Chun-Wei Kong

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Short Bio: I am a PhD student in Aerospace Engineering Sciences at CU Boulder. My research develops machine-learning and formal-methods approaches for control and decision-making with provable guarantees, enabling intelligent, high-performance, and trustworthy autonomy in safety-critical systems.

Education

Aug. 2023 – May 2028 (expected) **Ph.D. in Aerospace Engineering Sciences (GPA: 4.0/4.0)**, *University of Colorado Boulder*, Research Focus: Physics-informed Neural Network, Stochastic Systems, Formal Verification and Synthesis.

Sept. 2021 – Apr. 2023 **M.S. in Aerospace Engineering (GPA: 4.0/4.0)**, *University of Michigan, Ann Arbor*, Course highlights: Machine Learning, Modern Physics, Model Predictive Control, Computational Fluid Dynamics.

Sept. 2015 – Jun. 2019 **B.S. in Aeronautics and Astronautics (GPA: 3.93/4.3)**, *National Cheng Kung University, Taiwan*, Graduated with full-tuition scholarship; submitted three journal papers.

Research Experience in Control, Robotics & Machine Learning

May 2024 – Present **Research Lead, Error Bounds for Physics-Informed Neural Networks (PINNs)** , *University of Colorado Boulder*

- Developed error–bounding framework for PINN solutions of linear PDEs, enabling provably correct use of learned models in control and estimation.
- Extending the method to high-dimensional systems for safety-critical, uncertainty-aware control of robotic and aerospace platforms.

Apr. 2025 – Present **Research Assistant, Emirates Mission to the Asteroid Belt (EMA)**, *University of Colorado Boulder*

- Design and test GNC algorithms for the EMA spacecraft, including image-based navigation and closed-loop attitude/orbit control for asteroid fly-bys.
- Run Monte Carlo campaigns to assess GNC robustness to orbit-determination errors and uncertain asteroid shape and dynamics.

May 2024 – Apr. 2025 **Research Assistant, Automatic Satellite Fault Identification** , *University of Colorado Boulder*

- Developed satellite fault-identification algorithms using digital twins in the Basilisk dynamics and control simulator.
- Designed an active fault-ID scheme that reduced misclassification from 5.5% to 0.5% and halved detection latency in closed-loop simulations.

Aug. 2023 – May 2024 **Research Assistant, Concepts for Ocean Worlds Life Detection Technology (NASA COLDTech)** , *University of Colorado Boulder*

- Worked with NASA's Ocean Worlds Autonomy Testbed on an autonomy architecture for scientist-in-the-loop exploration under high latency and low bandwidth.
- Maintained and upgraded core software to ensure build stability and compatibility with evolving scientific libraries.

Publications

Peer-Reviewed Publications

- C. Kong, M. Lahijanian, & J. McMahon, "Certified Stochastic Control via Covariance Steering with Pick-to-Learn," accepted to IEEE Conference on Decision and Control (CDC), 2026.
- C. Kong, J. McMahon, & M. Lahijanian, "Training with Hard Constraints: Learning Neural Certificates and Controllers for SDEs," presented at International Conference on Neuro-Symbolic Systems (NeuS), 2026.
- C. Kong, L. Laurenti, J. McMahon, & M. Lahijanian, "Error Bounds for Physics-Informed Neural Networks in Fokker-Planck PDEs," in Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI), 2025.
- C. Kong, J. McMahon, & M. Lahijanian, "Bayesian Diagnosability and Active Fault Identification," in Proceedings of the Conference on Decision and Control (CDC), 2025.
- C. Kong, M. Lahijanian, & J. McMahon, "Learning Orbital Uncertainty with Quantified Error Bounds for Conjunction Analysis," in Proceedings of the AAS/AIAA Astrodynamics Specialist Conference, 2025.
- C. Kong et al., "Simulation-Based Methodology for Assessing Forced Merging Strategies for Autonomous Vehicles," *IEEE ACC*, 2023.
- B. Lin, C. Kong et al., "A Control Framework for CubeSat Rendezvous and Proximity Operations using Electric Propulsion," *AAS/AIAA Astrodynamics*, 2023.
- C. Kong, M. Lo et al., "Conceptual Design of a Lunar Drone Operated using In-situ Propellant," *AIAA ASCEND*, 2023.
- S. Ahmed, C. Kong et al., "A Data-Driven Dynamic Obstacle Avoidance Method for Liquid-Carrying Plant Protection UAVs," *Agronomy*, 2022.

Under Review

- C. Kong, M. Lahijanian, & J. McMahon, "Physics-informed Learning for Orbital Uncertainty Propagation with Error Bounds," submitted to Journal of Guidance, Control, and Dynamics, 2026.

Technical Skills

- C++, Python, Linux, Git, MATLAB, Simulink, SolidWorks, ANSYS, Visual Studio

Leadership & Service

- College Senator, Graduate and Professional Student Government: representing the interests of graduate and professional students in shared governance at CU Boulder.
- Graduate Instructor: Spacecraft Technology (55 M.S. students) and Modern Physics Lab (40 undergraduates).
- Summer Camp Assistant, Girls in Science & Engineering: facilitated hands-on STEM workshops.

Awards

- Lead TA Fellowship, AES Graduate Student Award, University of Colorado Boulder.
- Tau-Beta-Pi Engineering Honor Society (top 1%), University of Michigan Ann Arbor.