TZU-YUAN HUANG

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EDUCATION

Chair of Information-oriented Control, Technical University of Munich Sep. 2023 - Now
Ph.D. student, Konrad Zuse School of Excellence in Reliable AI (RelAI) Munich, Germany

- Advisor: Prof. Sandra Hirche
- Research Interest: Safe Diffusion Models for Learning-Based Control in Robot Systems Consider state and input constraints
- SeaClear 2.0 Project: Design an autonomous robotic system to collect marine litter. Currently focus on robot grasping orientation generation.

Dep. of Electr. Eng., National Cheng Kung University (NCKU) Sep. 2018 - Sep. 2020
Master of Science Tainan, Taiwan

- Overall GPA: 4.09/4.3
- Master's Thesis: *Study on Motion Planning for Industrial Manipulators Based on Kinematic Constraints and Dynamic Constraints*; advisor: Prof. Ming-Yang Cheng
- Best Presentation Paper, 2019 International Conference on Advanced Robotics and Intelligent Systems

Dep. of Mech. Eng., National Cheng Kung University (NCKU) Sep. 2014 - Jun. 2018
Bachelor of Science Tainan, Taiwan

- Overall GPA: 3.7/4.0;
- Mechanical Engineering Capstone Project: A bionic teleoperated robot with Theo Jansen's leg mechanism and 4 Degree of Freedom (DoF) robotic arm
- Dean's list (top 10% academic performance of the class in the academic year, 2016)

PUBLICATIONS

1. **T. Huang**, S. Zhang, X. Dai, A. Capone, V. Todorovski, S. Sosnowski, S.Hirche, 2024, "Learning-based Prescribed-Time Safety for Control of Unknown Systems with Control Barrier Functions," *IEEE Control Systems Letters.*
2. S. Zhang, DH. Zhai, X. Dai, **T. Huang**, Y. Xia, S. Hirche, 2024, "Learning-based Parameterized Barrier Function for Safety-Critical Control of Unknown Systems," *63th Conference on Decision and Control.*
3. H. Huang, M. Cheng, and **T. Huang**, 2023, "A Rapid Base Parameter Physical Feasibility Test Algorithm for Industrial Robot Manipulator Identification Using a Recurrent Neural Network," *IEEE Access.*
4. J. Wong, M. Cheng, and **T. Huang**, J. Kuo, J. Wu, 2023, "On the Relationship between the Desired Feedrate and Contour Error Constraints for 2-DOF Robot Manipulators Performing Parametric Curve Following," *International Automatic Control Conference (CACS).*

PATENT

1. M. Cheng, **T. Huang**, J. Wong, and C. Hsu, 2022, "Method for planning feedrate of transmission mechanism based on physical constraints of joints", Patent No. I766598, TW (Invention Patent)

ACADEMIC ACHIEVEMENTS AND AWARDS

- 2020 3rd Place in Best Student Paper Award, Chinese Institute of Electrical Engineering (CIEE)
- 2020 Excellent Award in Master Thesis Award, Robotics Society of Taiwan (RST)
- 2020 Fellowship for research assistant in Dept. of E.E. in NCKU
- 2019 Scholarship for outstanding academic performance, funded by Pan Wen Yuan Foundation
- 2019 Recruiting Fellowship of Delta Electronics, Inc.
- 2018 Young College Elite of NCKU, selected 2/12000 for significant contribution and dedication to campus
- 2017 Undergraduate Research Fellowship (1 year), funded by Ministry of Science and Technology of Taiwan
- 2017 3rd Place in Creative Engineering Design Course final project competition
- 2015 Excellent Award(top 10% in the school) in Physics Competition of Nation Cheng Kung University

EXPERIENCE

Syntec Technology Co., Ltd. Nov. 2020 - Present
R&D Engineer, Motion Control Group Hsinchu, Taiwan

- Building a data processing GUI along with an algorithm platform for analyzing trajectory data in Python, supporting five trajectory planning algorithms.
- Representative work: The development of a trajectory planning algorithm of five-axis machine tool in C++

Visual and Servo Control Laboratory, NCKU Sep. 2018 - Sep. 2020
Master's Student, advisor: Prof. Ming-Yang Cheng Tainan, Taiwan

- Project: Developed a novel, complete, and real-time motion planning approach, supporting translation and orientation movement subject to constraints of joint velocity, joint acceleration, and joint torque in 6 DoF robot manipulator, funded by Delta Electronics, Inc.
- Built various types of kinematics model and dynamics model of 6 DoF robot manipulator in Matlab

Advance Technology Research Center, Delta Electronics, Inc. Jul. 2019 - Jul. 2020
Research Assistant (Part-time) Tainan, Taiwan

- Implemented a motion planning algorithm for smoothness optimization with NURBS curve
- Built system identification methods to two-links manipulator and 6 DoF robot manipulator

Acer Inc. Jul. 2018 - Aug. 2018
Intern, Software Engineer, Value Laboratory Taipei, Taiwan

- Project: Image Enhancement and Preprocessing in Dark Environment. Implemented ResNet, VGG19, and GAN in image processing by using python, Tensorflow, and Keras.

Junxing Electromechanical Co., Ltd. Jul. 2017 - Aug. 2017
Intern, Product Engineer Zhuhai, China

- Improved the manufacturing process time by 10% of gear product by adjust the parameters of the machine

NCKU Electric Vehicle Racing Team Sep. 2017 - Aug. 2018
CTO Tainan, Taiwan

- Led five teammates to design and manufacture the car body with Solidworks

TEACHING EXPERIENCE

- Teaching assistant in Adaptive Control (2024 Spring), graduate-level course
- Teaching assistant in Advanced Control and Robotics Lab (2024 Spring), graduate-level course
- Private C/C++ program design tutor (2022)
- Teaching assistant in Visual Servoing System (2019 Fall), graduate-level course
- Invited speaker in National Cheng Kung University Freshman Orientation(2015, 2017, 2018)

LANGUAGES AND SKILLS

Language	Mandarin (Native), English (Fluent, IELTS: 7.0/9.0)
Software	C++, Python, Matlab, ROS, Docker, Conda, Solidworks
Skills	Control Barrier Function, Gaussian Process, Diffusion model, Adaptive Control, Motion control, Trajectory planning, Robotics

LEADERSHIPS & EXTRACURRICULAR ACTIVITIES

CEO, Leadership Center, NCKU Oct. 2017 - Jun. 2018

- School representative to advance the understanding, practice, and development of leadership for students
- Collaborated with Acer Inc. to launch a two-day leadership camp, including 50+ participants

Chairperson, Mechanical Engineering Technology Camp, NCKU Jul. 2016 - Jun. 2017

- Led 60+ members to hold a 5-day camp, for 90+ senior high school students
- Organized 20+ courses, 10+ events, 4 speeches and 2 special projects
- Conducted industrial visit with Tongtai Machine & Tool Co., Ltd.