

# Jack Kolb

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<b>Summary</b>	<p>My goal is to enhance the performance, fluency, and capabilities of agents in human-centered domains. My experience spans smart homes, autonomous vehicles, aerospace, marine robotics, and household robotics, with publications in leading robotics conferences. In addition to technical skills in machine learning, systems engineering, computer vision, and robotics research, I bring strong project management and team leadership experience. I am seeking industry roles where I can contribute to building the next generation of embodied AI and advanced robotics for our unstructured, chaotic world.</p>	
<b>Tools</b> <b>Languages</b> <b>Skills</b>	<p>Git, HuggingFace, LangChain, Linux, OpenCV, PyTorch, ROS, scikit-learn, Unity3D C++, C#, Go, HTML/JS, Python Computer Vision, Foundation Models, Machine/Deep Learning, Human-AI Teaming</p>	
<b>Education</b>	<b>Georgia Institute of Technology</b> , Atlanta, GA	
	<i>PhD in Robotics</i>	2020 - 2025
	<i>MS in Computer Science</i>	2023
	Advisor: Karen Feigh	
	Committee: Julie Adams, Sonia Chernova, Harish Ravichandar, Alan Wagner	
	<b>University of California at Riverside</b> , Riverside, CA	
	<i>BS in Mechanical Engineering (Cum Laude, Honors)</i>	2020
<b>Work Experience</b>	<b>Gatik AI</b>	Mountain View, CA
	<i>Robotics Engineer (Intern)</i>	May 2022 - Aug 2022
	<ul style="list-style-type: none"><li>• Designed and prototyped a novel graph neural network architecture for forecasting surrounding vehicle trajectories, tailored to Gatik’s operational design domain.</li><li>• Identified business-competitive research opportunities for Gatik’s platform (autonomous vehicles for short-haul middle mile deliveries).</li><li>• Conducted a literature review and presented design recommendations for Gatik’s surrounding vehicle prediction module in a company-wide talk.</li></ul>	
	<b>NextGen Assistive Technologies</b>	Petaluma, CA
	<i>Software Engineer</i>	May 2020 - Aug 2020
	<ul style="list-style-type: none"><li>• Developed the complete minimum viable product for a sensor-based smart home remote caregiving system, deployed in 100+ homes and producing \$500k+ ARR.</li><li>• Integrated sensor event intake, video conferencing, and event resolution, enabling each caregiver to support 10+ clients via remote monitoring and interactions.</li></ul>	
	<b>UC Riverside Marine Robotics (RoboSub)</b>	Riverside, CA
	<i>Project Lead ('18-20)</i>	Sept 2016 - Aug 2020
	<i>Mechanical Team Lead ('17-18)</i>	
	<i>Mechanical Team Member ('16-17)</i>	
	<ul style="list-style-type: none"><li>• Led 25+ members in the development of two autonomous marine robot platforms for aquatic navigation and interaction tasks.</li><li>• Researched and implemented systems for underwater autonomy, navigation, vision, mission control, and object interaction.</li><li>• Designed and manufactured physical hardware and systems architectures, wrote field test plans and procedures, and managed relationships with sponsors.</li><li>• Competed in the international RoboSub competition (2018, 2019, 2020).</li><li>• Awarded “Best Large-Scale Student Project” by UC Riverside (2019).</li></ul>	

Research Experience	<b>Cognitive Engineering Center</b>	<i>Georgia Tech</i>
	<i>Graduate Research Assistant</i>	Sept 2022 - present
	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Applying LLMs and vision models to reason over estimated user belief states and summarize state information in task-driven collaborative human-AI teams.</li> <li>• Researching generative image manipulation of poses using text-guided instructions.</li> <li>• Developing autonomous aircraft wingmen using deep reinforcement learning and constrained control to support human pilots in collaborative high-risk missions.</li> <li>• Explored structuring shared human-AI decision-making processes to enhance user situational awareness and decision outcomes.</li> <li>• Wrote and awarded an \$80k grant from Amazon Consumer Robotics (Lab126).</li> <li>• Wrote papers accepted to leading robotics conferences – IROS, RO-MAN.</li> </ul>	
	<b>Robot Autonomy and Interactive Learning Lab</b>	<i>Georgia Tech</i>
	<i>Graduate Research Assistant</i>	Sept 2020 - May 2022
	<ul style="list-style-type: none"> <li>• Applied machine learning to predict user teleoperation task performance and inform role assignment, improving team performance by 24%.</li> <li>• Structured human demonstrations with offline training in “pick-and-place” robot manipulation, improving .</li> <li>• Wrote quarterly reports and presented research talks to grant sponsors.</li> <li>• Wrote papers accepted to leading robotics conferences – IROS, RO-MAN.</li> </ul>	
	<b>Sundararajan Venkatadriagaram Research Group</b>	<i>UC Riverside</i>
	<i>Undergraduate Research Assistant</i>	Mar 2018 - June 2020
	<ul style="list-style-type: none"> <li>• Designed and prototyped an IOT sensor network to record and analyze vibrations of electric motors to classify motor damage and predict mechanical failure.</li> <li>• Tried system on university campus ventilation and water infrastructure, worked with university to commercialize system.</li> </ul>	
Awards	<b>Amazon Consumer Robotics Grant (\$80k), 2022</b>	
	<i>Awarded to support my dissertation research on enabling robots to estimate a user’s belief state in household human-robot teaming domains.</i>	
	<b>IEEE RO-MAN – Best Student Paper Finalist (3/237, 1.2%), 2022</b>	
	<i>For my work on applying user cognitive skills to predict user performance at robot teleoperation tasks and inform role assignment.</i>	
	<b>HackGT – Winner, 2021</b>	
	<i>Awarded for RoboVR: a multi-user platform for teleoperating 10+ real-world robots in virtual reality.</i>	
	<b>UC Riverside – Best Large-Scale Student Project, 2019</b>	
	<i>Accepted on behalf of UCR Marine Robotics, for our work in designing and developing autonomous underwater vehicles.</i>	
	<b>CutieHack – Best UI/UX Award, 2019</b>	
	<i>Awarded for Schedulio: a collaborative platform for large-scale projects to schedule meetings and visualize availability.</i>	
	<b>CitrusHack – Winner, EquipoVision’s Choice, 2018</b>	
	<i>Awarded for BlindSight: a hat that enabled “feeling” the proximity of surrounding objects through localized and directioned haptic vibrations.</i>	
Professional Activities	<b>Teaching Assistant</b>	
	• CS6476: Computer Vision (Graduate Level)	Sp’24, Fa’24, Sp’25
	• CS6262: Network Security (Graduate Level)	Su’24

## 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 → PhD 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 (BS at Duke) 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.*

## Journal Papers

2. **Estimating Teammate Belief States in Human-Robot Teams**  
J. Kolb, A. Garg, N. Warner, K. Feigh.  
*Under review.*
1. **Attention-Tunable Safety Barriers for Fluent Human-Autonomy Coordination in Specialized Aviation Missions**  
C. Cortes, R. Agbeyibor, J. Kolb, K. Feigh, S. Coogan.  
*Under review.*

## Conference Proceedings

12. **Learning Complex Non-Rigid Image Edits from Multimodal Conditioning**  
N. Warner, J. Kolb, M. Hahn, J. Huang, I. Essa, V. Birodkar.  
*Under review.*
11. **Investigating Human-AI Team Fluency in Autonomous Medical Evacuation: A Study of Novice Aviator Cognitive States and HAI Interface Design**  
S. Doda, R. Agbeyibor, C. Cortes, J. Kolb, J. Magalhaes, K. Feigh.  
*AIAA Aviation Forum and Exposition, 2025.*
10. **Use of Simulated Mental Models and Active Replanning for Human-Robot Interaction**  
J. Ren\*, A. Swaminathan\*, J. Kolb, Y. Zhao, S. Coogan, K. Feigh.  
*AIAA SciTech Forum and Exposition, 2025.*
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**

5. **Human-AI Interaction in Autonomous Medical Evacuation Helicopters**  
S. Doda, R. Agbeyibor, C. Cortes, **J. Kolb**, J. Magalhaes, K. Feigh.  
*The Vertical Flight Society's 81st Annual Forum & Technology Display*, 2025.
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.