agent Reinforcement Learning with Explainable Decision Support for Human-Robot Teams**.
Aaquib Tabrez*, Matthew B. Luebbers*, Kyler Ruvane*, Ashley H. Rabin, Kevin W. King, William Gerichs, and Bradley Hayes.
Proceedings of the Workshop on Explainability for Human-Robot Collaboration (X-HRI), 2024

paper link **Autonomous Policy Explanations for Effective Human-Machine Teaming**.
Aaquib Tabrez.
Doctoral Consortium at the AAAI Conference on Artificial Intelligence, 2024

paper link **Effective Human-Machine Teaming through Communicative Autonomous Agents that Explain, Coach, and Convince**.
Aaquib Tabrez
Doctoral Consortium at the International Conference on Autonomous Agents and Multiagent Systems, 2023

paper link **Augmented Reality and Proxy Grippers Improve Demonstration-based Robot Skill Learning**.
Carl L. Mueller, Matthew B. Luebbers, **Aaquib Tabrez**, and Bradley Hayes.
Proceedings of the Workshop on Life-Long Learning with Human Help (L3H2), 2023

paper link **Mediating Trust and Influence in Human-Robot Interaction via Explainable AI**.
Aaquib Tabrez, Bradley Hayes.
Pioneers Workshop at Robotics: Science and Systems (RSS), 2022

paper link **Augmented Reality-Based Explainable AI Strategies for Establishing Appropriate Reliance and Trust in Human-Robot Teaming**.
Matthew B. Luebbers*, **Aaquib Tabrez***, Bradley Hayes.
Workshop on Virtual, Augmented and Mixed Reality for Human-Robot Interaction (VAM-HRI), 2022

paper link **Solutions for Socially Intelligent HRI in Real-World Scenarios (SSIR-HRI)**.
Karen Tatarian, Sera Buyukgoz, Marine Chamoux, **Aaquib Tabrez**, Bradley Hayes, Mohamed Chetouani.
Companion of the ACM/IEEE International Conference on Human-Robot Interaction, 2021

paper link **Interactive Constrained Learning from Demonstration Using Visual Robot Behavior Counterfactuals**.
Carl Mueller, **Aaquib Tabrez**, Bradley Hayes
Workshop on Accessibility of Robot Programming and Work of the Future at RSS, 2021

paper link **Emerging Autonomy Solutions for Human and Robotic Deep Space Exploration**.
Matthew B. Luebbers*, Christine T. Chang*, **Aaquib Tabrez***, Jordan Dixon*, Bradley Hayes.
SpaceCHI: Human-Computer Interaction for Space Exploration, 2021

paper link **Automated Failure-Mode Clustering and Labeling for Informed Car-To-Driver Handover in Autonomous Vehicles**.
Aaquib Tabrez*, Matthew B. Luebbers*, Bradley Hayes.
Workshop on Assessing, Explaining, and Conveying Robot Proficiency for Human-Robot Teaming, 2020

paper link **Improving human-robot interaction through explainable reinforcement learning**.
Aaquib Tabrez, Bradley Hayes.
Companion of the ACM/IEEE International Conference on Human-Robot Interaction, 2019

Teaching & Research Assistantships

Spring 2021 - Present **Army Research Lab STRONG Program: Strengthening Teamwork for Robust Operations in Novel Groups**, *University of Colorado Boulder, CO*.
Research Assistant, Prof. Bradley Hayes

Fall 2020 **CSCI 5302/4302: Advanced Robotics**, *University of Colorado Boulder, CO*.
Teaching Assistant, Prof. Bradley Hayes

Fall 2020 **CSCI 3302: Introduction to Robotics**, *University of Colorado Boulder, CO*.
Teaching Assistant, Prof. Bradley Hayes

Spring 2020 **CSCI 5922: Neural Networks and Deep Learning**, *University of Colorado Boulder, CO*.
Teaching Assistant, Profs. Adam Bloniarz & Shumin Wu

Fall 2019 **CSCI 3302: Introduction to Robotics**, *University of Colorado Boulder, CO*.
Teaching Assistant, Prof. Bradley Hayes

Spring 2019 **CSCI 5322: Algorithmic Human-Robot Interaction**, *University of Colorado Boulder, CO*.
Course Grader, Prof. Bradley Hayes

Spring 2018 **MCEN-4026: Manufacturing Processes and Systems**, *University of Colorado Boulder, CO*.
Course Grader, Prof. Jenifer Blacklock

Workshop Committee Leadership

August 2023 **Workshop on Human-Robot Interaction for Explainability in Robotics**, *RO-MAN 2023*.
Co-Organizer

June 2023 **RSS Pioneers 2023 Workshop**, *RSS 2023*.
Program Committee Chair

March 2021 **Solutions for socially intelligent HRI in real-world scenarios workshop**, *HRI 2021*.
Co-Organizer

March 2021 **HRI Pioneers 2021 Workshop**, *HRI 2021*.
Program Chair

August 2020 **Solutions for socially intelligent HRI in real-world scenarios workshop**, *RO-MAN 2020*.
Co-Organizer

March 2020 **HRI Pioneers 2020 Workshop**, *HRI 2020*.
Program Chair

Invited Panels and Talks

2023 **Talking Robotics**, *Building Trust and Transparency through Explainable Multimodal Communication*.

2021 **University of Colorado Boulder**, *Mediating Trust and Influence in Human-Robot Interaction via Explainable AI*, Robotics Summer Seminar Series.

Professional Experience

2014 – 2016 **Daimler**, *Chennai, India*.
Procurement Manager

Aug 2012 – Dec 2012 **Kudremukh Iron Ore Company**, *Kudremukh, India*.
Industrial Intern

Research Mentorship

2024 - **David Chaparro**, *Masters*, CU Boulder.

2023 - **Kyler Ruvane**, *Masters*, CU Boulder.

2023 **Nathan Howard**, *Masters*, CU Boulder.

2022 - 2023 **Kanaka Talanki Sreenivasa Murthy**, *Masters*, CU Boulder.

2021 - 2022 **Karthik Siddaramanna**, *Masters*, CU Boulder.

2020 - 2021 **Aditi Periyannan**, *Undergraduate*, Tufts University.

2019 **Felix Moses**, Berkeley High School.

2019 **Stephen Kwak**, Bellarmine High School.

2018 - 2019 **Xi Hu**, *Undergraduate*, CU Boulder.

Conference and Journal Review

Robotics Science and Systems (RSS)
IEEE Robotics and Automation Letters (RA-L)
ACM Transactions on Human-Robot Interaction (T-HRI)
International Journal of Human-Computer Interaction (IJHCI)
ACM/IEEE International Conference on Human-Robot Interaction (HRI)
IEEE International Conference on Robotics and Automation (ICRA)
IEEE International Conference on Intelligent Robots and Systems (IROS)
CHI: Conference on Human Factors in Computing Systems (CHI)
IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)
Explainable AI Planning Workshop (XAIP), ICAPS
Workshop on Explainable Artificial Intelligence (XAI), IJCAI