YI-HSUAN CHEN

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Research Interest

Robotics, Dynamics and Control, Motion Planning, Multi-agent Systems, Flight Control Systems

Education

University of Maryland (UMD) — **College Park, USA**
Ph.D. in Aerospace Engineering — Aug. 2022 - May 2027 (Expected)
- Motion and Teaming (Mo-T) Lab, Advisor: Dr. Michael Otte

King Abdullah University of Science and Technology (KAUST) — **Thuwal, Saudi Arabia**
M.S. in Mechanical Engineering (GPA : **3.81/4.00**) — Aug. 2020 - May 2022
- Robotics, Intelligent Systems, and Control (RISC) lab, Advisor: Dr. Eric Feron

National Cheng Kung University (NCKU) — **Tainan, Taiwan**
B.S. in Aeronautics and Astronautics (GPA : **4.07/4.3**, graduate ranking: **2/66**) — Sep. 2015 - Jun 2019
- Intelligent Embedded Control (IEC) Lab, Advisor: Dr. Chao-Chung Peng

Professional Experience

Graduate Research Assistant, Mo-T lab at UMD — Aug. 2022 – PRESENT
- Researching on reachable set-based motion framework by integrating zonotopes and sampling-based planner for enhanced autonomous navigation safety.
- Developing a safe planning framework by exploring control barrier functions, convex optimization, and set operations (Minkowski sum) in computational geometry.

Master Thesis Research, RISC lab at KAUST — Aug. 2020 – May 2022
- Designed a triple-integral control framework to counteract the unknown aerodynamic drag that will be increasing quadratically with time during zero-gravity flight. [Project link][Youtube link]
- Built a flight simulator in Simulink to verify the proposed control strategy and visualized it in FlightGear.
- Published findings in AIAA SciTech 2023, with follow-up research accepted for SciTech 2025.

Undergraduate Researcher, IEC lab at NCKU — Jan. 2018 – Dec. 2019
- Developed a fault-tolerant flight control system combining reconfiguration techniques with sacrificial yaw control, enabling successful recovery from single motor failures. [Project link] [Youtube link]
- Collaborated with Information and Communications Research Laboratories of Industrial Technology Research Institute.

Selected Course Projects

Hands on Autonomous Aerial Robotics (UMD), Lecturer: Dr. Joseph Conroy — 2024 Spring

Group Project: ***"Fast-Planner ROS2 Implementation, and Multiple AprilTags Detection and Navigation."***
- Implemented cross-platform compatibility by migrating Fast-Planner from ROS1 to ROS2 through ROS1-bridge and Docker image, enabling system integration between PX4, QGroundControl, and Gazebo. [Project link] [Youtube link]
- Integrated real-time detection of multiple AprilTags and realized sequential waypoints navigation using Modal AI VOXL 2 drone using PX4 offboard control. [Youtube link]

Advanced Dynamics (UMD), Lecturer: Dr. Derek Paley — 2023 Spring

Project title: ***"Torque-Free Motion of a Rigid Body."*** [Project link][Youtube link]
- Derived and validated dynamical models for torque-free rigid body dynamics through numerical simulations, allowing accurate trajectory prediction and visualization in the inertial frame trajectory predictions.

Dynamic Programming and Optimal Control (KAUST), Lecturer: Dr. Meriem Taous Laleg — 2021 Spring

Project title: ***"NMPC for Quadrotor trajectory tracking with constrained inputs."*** [Project link][Youtube link]
- Implemented a quaternion-based nonlinear model predictive controller to realize trajectory tracking with constrained inputs using open source optimization tool CasADi.

Technical Skills

Programming Languages	Python, MATLAB/Simulink, C/C++, Julia, , LabVIEW, LaTeX
Engineering Tools	PyTorch, Linux/Ubuntu, Git, ROS/ROS2, Docker, AutoCAD/CATIA
Optimization Softwares	Mosek, Yalmip, CasADi, SOSTOOLS, CVX
Relevant Coursework	Linear/Nonlinear Systems, FeedForward/Optimal/Stochastic/Robust Control
Languages	English (advanced), Mandarin (native), Taiwanese (fluent)

Publication

1. **Chen, Yi-Hsuan**, Shou Liu, Wei Xiao, Calin Belta, and Michael Otte. "Control Barrier Functions via Minkowski Operations for Safe Navigation among Polytopic Sets." *arXiv Preprint (Accepted in CDC 2025)*.
2. Mohammed Nasser Aldosari, **Chen, Yi-Hsuan**, Adeel Akhtar, and Eric Feron. "Acceleration Feedback Control for Atmospheric Reduced Gravity Flights." In *AIAA SCITECH 2025 Forum*. 2025.
3. **Chen, Yi-Hsuan**, and Eric Feron. "Design of Longitudinal Control for Reduced-Gravity Atmospheric Flights." In *AIAA SCITECH 2023 Forum*. 2023.
4. Lien, Yu-Hsuan, Chao-Chung Peng, and **Yi-Hsuan Chen**. 2020. "Adaptive Observer-Based Fault Detection and Fault-Tolerant Control of Quadrotors under Rotor Failure Conditions." In *Applied Sciences*. 10, no. 10: 3503.

Awards & Honors

Government Scholarship to Study Abroad (GSSA) 2024-2026
- Awarded prestigious and highly competitive research award from Taiwan Ministry of Education for Overseas Study (22 Engineering recipients nationwide).

Gustave J. Hokenson Fellowship (UMD) 2023
- Distinguished fellowship nominated by Aerospace Engineering faculty for academic excellence.

Honorary Member of Phi Tau Phi Scholastic Honor Society (NCKU) 2019
- Awarded university's highest honor, granted to top 1% of graduates for outstanding academic merit and moral integrity.

Professor Li Ke-Rang Scholarship (NCKU) 2018
- Selected among top five Aerospace Engineering students for academic excellence and research potential.

Academic Achievement Award*3 (NCKU) 2015 – 2019
- Consistently maintained top 10% class ranking and Dean's List honors throughout undergraduate studies.

Distinguished Physics Contest Award (NCKU) 2016
- Achieved top 10% standing in competitive university-wide physics contest among peer candidates.

Academic Experience

Teaching Assistant on Aircraft Flight Dynamics (UMD) Aug. 2024 - Dec. 2024
- Mentored undergraduate students on flight dynamics through regular office hours and provided comprehensive feedback on technical assignments.

Course Developer (Mechatronics Program at University of Shady Grove) Jun. 2024 - Aug. 2024
- Developed hands-on Arduino-based laboratory projects aligned with course learning objectives, including sensor integration, motor control, and automation systems.

Teaching Assistant on Control of Aerospace Systems (UMD) Jan. 2023 - May. 2023 & 2025
- Developed and delivered weekly 50-minute review lectures on control theory, engaging students through interactive problem-solving and analytical discussions.

References

Dr. Michael Otte (otte@umd.edu)
Assistant Professor, Department of Aerospace Engineering
Affiliated with Maryland Robotics Center
University of Maryland, College Park

Dr. Calin Belta (calin@umd.edu)
Brendan Iribe Endowed Professor, Department of Electrical and Computer Engineering
Affiliated with Maryland Robotics Center and Institute of Systems Research
University of Maryland, College Park

Dr. Eric Feron (eric.feron@kaust.edu.sa)
Professor, Department of Electrical and Computer Engineering
Joint Appointment, Mechanical Engineering and Bioengineering
King Abdullah University of Science and Technology