

Jack Kolb

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Education	Georgia Institute of Technology , Atlanta, GA	
	<i>PhD in Robotics</i>	2020 - Present
	<i>MS in Computer Science</i>	2023
	Advisor: Karen Feigh	
	Committee: Julie Adams, Sonia Chernova, Harish Ravichandar, Alan Wagner	
	University of California at Riverside , Riverside, CA	
	<i>BS in Mechanical Engineering (Cum Laude, Honors)</i>	2020
Research Experience	Cognitive Engineering Center , <i>Georgia Tech</i>	Atlanta, GA
	<i>Graduate Research Assistant</i>	Sept 2022 - present
	<ul style="list-style-type: none">• Investigating how household robots can estimate a co-located user's world belief state to intelligently support user queries and construct a shared mental model.• Applying LLMs and vision models to reason over estimated user belief states and summarize state information in task-driven collaborative human-AI teams.• Researching generative image manipulation of poses using text-guided instructions.• Developing autonomous aircraft wingmen using deep reinforcement learning and constrained control to support human pilots in collaborative high-risk missions.• Explored structuring shared human-AI decision-making processes to enhance user situational awareness and decision outcomes.• Wrote and awarded an \$80k grant from Amazon Consumer Robotics (Lab126).	
	Robot Autonomy and Interactive Learning Lab , <i>Georgia Tech</i>	Atlanta, GA
	<i>Graduate Research Assistant</i>	Sept 2020 - May 2022
	<ul style="list-style-type: none">• Applied machine learning to predict user teleoperation task performance and inform role assignment for multi-human multi-robot teaming.• Explored safe reinforcement learning techniques to improve sample efficiency in "pick-and-place" robot manipulation.• Wrote quarterly reports and presented research talks to grant sponsors.	
	Sundararajan Venkatadriagaram Research Group	Riverside, CA
	<i>Undergraduate Research Assistant</i>	Mar 2018 - June 2020
	<ul style="list-style-type: none">• Designed and prototyped an IOT sensor network to record and analyze vibrations of electric motors to classify motor damage and predict mechanical failure.• Tried system on university campus ventilation and water infrastructure, worked with university to commercialize system.	
Work Experience	Gatik AI	Mountain View, CA
	<i>Robotics Engineer (Intern)</i>	May 2022 - Aug 2022
	<ul style="list-style-type: none">• Designed and prototyped a novel graph neural network architecture for forecasting surrounding vehicle trajectories, tailored to Gatik's operational design domain.• Identified business-competitive research opportunities for Gatik's platform (autonomous vehicles for short-haul middle mile deliveries).• Presented design recommendations for improving Gatik's surrounding vehicle prediction module in a company-wide talk.	
	NextGen Assistive Technologies	Petaluma, CA
	<i>Software Engineer</i>	May 2020 - Aug 2020
	<ul style="list-style-type: none">• Developed the complete minimum viable product for a sensor-based smart home remote caregiving system, now deployed in 100+ homes.• Integrated sensor event intake, video conferencing, and event resolution, enabling each caregiver to support 10+ clients.	

UC Riverside Marine Robotics (RoboSub)

Project Lead ('18-20)

Mechanical Team Lead ('17-18)

Mechanical Team Member ('16-17)

Riverside, CA

Sept 2016 - Aug 2020

- Led 25+ members in the development of two autonomous marine robot platforms for aquatic navigation and interaction tasks.
- Researched and implemented systems for underwater autonomy, navigation, vision, mission control, and object interaction.
- Designed and manufactured physical hardware and systems architectures, wrote field test plans and procedures, and managed relationships with sponsors.
- Competed in the international RoboSub competition (2018, 2019, 2020).
- Awarded “Best Large-Scale Student Project” by UC Riverside (2019).

Conference Proceedings

14. **Use of Simulated Mental Models and Active Replanning for Human-Robot Interaction**
J. Ren*, A. Swaminathan*, **J. Kolb**, Y. Zhao, S. Coogan, K. Feigh.
Under review.
13. **Investigating Human-AI Team Fluency in Autonomous Medical Evacuation: A Study of Novice Aviator Cognitive States and Human-AI Interface Design**
S. Doda, R. Agbeyibor, C. Cortes, **J. Kolb**, J. Magalhaes, K. Feigh.
Under review.
12. **Human-AI Interaction in Autonomous Medical Evacuation Helicopters**
S. Doda, R. Agbeyibor, C. Cortes, **J. Kolb**, J. Magalhaes, K. Feigh.
Under review.
11. **Learning Complex Non-Rigid Image Edits from Multimodal Conditioning**
N. Warner, **J. Kolb**, M. Hahn, J. Huang, I. Essa, V. Birodkar.
Under review.
10. **Constructing Team Mental Models in Human-Robot Teams**
J. Kolb, A. Garg, N. Warner, K. Feigh.
Under review.
9. **Inferring Belief States in Partially-Observable Human-Robot Teams**
J. Kolb, K. Feigh.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024.
8. **Human-AI Collaboration in Autonomous Aerial Vehicles for ISR: Experience, Trust, and Perception**
R. Agbeyibor, V. Ruia, **J. Kolb**, K. Feigh.
HFES International Annual Meeting (ASPIRE), 2024.
7. **Towards Safe Collaboration Between Autonomous Pilots and Human Crews for Intelligence, Surveillance, and Reconnaissance**
R. Agbeyibor, V. Ruia, **J. Kolb**, C. Cortes, T. Mancao, S. Coogan, K. Feigh.
IEEE/AIAA Digital Avionics Systems Conference (DASC), 2024.
6. **Run Time Assurance and Human AI Fluency in Manned Autonomous Intelligence Surveillance and Reconnaissance**
R. Agbeyibor, V. Ruia, C. Cortes, **J. Kolb**, S. Coogan, K. Feigh.
AIAA Aviation Forum and Exposition, 2024.
5. **Impact of Abstraction Levels of Context Information on AI-Advised Decision Making for an Entry Descent and Landing Task**
D. Srivastava, **J. Kolb**, K. Feigh.
AIAA SciTech Forum and Exposition, 2024.

4. **The Effects of Robot Motion on Comfort Dynamics of Novice Users in Close-Proximity Human-Robot Interactions**
P. Howell, **J. Kolb***, Y. Liu*, H. Ravichandar.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.
3. **The Effects of Inaccurate Decision-Support Systems on Structured Shared Decision-Making for Human-Robot Teams**
J. Kolb, D. Srivastava, K. Feigh.
IEEE Intl. Conf. on Robot & Human Interactive Communication (RO-MAN), 2023.
2. **Leveraging Cognitive States in Human-Robot Teaming**
J. Kolb, H. Ravichandar, S. Chernova. [Best Student Paper Finalist]
IEEE Intl. Conf. on Robot & Human Interactive Communication (RO-MAN), 2022.
1. **Predicting Individual Human Performance in Human-Robot Teaming**
J. Kolb, M. Kishore, K. Shaw, H. Ravichandar, S. Chernova
IEEE Intl. Conf. on Robot & Human Interactive Communication (RO-MAN), 2021.

**Symposium &
Workshop
Proceedings**

4. **A Framework for Inferring Belief States in Partially-Observable Human-Robot Teams**
J. Kolb, K. Feigh.
40th Anniversary of the IEEE Conf. on Robotics and Automation (ICRA@40), 2024.
3. **Safe Dexterous Manipulation Using Geometric Boundary Constraints**
A. Jain*, **J. Kolb***, H. Ravichandar.
Safe Reinforcement Learning Workshop at the International Joint Conference on Artificial Intelligence (IJCAI), 2022.
2. **Evaluating the Effectiveness of Corrective Demonstrations and a Low-Cost Sensor for Dexterous Manipulation**
A. Jain*, **J. Kolb***, J. Abbess, H. Ravichandar.
Machine Learning in Human-Robot Collaboration Workshop at the International Conference on Human-Robot Interaction (HRI), 2022.
1. **Predicting Individual Human Performance in Human-Robot Teaming**
J. Kolb, M. Kishore, H. Ravichandar, S. Chernova
Workshop Your Study Design Workshop at the International Conference on Human-Robot Interaction (HRI), 2021.

**Professional
Activities**

Teaching

Teaching Assistant.

- CS6476: Computer Vision (Graduate Level) Sp2024, Fa2024, Sp2025
- CS6262: Network Security (Graduate Level) Su2024

Reviewing

- HFES ASPIRE (conference) 2023, 2024
- IEEE BioRob (conference) 2024
- IEEE/ACM HRI (conference) 2024
- IEEE ICRA (conference) 2025
- IEEE RO-MAN (conference) 2024

Advising

Formal mentoring of students on research projects.

- Ryan Bowers (MS at GaTech) 2024 - Present
Using deep reinforcement learning for controlling autonomous wingmen.
- Alagappan Swaminathan (MS at GaTech → PhD at GaTech) 2023 - Present
User belief state estimation for human-swarm command & control.
- Richard Agbeyibor (PhD at GaTech) 2022 - Present
Adaptive autonomy for human-AI systems and autonomous wingmen.
- Sanya Doda (PhD at GaTech) 2022 - Present
Real-time cognitive workload assessment from biometric sensors.
- Rohan Shrivastava (Lovett School) 2024
Identifying misinformation at internet-scale for computational anthropology.
- Pranav Gopalabhatla (BS at Purdue) 2023
Predicting asthma prevalence from air quality and environmental factors.
- Sia Godika (BS at MIT) 2023
Predicting malaria incidence in underdeveloped regions.
- Mayank Kishore (MS at GaTech → Founder at Mirage ML) 2021 - 2022
Virtual human-robot command & control tasks.

Awards

Amazon Consumer Robotics Grant (\$80k), 2022

Awarded to support my dissertation research to make robots estimate a user's belief state in household human-robot teaming domains.

IEEE RO-MAN – Best Student Paper Finalist (3/237, 1.2%), 2022

For my work on applying user cognitive skills to inform role assignment for robot teleoperation tasks.

HackGT – Winner, 2021

Awarded for RoboVR: a multi-user platform for teleoperating 10+ real-world robots in virtual reality.

UC Riverside – Best Large-Scale Student Project, 2019

Accepted on behalf of UCR Marine Robotics, for our work in designing and developing autonomous underwater vehicles.

CutieHack – Best UI/UX Award, 2019

Awarded for Schedulio: a collaborative platform for large-scale projects to schedule meetings and visualize availability.

CitrusHack – Winner, EquipoVision's Choice, 2018

Awarded for BlindSight: a hat that enabled “feeling” the proximity of surrounding objects through localized and directioned haptic vibrations.

Leadership & Involvement

Georgia Tech's Robotics Graduate Student Association (RoboGrads)

Robotics PhD VP ('23-24) 2021 - 2024

President ('22-23)

Treasurer ('21-22)

- Led RoboGrads' support of the academic, professional, and social development of GaTech's robotics research community.
- Supported graduate students by hosting student-led research seminars, mock qualifying exams, academia and industry panels, new student orientations, career and academic Q/A panels, and community socials.
- Worked with industry and academic partners to support Georgia Tech's robotics research and facilitate access to the robotics student talent pool.
- Represented graduate student interests to the robotics institute's administration.

UC Riverside's Department of Residential Life

Resident Advisor

2018 - 2020

- Supported students in residential communities as their primary point-of-contact.
- On-call first responder for fire, medical, mental, and safety crises for 1,200 residents.
- Conducted conflict resolution, emergency response, intentioned programming, engagement with resident diversity, long-term strategy for at-risk residents, and individual support of resident mental and academic health.
- Directly supported 250+ first-year undergraduate students through mentorship, community programming, and targeted community building.
- Peer-awarded MVP for the '18-19 and '19-20 academic years.

UC Riverside's IEEE Student Chapter

Projects Chair ('19-20)

2018 - 2020

RoboSub Liaison ('18-20)

- Hosted technical workshops for students: Python, Linux/Raspberry Pi, Arduino, Soldering, SolidWorks, 3D Printing, IOT, Circuit Design, ROS, Flask (webservers), Product Pitching.
- Oversaw four large-scale student projects to review project sustainability and design feasibility.
- Led large-scale community outreach events for 1,000+ community members, including an annual Boy Scout Merit Badge Day, Electrical and Computer Engineering Day, and various Hackathons.

Hackathons

- **Judge:** Prototypical '22, RoseHack '21-22
- **Mentor:** RoseHack '20, CitrusHack '19, CutieHack '18
- **Attendee:** VandyHacks '21, ShellHacks '21, HackGT '20-21, CutieHack '17-19, HackUCI '19, HackSC '19, BioHack '19, HackTech '18, HackIOT '18, CitrusHack '16-18, Enginuity '17