Matthew Kim

Email ⋄ Scholar ⋄ LinkedIn

EDUCATION

University of California, San Diego   La Jolla, CA
Computer Science (B.S.) – GPA: 3.8/4.0   Aug 2022 - Jun 2026

Relevant Coursework: Search and Optimization, Deep Learning, Deep Reinforcement Learning.
Societies: Korean-American Scientists and Engineers Association, Association of Computing Machinery.

RESEARCH EXPERIENCE

Safe Autonomous Systems Lab – UC San Diego   La Jolla, PA
UG Researcher - PI: Prof. Sylvia Herbert   Sep 2022 - Present
- Investigated safety in learning-based controllers for autonomous systems through Hamilton-Jacobi Reachability.
- Developed scalable methods for verifying and improving safety guarantees in neural control policies.
- Mentored undergraduate researchers, guiding them through onboarding and introducing them to lab projects.

Intent Lab – Carnegie Mellon University (Robotics Institute)   Pittsburgh, PA
Robotics Institute Summer Scholar - PI: Prof. Andrea Bajcsy   Jun 2025 - Sep 2025
- Conducted research on how world models and latent safety filters behave under partially observable constraints.
- Designed a mutual information-based metric to quantify the observability of safety-critical features in latent spaces.
- Introduced and deployed a multimodal-supervised training strategy to shape safer latent state representations.

PUBLICATIONS

Kim, M.*, Nakamura, K.*, & Bajcsy, A. (2025). What You Don't Know Can Hurt You: How Well do Latent Safety Filters Understand Partially Observable Safety Constraints? *Submitted to IEEE International Conference on Robots and Automation (ICRA) 2026.*

Kim, M., Sharpless, W., Jeong, H. J., Tonkens, S., Bansal, S., & Herbert, S. (2025). Reachability Barrier Networks: Learning Hamilton-Jacobi Solutions for Smooth and Flexible Control Barrier Functions. *Submitted to IEEE International Conference on Robots and Automation (ICRA) 2026.*

Sharpless, W., Shinde, N., **Kim, M.**, Chow, Y. T., & Herbert, S. (2023). Koopman-Hopf Hamilton-Jacobi Reachability and Control. arXiv preprint arXiv:2303.11590.

WORKSHOP PAPERS

Kim, M., Sharpless, W., Jeong, H. J., Tonkens, S., Bansal, S., & Herbert, S. (2025). Reachability Barrier Networks: Learning Hamilton-Jacobi Solutions for Smooth and Flexible Control Barrier Functions. *Scalable and Resilient Multi-Robot Systems, RSS 2025.*

Kim, M., Sharpless, W., Jeong, H. J., Tonkens, S., Bansal, S., & Herbert, S. (2025). Reachability Barrier Networks: Learning Hamilton-Jacobi Solutions for Smooth and Flexible Control Barrier Functions. *Safe and Robust Robot Learning for Operation in the Real World, CoRL 2025.*

HONORS AND AWARDS

- **Robotics Institute Summer Scholar (2025)** – Awarded stipend to pursue research at Carnegie Mellon University.
- **Triton Research and Experiential Learning Scholar (2023)** – Awarded stipend to pursue research at home institution (UC San Diego).
- **Regents Scholar (2022)** – Selected as one of less than 0.1% of applicants based on academic excellence.