YI-HSUAN CHEN

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Research Interest

Dynamics and Control, Autonomous system, Flight Mechanics

Education

King Abdullah University of Science and Technology (KAUST) **Thuwal, Saudi Arabia**
Master's in Mechanical Engineering, Cumulative GPA : 3.81/4.00 Aug. 2020 - Present
Robotics, Intelligent Systems, and Control (RISC) lab Advisor: Prof. Eric Feron

- Related Courses: Linear Systems, Nonlinear Systems, Dynamic Programming and Optimal Control

National Cheng Kung University (NCKU) **Tainan, Taiwan**
B.S. in Aeronatics and Astronautics, Overall GPA: 4.07/4.3 Sep. 2015 - Jun 2019
Intelligent Embedded Control (IEC) Lab Advisor: Prof. Chao-Chung Peng

- Related Courses: Computer Control of Feedback System, Signal and Systems, Feedforward Control, Optimal Control, Programming Design

Research Experience

Master Thesis Student **Aug. 2020 – Present**
Department of Mechanical Engineering KAUST, SA
Thesis title: "Design of longitudinal control for reduced-g parabolic flight"

- Advisor: Prof. Eric Feron
- Designed a triple-integral controller based on the internal model principle (IMP) to counteract the unknown quadratically increasing aerodynamic drag during parabolic flight.
- Developed a control algorithm that tracked airspeed and flight path angle generated by projectile motion to achieve parabolic flight.

Graduate Course Research Project **Jan. 2021 – May 2021**
EE376 - Dynamic Programming and Optimal Control KAUST, SA
Project title: "NMPC for Quadrotor trajectory tracking with constrained inputs"

- Advisor: Prof. Meriem Taous Laleg
- Developed a nonlinear model predictive controller to realize trajectory tracking subject to constrained inputs.
- Formulated quadrotor control as an Optimal Control Problem (OCP), that is further transformed into a Nonlinear Programming Problem (NLP), and solved it by optimization tool CasADi.

Undergraduate Researcher **Jan. 2018 – Dec. 2019**
Department of Aeronautics and Astronautics NCKU, TW
Project title: "Fault Tolerant Control of a quadrotor under actuator failures"

- Advisor: Prof. Chao-Chung Peng
- Applied reconfiguration technique combined with sacrificing yaw control to recover flight control in the presence of single motor failure.
- Realized time-variant heading flight control that utilized transformation between global and local errors.

Project title: "Dynamics Modeling and Control for UAV system"

- Advisor: Prof. Chao-Chung Peng
- Applied Lagrangian mechanics on modeling of quadrotor, and using feedback linearization to design the PID controller.
- Built the visualized flight simulator and validated control algorithm with Simulink.
- Collaborated with Information and Communications Research Laboratories of Industrial Technology Research Institute (ITRI).

Publication

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.", *Applied Sciences*. 10, no. 10: 3503. https://doi.org/10.3390/app10103503.

Teaching Experience

Teaching Assistant in Engineering Mathematics Sep. 2019 - Jun. 2020
Department of Aeronautics and Astronautics Tainan, Taiwan

- Provided consultation in regular TA hours and graded assignments and exams.

After-School Part-time Tutor Opt. 2018 – June 2019
National Tainan Chia-Chi Senior High School Tainan, Taiwan

- Offered after-school consultation in Mathematics and Physics for high school students

Awards & Honors

Honorary Member of Phi Tau Phi Scholastic Honor Society 2019

- The highest honor given to the top 1% of graduates in university, based on excellence academic achievements as well as moral conduct.

Professor Li Ke-Rang Scholarship 2018

- For university students who are the top five students in their department
- A well-known scholarship sponsored by the Honorary Prof. Li, Ke-Rang

Academic Achievement Award*3 (Top 10% in class each academic year) 2015 – 2019

Distinguished Physics Contest Award (Top 10% of all candidates) 2016

Technical Skills

Programming Languages	MATLAB, C++, Python, LabVIEW, LaTeX
Engineering Tools	AutoCAD, CATIA, PSoC Creater, ROS
Languages	Mandarin (native), English (advanced), Taiwanese (fluent)

- TOEFL iBT: 104 (Reading: 29 | Listening: 27 | Speaking: 22 | Writing: 25)
- GRE: 324 (Verbal: 157 | Quantitative: 167 | AWA: 3.0)

Volunteer Experience

Taiwan-United States Alliance (TUSA) Global Ambassador Scholarship Program 2019

- Volunteered as a Language Exchange Partner to improve English speaking skills
- Assisted international students in settling into life in Tainan