Ryan Kazuo Cosner

www.rkcosner.com

EDUCATION

California Institute of Technology
PhD, Mechanical Engineering, Advisor: Prof. Aaron D. Ames   *2019–2024*
MS, Mechanical Engineering   *2019–2021*

University of California, Berkeley
BS, Mechanical Engineering   *2015–2019*

PAST POSITIONS

Nvidia Corporation
Research Intern, Advisor: Prof. Marco Pavone   *Summer 2022*

Squishy Robotics
Mechatronics Intern, Advisor: Prof. Alice Agogino   *Summer 2019*

Ford Motor Company
Vehicle Evaluation and Verification Intern   *Summer 2018*

TEACHING

2024: Teaching Assistant for Mobile Robotics: Applications, Prof. Günter Niemeyer

2024: Teaching Assistant for Mobile Robotics: Theory & Algorithms, Prof. Günter Niemeyer

2023: Teaching Assistant for Nonlinear Control, Prof. Aaron D. Ames

2023: Teaching Assistant for Nonlinear Dynamics, Prof. Aaron D. Ames

ACADEMIC PUBLICATIONS

* indicates equal contribution

Journal Articles

[1] **Ryan K. Cosner**, Preston Culbertson, Aaron D. Ames. *Bounding Stochastic Safety: Leveraging Freedman's Inequality with Discrete-Time Control Barrier Functions.* IEEE, Control Systems Letters (CSL), 2024. (pdf)

[2] Max H. Cohen, **Ryan K. Cosner**, Aaron D. Ames. *Constructive Safety-Critical Control: Synthesizing Control Barrier Functions for Partially Feedback Linearizable Systems.* IEEE Control Systems Letters, 2024. (pdf)

[3] Devansh R. Agrawal*, Hardik Parwana*, **Ryan K Cosner***, Ugo Rosolia, Aaron D. Ames, Dimitra Panagou. *A Constructive Method for Designing Safe Multirate Control for Differentially-Flat Systems.* IEEE Control Systems Letters (CSL), 2021. (pdf)

[4] Tamas G. Molnar, **Ryan K. Cosner**, Andrew W. Singletary, Wyatt Ubellacker, Aaron D. Ames. *Model-Free Safety-Critical Control for Robotic Systems*. IEEE Robotics and Automation Letters (RAL), 2021. (pdf)

[5] Kunal Garg, **Ryan K. Cosner**, Ugo Rosolia, Aaron D. Ames, Dimitra Panagou. *Multi-rate Control Design under Input Contraints via Fixed-Time Barrier Functions*. IEEE Control Systems Letters (CSL), 2021. (pdf)

Conference Papers

[1] Gilbert Bahati, **Ryan K. Cosner**, Max H. Cohen, Ryan M. Bena, Aaron D. Ames. *Control Barrier Function Synthesis for Nonlinear Systems with Dual Relative Degree*. Submitted to the American Controls Conference (ACC), 2025.

[2] **Ryan K. Cosner**, Igor Sadalski, Jana K. Woo, Preston Culbertson, Aaron D. Ames. *Generative Modeling of Residuals for Real-Time Risk-Sensitive Safety with Discrete-Time Control Barrier Functions*. International Conference on Robotics and Automation (ICRA), 2024. (pdf)

[3] Preston Culbertson, **Ryan K. Cosner**, Maegan Tucker, Aaron D. Ames. *Input-to-State Stability in Probability* . Conference on Decision and Control (CDC), 2024. (pdf)

[4] **Ryan K. Cosner**, Preston Culbertson, Andrew J. Taylor, Aaron D. Ames. *Robust Safety under Stochastic Uncertainty with Discrete-Time Control Barrier Functions*. Robotics: Science and Systems (RSS), 2023. (pdf)

[5] **Ryan K. Cosner**, Yuxiao Chen, Karen Leung, Marco Pavone. *Learning Responsibility Allocations for Safe Human-Robot Interaction with Applications to Autonomous Driving*. International Conference on Robotics and Automation (ICRA), 2023. (pdf)

[6] Shushant Veer, Karen Leung, **Ryan K. Cosner**, Yuxiao Chen, Marco Pavone. *Receding Horizon Planning wiht Rule Hierarchies for Autonomous Vehicles*. International Conference on Robotics and Automation (ICRA), 2023. (pdf)

[7] **Ryan K. Cosner**, Yisong Yue, Aaron D. Ames. *End-to-End Imitation Learning with Safety Guarantees using Control Barrier Functions*. Conference on Decision and Control (CDC), 2022. (pdf)

[8] Andrew J. Taylor*, Victor D. Dorobantu*, **Ryan K. Cosner***, Yisong Yue, Aaron D. Ames. *Safety of Sampled-Data Systems with Control Barrier Functions via Approximate Discrete Time Models*. Conference on Decision and Control (CDC), 2022. (pdf)

[9] **Ryan K. Cosner**, Maegan Tucker, Andrew J. Taylor, Kejun Li, Tamas G. Molnar, Anil Alan, Gabor Orosz, Yisong Yue, Aaron D. Ames. *Safety-Aware Preference-Based Learning for Safety-Critical Control*. Learning for Dynamics and Control Conference (L4DC), 2022. (pdf)

[10] **Ryan K. Cosner***, Ivan D. Jimenez Rodriguez*, Tamas G. Molnar, Wyatt Ubellacker, Yisong Yue, Aaron D. Ames, Katherine L. Bouman. *Self-Supervised Online Learning for Safety-Critical Control using Stereo Vision*. International Conference on Robotics and Automation (ICRA), 2022. (pdf)

[11] **Ryan K. Cosner**, Andrew W. Singletary, Andrew J. Taylor, Tamas G. Molnar, Aaron D. Ames. *Measurement-Robust Control Barrier Functions: Certainty in Safety with Uncertainty in State*. International Conference on Intelligent Robots and Systems (IROS), 2021. (pdf)

[12] Noel Csomay-Shanklin*, **Ryan K. Cosner*** , Min Dai*, Andrew J. Taylor, Aaron D. Ames. *Episodic Learning for Safe Bipedal Locomotion with Control Barrier Functions and Projection-to-State Safety.* Learning for Dynamics and Control Conference (L4DC), 2021. (pdf)

[13] Sarah Dean, Andrew J. Taylor, **Ryan K. Cosner**, Benjamin Recht, and Aaron D. Ames. *Guaranteeing Safety of Learned Perception Modules via Measurement-Robust Control Barrier Functions.* Conference on Robotic Learning (CoRL), 2020. (pdf)
<u>Best Student Paper Finalist</u>.

Patents

[1] **Ryan K. Cosner**, Yuxiao Chen, Karen Leung, Marco Pavone. *Allocating responsibility for autonomous and semi-autonomous machine interactions and applications.* Pub. No.: US 2024/0160913 A1, 2024.

[2] Shushant Veer, Karen Leung, **Ryan K. Cosner**, Yuxiao Chen, Marco Pavone. *Ego trajectory planning with rule hierarchies for autonomous vehicles.* Pub. No.: US 2024/0199074 A1. 2024.

Workshops and Invited Presentations

[1] **Ryan K. Cosner**. *Stochastic Safety Guarantees for Real-World Systems using Discrete-Time Control Barrier Functions.* Southern California Controls Workshop, 2024.

[2] **Ryan K. Cosner**. *CBF-based Safety for Real-World Robotic Systems.* Conference on Decision and Control (CDC) workshop, "Control Barrier Functions: Recent developments and future directions", 2023.

[3] Glen Chou, Shushant Veer, Heng Yang, **Ryan K. Cosner**, Marco Pavone. *Workshop on Safe and Robust Learning for Perception-based Control.* American Controls Conference (ACC), 2023. (website)

SERVICE AND OUTREACH

1. **Academic Peer Reviewer (28 papers)**: (1) ACC 2022, (1) L4DC 2022, (2) CDC 2022, (1) MECC 2022, (1) NeuRips 2023, (4) L4DC 2023, (5) ICRA 2023, (2) CDC 2023, (2) TAC 2023, (2) Automatica 2023, (1) LCSS 2023, (2) RAL 2023, (1) TCST 2023, (3) CSL 2024.

2. **Caltech Center for Teaching, Learning, and Outreach**, Tour Guide. Provided lab tours for middle and high school students. 2021-Present.

3. **Caltech Triathlon,** President. Organized 3 weekly workouts and 15 team races, 2021-2024.

4. **Caltech Graduate Workers and Postdocs United**, Community Organizer. 2023-Present.

5. **Manhattan Beach Unified School District Community Panel for Equity**, Organizer. 2020.

6. **Science Olympiad**, Test Writer and Event Supervisor. Wrote exams and supervised events for the Southern California State-Level Science Olympiad Competition, 2023.

7. **Caltech Rise**, Volunteer Tutor. Tutored public school students struggling in math and science, 2019-2021.

8. **UC Berkeley**, Campus Ambassador. Gave tours of the UC Berkeley, 2016-2019.

9. **United Technologies for Kids**, Volunteer Teacher. Taught engineering to middle and high school students in English and Spanish in Peru, Summer 2017.

Student Advising

1. Gilbert Bahati (PhD student, 2024)

2. Igor Sadalski (Caltech Summer Undergraduate Research Fellow, 2023 – now at Somite Therapeutics)

3. Jana K Woo (Caltech Summer Undergraduate Research Fellow, 2023)

Awards

1. **Outstanding Teaching Assistant Award**, *Mechanical and Civil Engineering Department, Caltech*, 2024.

2. **Best Student Paper Finalist**, *Conference on Robotic Learning*, 2020.

3. **Graduate Student Fellowship**, *Rose Hills Foundation*, 2020.

4. **High Honors at Graduation**, *UC Berkeley*, 2019.

5. **Alexander and Ethel Levens Mechanical Engineering Award**, *UC Berkeley*, 2017.

6. **Regents' and Chancellor's Scholar**, *UC Berkeley*, 2015–2019.

7. **Chevron Academic Scholar**, *Chevron, El Segundo*, 2015.