XIAOYI (JEREMY) CAI

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EDUCATION

Massachusetts Institute of Technology, Ph.D. in Aeronautics and Astronautics — Jul. 2019 - Present

Georgia Institute of Technology, M.S. in Electrical and Computer Engineering — Jan. 2018 - May 2019

Georgia Institute of Technology, B.S. in Electrical and Computer Engineering — Aug. 2014 - Dec. 2017

RESEARCH EXPERIENCE

Research Assistant — Jul. 2019 - Present
Aerospace Controls Lab (ACL) — Massachusetts Institute of Technology
Advisor: *Professor Jonathan P. How*

- Uncertainty quantification and risk-aware off-road navigation leveraging terrain semantics
- Multi-robot information gathering leveraging heterogeneous sensing and mobile capabilities
- Distributed task assignment for drone formation flying

Robotics Research Intern — Jun. 2023 - Sep. 2023
Dexterous Mobile Manipulation Team — The AI Institute
Collaborators: *Bernadette Bucher, Stephen Phillips, Jiuguang Wang*

- Traversability learning and risk-aware off-road navigation for a quadruped robot

Research Assistant — Jan. 2017 - May 2019
Georgia Robotics and Intelligent Systems (GRITS) Lab — Georgia Institute of Technology
Advisor: *Professor Magnus Egerstedt*

- Safe multi-robot planning leveraging Control Barrier Functions (CBFs)

PUBLICATIONS

(* indicates equal contribution)

Preprint

[A1] **X. Cai**, S. Ancha, L. Sharma, P. R. Osteen, B. Bucher, S. Phillips, J. Wang, M. Everett, N. Roy, and J. P. How, "Evora: Deep evidential traversability learning for risk-aware off-road autonomy," *arXiv preprint arXiv:2311.06234*, 2023 **(under review for T-RO)** (Project Website)

Journal

[J5] **X. Cai**, B. Schlotfeldt, K. Khosoussi, N. Atanasov, G. J. Pappas, and J. P. How, "Energy-aware, collision-free information gathering for heterogeneous robot teams," *IEEE Transactions on Robotics*, 2023 (Video)

[J4] S. Wilson, P. Glotfelter, S. Mayya, G. Notomista, Y. Emam, **X. Cai**, and M. Egerstedt, "The robotarium: Automation of a remotely accessible, multi-robot testbed," *IEEE Robotics and Automation Letters*, vol. 6, no. 2, pp. 2922–2929, 2021

[J3] P. C. Lusk, **X. Cai**, S. Wadhwania, A. Paris, K. Fathian, and J. P. How, "A distributed pipeline for scalable, deconflicted formation flying," *IEEE Robotics and Automation Letters*, vol. 5, no. 4, pp. 5213–5220, 2020 (Video)(Code)

[J2] R. Funada, **X. Cai**, G. Notomista, M. W. S. Atman, J. Yamauchi, M. Fujita, and M. Egerstedt, "Coordination of robot teams over long distances: From georgia tech to tokyo tech and back-an 11,000-km multirobot experiment," *IEEE Control Systems Magazine*, vol. 40, no. 4, pp. 53–79, 2020

[J1] P. Pierpaoli, A. Li, M. Srinivasan, **X. Cai**, S. Coogan, and M. Egerstedt, "A sequential composition framework for coordinating multirobot behaviors," *IEEE Transactions on Robotics*, pp. 1–13, 2020

Conference

[C6] **X. Cai**, M. Everett, L. Sharma, P. R. Osteen, and J. P. How, "Probabilistic traversability model for risk-aware motion planning in off-road environments," in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, 2023, pp. 11 297–11 304 (Video)(Code)

[C5] L. Sharma, M. Everett, D. Lee, **X. Cai**, P. Osteen, and J. P. How, "Ramp: A risk-aware mapping and planning pipeline for fast off-road ground robot navigation," in *2023 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE, 2023, pp. 5730–5736 (Video)

[C4] **X. Cai**, M. Everett, J. Fink, and J. P. How, "Risk-aware off-road navigation via a learned speed distribution map," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, 2022, pp. 2931–2937

[C3] **X. Cai***, B. Schlotfeldt*, K. Khosoussi, N. Atanasov, G. J. Pappas, and J. P. How, "Non-monotone energy-aware information gathering for heterogeneous robot teams," *International Conference on Robotics and Automation (ICRA)*, 2021 (Video)

[C2] A. Tagliabue*, J. Tordesillas*, **X. Cai***, A. Santamaria-Navarro, J. P. How, L. Carlone, and A.-a. Agha-mohammadi, "Lion: Lidar-inertial observability-aware navigator for vision-denied environments," *International Symposium on Experimental Robotics (ISER)*, 2020 (Video)

[C1] G. Notomista, **X. Cai**, J. Yamauchi, and M. Egerstedt, "Passivity-based decentralized control of multi-robot systems with delays using control barrier functions," *International Symposium on Multi-Robot and Multi-Agent Systems (MRS)*, pp. 231–237, 2019

TEACHING EXPERIENCE

Graduate Teaching Assistant Jan. 2018 - Dec. 2018
ECE 2035: Programming for Hardware/Software Systems Georgia Institute of Technology

- Designed student projects involving data structure and embedded system development
- Created grading scripts and managed a team of 7 undergraduate teaching assistants

WORK EXPERIENCE

Core Transports QA Intern May 2017 - Aug. 2017
Apple Inc., Core OS Cupertino, CA

- Developed Python tools for testing USB/Thunderbolt devices across power state transitions, e.g., sleep and restart
- Designed extensible test classes for adding future tests and invoking internal test tools

Hardware Engineering Intern Aug. 2015 - Dec. 2015
Panasonic Automotive System of America Atlanta, GA

- Wrote serial communication drivers for Atmel micro-controllers

PROFESSIONAL SERVICE

Peer Reviewer

- IEEE Transactions on Robotics (T-RO)
- International Journal of Robotics Research (IJRR)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Robotics and Automation Magazine (RAM)
- IEEE Control Systems Magazine (CSM)
- IEEE International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Automation Science and Engineering (CASE)
- IEEE Access
- Field Robotics