

# Jack Kolb

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| <b>Summary</b>         | I am a roboticist with a background in enhancing the performance, fluency, and capabilities of agents in human-centered domains. My experience spans smart homes, autonomous vehicles, aerospace, marine robots, and household robotics, with publications in leading robotics conferences. I am seeking roles where I can contribute to building the next generation of embodied AI for our chaotic and unstructured world.   |                          |                      |
| <b>Tools</b>           | Git, LangChain, Linux, OpenCV, PyTorch, ROS, scikit-learn, Unity3D   |                          |                      |
| <b>Languages</b>       | Python, C++, Go, HTML/JS, C#   |                          |                      |
| <b>Skills</b>          | Computer Vision, Foundation Models, Deep Learning, Human-AI Teaming  |                          |                      |
| <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>  | <i>Mountain View, CA</i> |                      |
|                        | <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>  | <i>Petaluma, CA</i>      |                      |
|                        | <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>  | <i>Riverside, CA</i>     |                      |
|                        | <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> |                          |                      |

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| Research Experience     | <b>Cognitive Engineering Center</b><br><i>Graduate Research Assistant</i><br>Georgia Tech<br>Sept 2022 - present <ul style="list-style-type: none"> <li>• Investigating how household robots can infer and apply a person’s world belief state for active assistance, team reasoning, and informed communication.</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><br><i>Graduate Research Assistant</i><br>Georgia Tech<br>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><br><i>Undergraduate Research Assistant</i><br>UC Riverside<br>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><br><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><br><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><br><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><br><i>Accepted on behalf of UCR Marine Robotics, for our work in designing and developing autonomous underwater vehicles.</i>  |
|                         | <b>CitrusHack – Winner, 2018</b><br><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> <ul style="list-style-type: none"> <li>• CS6476: Computer Vision (Graduate Level) Sp’24, Fa’24, Sp’25</li> <li>• CS6262: Network Security (Graduate Level) Su’24</li> </ul>   |

### Reviewing

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

### Invited Talks

- Georgia Tech OMSCS Seminar Series Feb 18, 2025  
*Inferring World Belief States in Human-Robot Teaming*
- Exponent Feb 4, 2025  
*Unraveling the Black Box: How systems can leverage cognitive, physiological, and mental states to improve human-AI teaming.*

### 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. **Inferring 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

9. **Model Cards for AI Teammates: Comparing Human-AI Team Familiarization Methods for High-Stakes Environments**  
R. Bowers, R. Agbeyibor, J. Kolb, K. Feigh.  
*Under review.*
8. **Learning Complex Non-Rigid Image Edits from Multimodal Conditioning**  
N. Warner, J. Kolb, M. Hahn, J. Huang, I. Essa, V. Birodkar.  
*Under review.*
7. **Inferring Belief States in Partially-Observable Human-Robot Teams**  
J. Kolb, K. Feigh.  
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024.*

6. **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.
5. **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.
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  
(selected)**

6. **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.
5. **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.
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. **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.
2. **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.
1. **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.