Hao-Fang Cheng

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EDUCATION

Master in Electrical Engineering

Aug 2021 - Aug 2023

National Taiwan University, Taipei, Taiwan GPA: 4.08/4.3 **Bachelor in Mechanical Engineering** National Taiwan University, Taipei, Taiwan GPA: 3.81/4.3

Last 60 credits: 4.11/4.3

Relevant Courses: Robotics, Control System, System Dynamics, Computer Vision, Machine Learning

PUBLICATIONS

H. -F. Cheng, Y. -C. Ho, and C. -W. Chen, "DentiBot: System Design and 6-DoF Hybrid Position/Force Control for Robot-Assisted Endodontic Treatment." arXiv preprint arXiv:2310.09691 (2023). (Submitted to Transactions on Robotics) [link] H. -F. Cheng, Y. -C. Li, Y. -C. Ho and C. -W. Chen, "Force-Guided Alignment and File Feedrate Control for Robot-Assisted Endodontic Treatment," 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Kyoto, Japan, 2022, pp. 1841-1847, doi: 10.1109/IROS47612.2022.9981393. [link]

C. -Y. Lin, H. -T. Chen, H. -F. Cheng and Y. -J. He, "Electrical Impedance Sensing System Design for Abnormal Object Detection," 2021 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), Delft, Netherlands, 2021, pp. 1313-1318, doi: 10.1109/AIM46487.2021.9517604. (Finalist, Best paper) [link]

C. -W. Chen, Y. -C. Li, and H. -F. Cheng, "Endodontic robotic surgical system and endodontic robotic surgical assembly," U.S. Patent No 12,029,509, 2024.

RESEARCH EXPERIENCE

Robotic System for Autonomous Surgical Tasks

Research Assistant, NASA Lab, National Taiwan University, Taiwan. Advisor: Prof. Cheng-Wei Chen

- Designed DentiBot, a robot with a force sensor and positioning module for autonomous endodontic treatment. [Video]
- Pioneered and optimized a 6-DoF string-based patient tracking module that, achieved submillimeter precision.
- Proposed a hybrid 6-DoF position/force control strategy for safe robot-patient alignment.
- Validated DentiBot through successful pre-clinical trials with dentists at Taipei Veterans General Hospital.

Control and Estimation for Human-Drone Interaction

Research Intern, MIST Lab, Polytechnique Montreal, Canada. Advisor: Prof. Giovanni Beltrame

- Co-developed an indoor drone show featuring resilient drones performing alongside dancers.
- Incorporated a decentralized controller to manage 6 drones simultaneously.
- Elevated stability of the ultra-wideband (UWB) localization system by enhancing the Extended Kalman Filter.

Mechatronic Systems for Abnormal Tissue Detection

Research Assistant, MIARL Lab, National Taiwan University, Taiwan. Advisor: Prof. Chun-Yeon Lin

- Invented an electrical impedance sensing system to accurately detect abnormal objects in biological phantoms.
- Applied a deep neural network (DNN) to predict the location and size of abnormal objects.
- Developed biological phantoms with resistivity properties to simulate human tissues and tumors.

Aug 2021 - Sep 2024

Feb 2023 - Aug 2023

Sep 2020 - Jun 2021

Sep 2017 - Jun 2021

WORKING EXPERIENCE	
Dynamic Model Identification for Collaborative Manipulator	Nov 2024 - Present
Robotic Engineer, Control Group, Mantis Robotics, Taiwan.	
Identified dynamic models of customized manipulators for advanced sensing and	control.
Autonomous Drone Development	Jul 2020 - Aug 2020
Summer Intern, Fly-Control Group, Taiwan Space Agency, Taiwan. Advisor: Dr. Chen-Y	⁄u Chan
Developed mode-switching capabilities for a drone, enabling smooth transitions be	etween navigation and rolling.
 Optimized control parameters, empowering the drone to roll 360°. 	
HONORS & ACCOLADES	
Second Place in 2020 TDK National Creative Design Competition (Flying Group)	Oct 2019
Led a team to fabricate an autonomous drone within three months.	
• Designed a drone that expertly followed ground trajectories, navigated obstacles,	and delivered payloads.
• Represented university, led team and secured resources in the competition as the	ne university's pioneer, to con-
struct a fully functional drone from the ground up.	
Dean's List(Rank 5/143), National Taiwan University	Aug 2020
TEACHING EXPERIENCE	
Teaching Assistant in Electrical Circuit Experiment	Jan 2022 - Jan 2023
 Lectured undergraduate students and resolved technical issues related to electric 	al instruments.
Teaching Assistant in Programming for Business Computing	Sep 2020 - Jan 2021
Guided new programmers in learning Python and assisted them with homework a	ssignments.
Mentoring High School Students for Robotic Projects	Jun 2022 - Sep 2022
Guided two Taipei First Girls High School students in developing a virtual environ	ment for human-robot interac-
tion.	
SKILL S	

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• Programming: Python, C++, MATLAB, ROS, Linux

• CAD software: Fusion360, Inventor, AutoCAD