

Kehan Long

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EDUCATION

- **Ph.D., Computational Mathematics** 2025 (expected)
University of California, San Diego *La Jolla, CA*
- **M.S., Mathematics** 2022
University of California, San Diego *La Jolla, CA*
- **B.S., Applied Mathematics** 2019
University of Illinois, Urbana-Champaign *Champaign, IL*

RESEARCH INTERESTS

Relevant Fields: Robotics, Deep Learning, Optimization and Control, Safe Autonomy

- Sensor-based safe stabilizing control for robotic systems in unknown dynamical environments
- Reinforcement learning with stability and safety guarantees for robot control systems
- Theoretical and practical aspects of distributionally robust optimization and control

EXPERIENCE

- **Graduate Researcher** University of California, San Diego 2020 - Present
Advisors: Nikolay Atanasov, Jorge Cortes, and Melvin Leok
Working on various aspects of robotics, including safe motion planning and control, learning-based control, optimization-based control, decision-making under uncertainty, distributionally robust optimization, etc.
- **Research Resident** Toyota Research Institute of North America May - Sep 2024
Advisors: Georgios Fainekos and Bardh Hoxha
Working on modeling the geometry and developing efficient and safe control strategies for continuum robots.
Working on developing safe motion planning algorithms for tractor-trailer systems.
- **Student Researcher** University of Illinois, Urbana-Champaign 2018 - 2019
Advisor: Naira Hovakimyan
Working on implementations of deep reinforcement learning algorithms.

PUBLICATIONS

* indicates equal contribution

Preprints

- P2. **K. Long**, H. Parwana, G. Fainekos, B. Hoxha, H. Okamoto, N. Atanasov, “Neural Configuration Distance Function for Continuum Robot Control,” Submitted to IEEE International Conference on Robotics and Automation (ICRA), 2025. [\[arxiv\]](#) [\[code\]](#)
- P1. **K. Long**, Y. Yi, Z. Dai, S. Herbert, J. Cortés and N. Atanasov, “Sensor-Based Distributionally Robust Control for Safe Robot Navigation in Dynamic Environments,” submitted to International Journal of Robotics Research (IJRR). [\[arxiv\]](#) [\[code\]](#) [\[website\]](#)

Journals

- J4. **K. Long**, J. Cortés and N. Atanasov, “Distributionally Robust Policy and Lyapunov-Certificate Learning,” IEEE Open Journal of Control Systems (OJ-CSYS), vol. 3, pp. 375-388, 2024. [\[arxiv\]](#) [\[code\]](#)
- J3. P. Mestres, **K. Long**, N. Atanasov and J. Cortés, “Feasibility and Regularity Analysis of Distributionally Robust Safe Stabilizing Controllers,” IEEE Control Systems Letters (L-CSS), vol. 8, pp. 91-96, 2024. [\[arxiv\]](#)
- J2. **K. Long**, V. Dhiman, M. Leok, J. Cortés and N. Atanasov, “Safe Control Synthesis With Uncertain Dynamics and Constraints,” IEEE Robotics and Automation Letters (RA-L), 7(3), pp. 7295-7302, 2022. [\[arxiv\]](#)

- J1. **K. Long***, C. Qian*, J. Cortés and N. Atanasov, “Learning Barrier Functions With Memory for Robust Safe Navigation,” IEEE Robotics and Automation Letters (RA-L), 6(3), pp. 4931-4938, 2021. [\[arxiv\]](#)

Conferences

- C5. P. Mestres, **K. Long**, M. Leok, N. Atanasov and J. Cortés, “Stabilization of Nonlinear Systems through Control Barrier Functions,” IEEE Conference on Decision and Control (CDC), 2024. [\[arxiv\]](#) [\[code\]](#)
- C4. **K. Long**, K. Tran, M. Leok and N. Atanasov, “Safe Stabilizing Control for Polygonal Robots in Dynamic Elliptical Environments,” American Control Conference (ACC), 2024. [\[arxiv\]](#)
- C3. **K. Long**, Y. Yi, J. Cortés and N. Atanasov, “Distributionally Robust Lyapunov Function Search Under Uncertainty,” Learning for Dynamics and Control Conference (L4DC), 2023. [\[arxiv\]](#) [\[code\]](#)
- C2. **K. Long***, Y. Yi*, J. Cortés and N. Atanasov, “Safe and Stable Control Synthesis for Uncertain System Models via Distributionally Robust Optimization,” American Control Conference (ACC), 2023. [\[arxiv\]](#)
- C1. HJ. Yoon, H. Chen, **K. Long**, H. Zhang, A. Gahlawat, D. Lee and N. Hovakimyan, “Learning to Communicate: A Machine Learning Framework for Heterogeneous Multi-Agent Robotic Systems,” AIAA Scitech Forums, 2019. [\[arxiv\]](#)

SEMINARS & TALKS

- T3. “Sensor-Based Distributionally Robust Control Barrier Function for Safe Robot Navigation,” 44th Southern California Control Workshop, USC, Los Angeles, CA, Nov. 2024.
- T2. “Introduction to Control Lyapunov Functions and Control Barrier Functions and its Applications,” MAE 207 Guest Lectures, UC San Diego, La Jolla, CA, Nov. 2021.
- T1. “Safe and Stable Controller Synthesis for Robotic Systems with Errors in Measurements and System Dynamics,” 38th Southern California Control Workshop, UC Irvine, Irvine, CA, Oct. 2021.

PROFESSIONAL ACTIVITIES

- **Journal Reviewer:** IEEE Transactions on Robotics, IEEE Robotics and Automation Letter, IEEE Transactions on Automatic Control, IEEE/ASME Transactions on Mechatronics, IEEE Open Journal of Control Systems, IEEE Control System Letters, Advanced Robotics, Elsevier Mathematics and Computers in Simulation.
- **Conference Reviewer:** Robotics: Science and Systems (RSS) (2023), IEEE International Conference on Robotics and Automation (ICRA) (2021 - present), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (2021 - present), IEEE International Conference on Decision and Control (CDC) (2022 - present), American Control Conference (ACC) (2022 - present), ACM International Conference on Hybrid Systems: Computation and Control (HSCC) (2023).
- **Session Chair:** IEEE International Conference on Robotics and Automation (ICRA) 2021.
- **Society Membership:** IEEE Student Membership (2021 - present), IEEE Robotics and Automation Society (2023 - present), IEEE Control Systems Society (2024 - present).

TEACHING EXPERIENCE

- **Teaching Assistant**, MATH 171B: Intro Numerical Optimization: Nonlinear Programming Spring 2022
- **Teaching Assistant**, MATH 171A: Intro Numerical Optimization: Linear Programming Winter 2022
- **Teaching Assistant**, MATH 20E: Vector Calculus Fall 2021
- **Teaching Assistant**, MATH 193A: Actuarial Mathematics Summer 2021
- **Teaching Assistant**, MATH 170A: Intro Numerical Analysis: Linear Algebra Fall 2020
- **Teaching Assistant**, MATH 20D: Introduction to Differential Equations Summer 2020
- **Teaching Assistant**, MATH 18: Linear Algebra Spring 2020
- **Teaching Assistant**, MATH 20B: Calculus for Science and Engineering Winter 2020

MENTORING

- **M.S. Student:**

Kevin Shih (UCSD)

2024

Fengrui Zhang (UCSD)

2023

Yinzhuang Yi (UCSD)

2022–2023

- **Undergraduate Student:**

Xuezhou Xu (National University of Singapore)

Summer 2023

TECHNICAL SKILLS

- **Programming Languages:** Python, C++, MATLAB
- **Machine Learning and Robotics:** PyTorch, JAX, ROS, ROS2, CasADi, Gazebo, PyBullet
- **Tools:** Linux, L^AT_EX, Git