

Yecheng WANG

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EDUCATION

University of Leeds, Leeds, UK

Sep 2023 – Jul 2027

BEng (Hons) Mechanical Engineering, expected Jul 2027

- Cumulative GPA 3.92/4.0, average 78.67/100 (on track for First Class)
- Final-year project: learning-based control for rehabilitation robots, Rehab45 Lab (supervisor: Dr. Justin Gallagher)

Southwest Jiaotong University (SWJTU), Chengdu, China

Sep 2023 – Jul 2027

BEng Mechanical Design, Manufacturing and Automation, SWJTU–Leeds Joint School (2+2 program)

- Cumulative GPA 3.89/4.0, average 92.7/100

HONOUR & AWARD

National Scholarship, Ministry of Education of China (top 0.2%)

Dec 2025

National Scholarship, Ministry of Education of China (top 0.2%)

Dec 2024

Cohort Champion, Autonomous Buggy Competition, University of Leeds

Feb 2026

Third Place, Magnetic Capsule Robot Arm Navigation System, University of Leeds

May 2026

PUBLICATION

1. **Y. Wang**, Y. Li, “PHLEX: Physically Layered Explanation for Counterfactual Motion Planning,” *ICLR 2027*, under review.
2. **Y. Wang**, Y. Li, “KineWorld: A Pluggable Counterfactual Kinematic World Model for Physically Grounding Multimodal Motion Prediction,” *AAAI 2027*, advanced to Phase 2.
3. **Y. Wang**, “MBO-YOLO: An Enhanced YOLOv8n-Based Algorithm for Detecting Marine Benthic Organisms,” in *AIITA 2025*, Xi’an, China, pp. 854–860. DOI: 10.1109/AIITA65135.2025.11047694.

RESEARCH EXPERIENCE

Surgical Robotics & Instrumentation Lab (SRIL), CUHK, Hong Kong SAR

Jun 2026 – Present

Research Intern · PI: Prof. Shing Shin CHENG · Direct Mentor: Dr. Jun HUO

P1: From Millimetres to Microns: Hysteresis Compensation of a Cable-Driven Continuum Surgical Robot

CUHK Summer Undergraduate Research Programme · Poster: yecheng-wang.com/cuhk-surp-2026

Jun 2026 – Aug 2026

- Rebuilt a 14-notch tendon-driven continuum surgical robot with stereo tip tracking and cable-tension sensing and identified path-dependent cable hysteresis as the dominant error source.
- Designed a data-driven hysteresis compensator and a P-type iterative learning controller for the 0.25 s vision latency; showed that tip loading widens the hysteresis loop, contradicting a friction-only assumption.
- Under a preregistered protocol on a sealed multi-target benchmark, the compensator cut tip error $3.0\times$ ($234 \rightarrow 78 \mu\text{m}$) and the ILC layer converged to $\sim 15 \mu\text{m}$, approaching the platform’s repeatability limit.

P2: Task-Conditioned Kinematic Coverage of Reduced-DoF Continuum Robots for Endoscopic Surgery

Aug 2026 – Present

- Built a kinematic simulation that tests whether a fixed-structure 4-DoF continuum arm can execute each surgical gesture within position and tool-axis tolerances, attributes failures to reach or position–axis coupling, and benchmarks four comparators.
- Plan to replace synthetic primitives with instrument trajectories from open dVRK datasets, identify the arm’s bending structure from EM tip tracking, and validate per-gesture predictions in teleoperation on a dual-arm flexible endoscope.

Physically Grounded Counterfactual World Models for Explainable Motion Prediction and Planning

Dec 2025 – Present

Co-researcher

KineWorld: A Pluggable Counterfactual Kinematic World Model for Physically Grounding Multimodal Motion Prediction

- Proposed a pluggable world model that decodes a frozen predictor’s trajectories against a library of differentiable motion mechanisms, giving interpretable behavior attribution and physically grounded counterfactual rollouts.
- On UniAD/nuScenes: maximum yaw rate $0.986 \rightarrow 0.640$ rad/s, mechanism self-consistency $8.45\% \rightarrow 57.27\%$, with gains in comfort, safety and planning accuracy.

PHLEX: Physically Layered Explanation for Counterfactual Motion Planning

- Extended the library into a predictor-agnostic framework that explains predicted trajectories through layered kinematic models, control laws and scene references, and re-runs varied explanations as counterfactual futures for ego planning.
- Cut collision rate by up to half and yaw-rate violations by 1.9–6.7 pp on three frozen planners (UniAD, VAD, SparseDrive).
- Reduced kinematic violations in agent forecasting (UniAD/MTR/QCNet, nuScenes/Argoverse 2) by $>80\%$ for ≤ 0.05 m minFDE.

MBO-YOLO: Enhanced YOLOv8n for Marine Benthic Organism Detection, Chengdu, China

Oct 2024 – Mar 2025

Independent research

- Integrated a P2 detection head, Non-Local Block attention and BiFPN into YOLOv8n for small, blurred underwater targets: +2.2 pp mAP50 and +2.9 pp mAP50:95 over the baseline on URPC2020. Code: github.com/Geoffrey-WANG-1027/MBO-YOLO.

SELECTED PROJECT

Magnetic Capsule Robotic Arm Navigation System | MATLAB, C++, Leeds, UK Feb 2026 – May 2026

- Wrote the inverse-kinematics solver and coordinate-transformation framework for a 2-DoF planar arm steering a magnetic capsule in a colonoscopy simulator, with elbow-down configuration logic and workspace constraints.
- Built the reachability simulation and the pipeline discretizing trajectories into motor counts for embedded C++; 3rd in the inter-team trial.

Autonomous Delivery Buggy Control System | C++, Arduino Mega, Leeds, UK Nov 2025 – Feb 2026

- Designed the embedded control architecture: finite-state mission manager, closed-loop PI velocity control with wheel synchronization and encoder filtering, and on-the-move payload release.
- Tuned gains and anti-windup on ReLOAD and in field trials; moved encoders to non-driven wheels to remove slip-induced velocity error. The competition run used the simpler open-loop FSM configuration for repeatability; ranked 1st of all teams.
- Contributed the quarter-car (2-DoF mass–spring–damper) stiffness and damping estimates for the team’s suspension choice.

Vibration Isolation Platform Design | MATLAB, Leeds, UK Feb 2026 – Mar 2026

- Led the modeling and computation in a team of 4: derived a base-excited SDOF isolator’s displacement/acceleration frequency responses over 0–12.3 Hz; showed the baseline breached the 9 m/s² limit, then grid-searched stiffness and damping to cut peak acceleration from 11.4 to 5.3 m/s².
- Designed a 2-DoF tuned mass absorber (4.03 kN/m at 6.15 Hz), solved the M–K eigenproblem for its natural frequencies and harmonic responses, and recommended the isolator for robustness against the absorber’s undamped resonances.

Helicopter Altitude Control | C++, Arduino, Chengdu, China Mar 2025 – Apr 2025

- Implemented and tuned a PID altitude controller for a tethered single-axis helicopter rig, run remotely on the University of Leeds ReLOAD platform: take-off, timed hover within ± 2 cm of the target height, and landing, with LED feedback on height error.

YOLO-Based Automatic-Checkout Cart | SolidWorks, Python, PyTorch, Chengdu, China Apr 2024 – Apr 2025

- Built and deployed a Raspberry Pi 5 cart prototype fusing a fisheye camera and a load cell for weight–vision consistency checks, with a 2-DoF pan-tilt laser pointer that physically flags unrecognized items.
- Integrated a Multi-Scale Dilated Attention module into YOLOv8n and ran it on the edge device: 92.4% mAP@0.5, 91.5% recall, <1 s/item.

INTERNSHIP

KNEWBOTS (Hangzhou Xiaowu Intelligence), Hangzhou, China Jul 2025 – Aug 2025

Mechatronics Engineer Intern

- Calibrated multi-sensor SLAM (LiDAR, ToF camera, ultrasound) on lift and forklift AMRs on the production line; validated mapping and localization by monitoring LiDAR point-cloud distributions in RViz.
- Diagnosed perception failures from mechanical misalignment; regression-tested the ROS-based navigation stack against more than 600 validation metrics and traced deployment edge cases in sensor fusion and loop closure.

SKILL

Programming & Software: Python, C++, MATLAB/Simulink, LaTeX, Git, OpenCV, ROS

Robot Control & Modeling: PID, ILC, system identification, continuum kinematics, state-machine control

Learning & Perception: PyTorch, YOLO, UniAD, nuScenes

Hardware & CAD/CAE: SolidWorks, Abaqus (FEA), ANSYS Fluent (CFD), 3D Printing, sensor integration and calibration

Language: Mandarin (native), English (IELTS Academic 7.5)

LEADERSHIP & COMPETITION

SWJTU Engineering Practice & Innovation Association, Chengdu, China Nov 2023 – Jun 2025

Co-founder · Student workshop network; 100+ members/year

- Ran the shared workshop (Creative Lab, 3D printing, laser engraving): equipment access, safety and hands-on support.
- Built a recurring project pipeline that created sustained opportunities for students to develop projects and participate in engineering competitions.

ML-Based Employability & Job Recommendation System, Chengdu, China Feb 2024 – Jun 2024

Full-Stack Developer · China Collegiate Computing Contest

- Built interactive front-end pages using HTML/CSS and implemented end-to-end integration logic to ensure seamless workflow.
- Developed backend services and database with Python and MongoDB, powering user storage, job retrieval and result rendering.

Real World Design Challenge: Urban Package Delivery & Flight Coordination, Hangzhou, China Oct 2020 – Feb 2021

Team Leader & Chief Designer · First Prize & Best Presenter · Embry-Riddle Aeronautical University

- Led the overall UAV design and urban delivery mission planning, including system modeling and a business feasibility analysis.
- Gained foundational knowledge in aircraft design, aerodynamics, structural mechanics, and UAV system engineering, covering basic design and performance evaluation methods.