CHIH-HAO CHOU

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EDUCATION

B.S. in Mechanical Engineering , **National Taiwan University (NTU)** Expected Jun. 2026

- GPA: 4.12/4.30 (3.93/4.0) | Rank: 11/210 (5%)
- Relevant Coursework: Linear Systems, Adaptive Control, Digital Control, Robotics, Robot Vision, Algorithm
- Certificates of Specialization Program (each requires completion of 4-5 specific courses):
  Robotics, Artificial Intelligence, Design & Practice of Electric Vehicles, System Control & Mechatronics

PUBLICATIONS C=CONFERENCE, J=JOURNAL

[J.1] P. Y. Chang, **C. H. Chou**, Y. P. Chang, and P .C. Lin, **"Development of a Dual-Mode Spherical Robot Using a Differential Drive,"** in *IEEE Robotics and Automation Letters*, under review (Co-first author)

[J.2] C. Y. Hong, **C. H. Chou**, K. L. Wu, I. Ji. Wang, and D. R. Li, **"Development of a Smart Cadaveric Limb Motion Simulator for Physiologically Relevant In-Vitro Biomechanical Evaluation of Small Joint,"** in *IEEE Transactions on Biomedical Engineering*, under review (Co-first author)

[C.1] P. Y. Chang, **C. H. Chou**, T. J. Wang, Y. P. Chang, and P .C. Lin, **"A Two-Degree-of-Freedom Pendulum-Driven Spherical Robot Platform,"** *2025 International Conference on Advanced Robotics and Intelligent Systems (ARIS)*, Taipei, Taiwan, 2025 (Co-first author)

[C.2] K. L. Wu, C. Y. Hong, **C. H. Chou**, I. Ji. Wang, and D. R. Li, **"Smart Joint Motion Simulation Platform with Integrated Force Sensing for Clinical Assessment of Artificial Finger Joints,"** *CSME 2025 Annual Meeting and the 42nd National Academic Conference*, Taipei, Taiwan, 2025 (Co-first author)

RESEARCH EXPERIENCE

2-DOF Dual-Mode Pendulum-Driven Spherical Robot
Bio-Inspired Robotics Lab, NTU Aug. 2023 - Sep. 2025

- Designed a modular frame and implemented a 2-DOF bevel gear mechanism for omni-directional control
- Modeled robot's kinematics and dynamics using Lagrangian mechanics to inform control design
- Developed a hybrid driving strategy: angular acceleration for startup, then closed-loop pendulum control
- Engineered embedded system and experimentally validated control strategies using Vicon motion capture system

Experimental Platform for Simulating PIP Joint Movement
Smart & Advanced Manufacturing Lab, NTU Aug. 2024 - Sep. 2025

- Engineered a motion simulator with a 3D-printed platform, force sensors, and kinematic tracking for joint analysis
- Developed a pipeline using PCA and K-means clustering to identify critical tissue regions from motion data
- Found an inverse relationship between global force damping and local strain in response to surgical defects
- Created a standardized framework for small joint surgery evaluation, enabling implant benchmarking

PROJECTS

Aero Rider (Capstone Project) Taipei, Taiwan
Practice of Mechanical Engineering, NTU Feb. 2024 - Jun. 2024

- Led a 5-person team to design, build, and test an autonomous wind-powered vehicle, delivering a prototype on spec
- Implemented PD closed-loop control with IMU and encoder fusion for precise autonomous steering via dual sails
- Validated mechanical and control performance using FEA, aerodynamic analysis, and iterative dynamic testing

Street Sweeping Mobile Robot Taipei, Taiwan
Intelligent Vehicle & Mechatronics Lab, NTU Sep. 2023 - Jun. 2024

- Implemented SLAM in campus environments using Fast-LIO for 3D map generation and NDT for re-localization
- Applied Open3D-ML for semantic segmentation of 3D LiDAR point clouds using KPConv and RandLA-Net
- Labeled 3D LiDAR data to train a PointPillars model, boosting real-world performance by 10%

Ascend (Autonomous Stair Climbing and Escort for Navigation and Delivery) Taipei, Taiwan
Introduction to Robotics, NTU Oct. 2024 - Dec. 2024

- Designed and built a mobile robot with human-following and stair-climbing capabilities, featuring a dual-chassis structure connected by an RRR manipulator
- Developed stair-climbing mechanism: manipulator lifts front chassis, then pulls back chassis step by step
- Planned manipulator trajectories, defining key poses and smooth paths with cubic polynomial interpolation

Robotic BackFlip Cat Taipei, Taiwan
2023 MakeNTU May 2023

- Engineered a novel spring-loaded leg mechanism powered by a motor-and-rope system to execute a backflip
- Fabricated custom parts using 3D printing and laser cutting, with motion controlled by an Arduino Nano

WORK EXPERIENCE

Technology Development Intern   Taipei, Taiwan
URS Robot Inc.   Jun. 2024 - Aug. 2024
- Built a ROS 2 turf monitoring system combining AI-based segmentation with GNSS to generate high-res heatmaps
- Developed an auto-labeling pipeline using ExG index and K-means clustering, producing high-quality training data
- Designed dual U-Net models to segment green grass, withered grass, and ground, improving accuracy under varying lighting conditions

Software Engineer Intern   Hsinchu, Taiwan
Industrial Technology Research Institute (ITRI)   Jul. 2023 - Feb. 2024
- Developed a program in ROS 2 using 64px ToF sensors and DBSCAN algorithm to differentiate planes
- Merged point clouds from 2 2D LiDARs, enabling detection of nearby obstacles
- Prevented AMR from falling at harbor edges and warned against close obstacles for safe operation

Calculus Teaching Assistant   Taipei, Taiwan
Department of Mathematics, NTU   Feb. 2023 - Jun. 2023
- Delivered lectures, graded coursework, and supported students in an English-Mediated (EMI) Calculus course

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

Vice-President of NTUME Student Association   Taipei, Taiwan
National Taiwan University   Jul. 2023 - Jun. 2024
- Initiated and established dedicated study spaces for students, enhancing campus learning environment
- Organized and managed multiple student events, promoting engagement and community within NTUME

Participant, Tokyo Tech Engineering Sustainability Challenge   Online/Tokyo, Japan
Institute of Science Tokyo formerly Tokyo Tech   Aug. 2023 - Dec. 2023
- Collaborated with a cross-national team (NTU and Tokyo Tech) to develop a business proposal for a drone-based robotic system, improving garbage collection efficiency and optimizing management of collection points
- Aimed to alleviate labor shortages and support aging communities through automation and improved accessibility

Participant, Google Hardware Product Sprint   Taipei, Taiwan
Google LLC   Jun. 2023 - Aug. 2023
- Collaborated with a cross-functional team to develop LOCUS, a lockbox for timed focus with distinct study modes
- Developed OpenCV face detection to trigger water-mist deterrent and auto-log compliance photos on early unlocks
- Created immersive study modes with distinct lighting, music, wallpapers, and scents, switchable via hand gestures

Participant, International Companions for Learning   Online/Taoyuan, Taiwan
Ministry of Education Republic of China (Taiwan)   Sep. 2021 - Jan. 2022
- Paired with an international student for weekly sessions, fostering cultural exchange for rural students in Taiwan
- Joined sponsored field trips to connect with students in person, supporting cross-cultural understanding

HONORS AND AWARDS

Presidential Award , **NTU**   Academic Year 2023–2024
- Earned full-tuition scholarship for 2 semesters for being in top 2% of students in department

Dean's List Award (×4) , **NTU**   Spring 2022, Fall 2022, Fall 2024, Spring 2025
- Recognized 4 times for achieving GPA in top 5% of class and received 24,000 NTD in total

Brilliant TA Award , **NTU**   Spring 2023
- Earned recognition and prize of 5,000 NTD based on student evaluations

1st Place , **2024 Mechaheroes Intercollegiate Engineering Project Competition**   Dec. 2024
- Won with "2-DOF Dual-Mode Pendulum-Driven Spherical Robot," earning 30,000 NTD

Micron LAUNCH Award , **Tokyo Tech Engineering Sustainability Challenge**   Dec. 2023
- Earned team award, including 300,000 JPY in development funds from Micron Foundation

Best Popularity Award , **2023 MakeNTU: "Robotic BackFlip Cat"**   May 2023
- Voted by participants as most creative and engaging project among competing teams

RELEVANT SKILLS

Programming Languages: C++, Python, MATLAB

Robotics & AI Technologies: ROS 2, OpenCV, Pytorch, Simulink

CAD & Design Tools: AutoCAD, Autodesk Inventor, SolidWorks

Languages: Chinese (Native), English (Fluent - TOEFL: 107 [R:27, L:29, S:23, W:28]; TOEIC: 975)