Kai-Hua Wang

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Education

National Taiwan University (NTU) *Sep 2021 – Expected Jan 2026*
B.S. in Mechanical Engineering, College of Engineering

- Overall GPA: 3.68 / 4.0, Last 60: 3.96 / 4.0
- Research: three programs in robotics, vehicle dynamics, and medical devices; one publication.

Research Experience

System Optimization Laboratory, NTU; Advisor: Kuei-Yuan Chan *Sep 2024 – Present*
Experimental Platform of a Scaled Autonomous Robotic Straddle Carrier for Port Operation Studies

- Designed and built a 1:12 scale straddle carrier AMR with a hoist mechanism, serving as a scaled testbed to develop perception, localization, motion planning, and control for future full-scale autonomous deployment.
- Developed a redundant localization framework combining LiDAR SLAM and depth camera–based AprilTag tracking, with cross-validation to ensure accuracy.
- Integrated an independent, redundant safety architecture featuring mechanical bumpers and LiDAR protective fields, reflecting real-world practices for full-scale automated straddle carriers.

Foxtron Vehicle Technologies Industry-Academia Collaboration Project

- Led a 7-member team as the first academic group collaborating with Foxtron, pioneering hardware and software modifications of the Luxgen N7 commercial electric SUV for autonomous driving research.
- Developed stereo camera perception modules for object detection and depth estimation using machine learning, and built a Simulink vehicle model for the N7 to simulate reference trajectories and closed-loop control behavior.
- Integrated sensing modules and vehicle control algorithms in a CARLA simulation framework and successfully validated autonomous driving through a cone lane with a pure pursuit controller.

Smart and Advanced Manufacturing Laboratory, NTU; Advisor: Dian-Ru Li *Oct 2022 – Present*
Double Lumen Catheter Stabilizer, Collaborator: Taipei Medical University

- Designed an optimized catheter stabilizer for hemodialysis to reduce blood loss during catheter exchanges and to simplify the workflow, reducing procedure time.
- Fabricated via photopolymerization 3D printing and validated them on silicone-based simulators with physician involvement.
- Conducted simulator-based usability testing with eleven physicians to compare the optimized surgical procedure, resulting in a 25% reduction in procedure time and a 54% reduction in leakage during replacement.

Formula SAE competition, Head of Aerodynamics, NTU Racing *Jul 2022 – Jul 2023*

- Led FSAE aero kits development with a team of seven.
- Designed aero kits prioritizing the downforce to drag ratio using COMSOL and MATLAB; delivered 229.8 N total downforce at 11 m/s with component drags of 18.5 N (cowl), 11.1 N (front wing), and 14.1 N (rear wing).
- Improved composite manufacturing by introducing resin transfer molding(RTM), reducing the weight of the aero kits by more 25% compared to the previous generation.
- Achieved first place performance in Formula Student Taiwan, 2023.

Publications

In preparation

1. **Wang, K.-H.**; Kuo, Y.-T.; Li, D.-R. *HemoSeal Stabilizer for double lumen hemodialysis catheter exchange: design and simulator based evaluation.* Journal manuscript in preparation as first author. Advisor: Prof. Dian-Ru Li.

Teaching Experience

- **Teaching Assistant**, Design and Practice of Intelligent Vehicles (I), NTU, *Fall 2025*.
  Led a project team building a 1:12 straddle carrier AMR and delivering a redundant safety architecture.
- **Teaching Assistant**, Design and Practice of Intelligent Vehicles (II), NTU, *Spring 2024*.
  Instructed students to build Simulink vehicle models and configure CARLA scenarios with Foxtron N7 data.

Skills and Languages

Software	Simulink, SolidWorks, COMSOL, STAR-CCM+, Inventor, AutoCAD, Cura, ROS/ROS2
Programming Languages	MATLAB, Python, C
Engineering Techniques	Simultaneous localization and mapping(SLAM), Therblig analysis, Carbon fiber forming
Language	Mandarin: Native Speaker; English: Proficient (TOEFL: 92)

Working Experience

Garmin Ltd. – New Product Introduction; Engineer Intern *Jul 2024 – Jan 2025*

- Independently executed manufacturing process design using Therblig analysis, process failure mode and effects analysis(PFMEA), and fixture development for the GPSMAP H1 accessory, leading to successful mass production.
- Standardized assembly processes for handheld device displays, achieving at least IPX7 waterproof standards.
- Collaborated with EE engineers in developing and optimizing testing equipment and parameter calibration for inductive buttons, solving the issue of high retest rates.

Awards and Honors

Technical Achievements

- 2023 Formula Student Taiwan – 1st Place as Aerodynamics Lead
- 2022 Formula Student Taiwan – 2nd Place

Extracurricular Achievements

- 2024 Intercollegiate Mechanical Engineering Sports Cup – 3rd Place in Badminton
- 2023 NTU Badminton Cup – 3rd Place as Vice Captain
- 2023 NTU Sports Day – 1st Place in Relay Race

Course Project

Modeling and Control of Unstable Vehicle Maneuvers, Vehicle Dynamics *2025 Spring*

- Modeled a vehicle loss of control incident in Simulink from video footage and developed an oversteer controller that triggers on computed vs. actual yaw rate error to intervene and prevent crashes.

EcoRedesign for 2024 Taipei Marathon, Product Carbon Footprint and EcoDesign *2024 Fall*

- Performed carbon footprint analysis for the 2024 Taipei International Marathon, integrating runner experience and insights to identify design solutions that balance participant experience with reduced carbon emissions.

Real-time Conveyor Pick-and-Place Robotic Arm, Application and Practical of Intelligent Robot *2024 Fall*

- Combined dynamics and machine learning to design an algorithm enabling robotic arms to detect, grasp, classify, and sort moving objects in real time on conveyors.

AeroRider, Practice of Mechanical Engineering *2023 Spring*

- Designed and built a 1:15 scale wind-driven vehicle and applied experiment-driven iterative design, continuously refining vehicle performance based on test results and airflow behavior analysis.

Wafer-handling robot, Microprocessor Controlled Systems *2023 Spring*

- Developed a three-degree-of-freedom wafer-handling robot using Arduino, inspired by automated material handling systems (AMHS) in production lines.

Extracurricular Activities

Yulon Nissan Campus Ambassador *Sep 2025 - Present*

- Applied mechanical engineering knowledge to promote Nissan's brand values and highlight vehicle engineering innovations, enhancing peers' technical understanding of the brand.

International Student Volunteer Program, Volunteer *Jun 2025 – Present*

- Supported international students, assisting with pre-arrival communication, visa applications, and campus integration to foster cross-cultural exchange.

NTU Badminton Club, President *Jul 2023 – Jul 2024*

- Led regular badminton coaching sessions, actively guiding club members' playing skills.
- Collaborated effectively with university administration and student clubs to manage venue arrangements.

Tri-department Orientation Camp, Equipment Officer *Jun 2023 – Sep 2023*

- Managed equipment rentals, including audiovisual setup and stage lighting to ensure smooth event execution.

Hometown Volunteer Service Team, Volunteer *Oct 2021 – Jul 2022*

- Prepared lesson plans and performances, leading a four-day camp in a remote area.