Zhenyu Xie

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Age: 20 | Location: Guangzhou, China | WeChat: Benny-0112
Research Interests: **Embodied AI, Reinforcement Learning, Motion/Social Planning, Multi-Agent Systems, Force/Haptic Feedback**



Education

South China University of Technology (Project 985 / Double First-Class)
School of Wu Xianming Intelligent Engineering 2024.09 – 2028.06 (Expected)
B.Eng. in Robotics Engineering Guangzhou, China

Academic Standing: **GPA: 3.6 / 4.0**, Recipient of University-Level Merit Scholarship.
Selected Coursework: Data Structures & Algorithms, Artificial Intelligence, Feedback Control Systems, Autonomous Driving, Signals & Systems, Dynamics & Vibration, Engineering Mechanics, Mechanical Design & Manufacturing, Embedded Systems.

Publications & Manuscripts Under Review

- **THORN: A Two-Level Topological and Social Navigation Planner for Non-Convex Environments**
  Submitted to AAMAS 2027 (26th International Conference on Autonomous Agents and Multiagent Systems)
  Co-First Author Under Review (2026)
  - Formulated a decoupled **topological global planning + local social compliance policy** framework for navigation in unmapped, non-convex indoor spaces with deadlocks (e.g., U-shaped corridors).
  - Implemented an incremental visibility sparse-graph builder from 2D LiDAR occupancy beliefs to escape local minima.
  - Evaluated benchmarks within **ROS2 + Gazebo**; boosted mission success rate on complex non-convex topologies by up to **+0.85** over purely local baselines, verified via end-to-end hardware deployment.
- **Navigation-grade mapping: does the capture plan decide whether a ground robot can drive?**
  Submitted to Unmanned Systems (World Scientific, SCI indexed)
  First and Corresponding Author Under Review (2026)
  - Investigated the cross-domain coupling between aerial UAV survey photogrammetry and ground robot navigation, establishing the first controlled measurement of how capture plans (nadir vs. 45° oblique, photo budget) causally impact ground robot navigation success.
  - Built an end-to-end 2.5D occupancy mapping and closed-loop navigation simulation stack; evaluated performance across 20 obstacle-forcing missions with controller perturbations (paired McNemar test $p = 3.8 \times 10^{-6}$).
  - Discovered that coverage loss in blind cells strictly dictates route feasibility over onboard recovery, proving capture planning rather than traditional reconstruction IoU determines ground-robot navigability.

Research & Engineering Projects

Multi-DoF Force-Feedback Glove: Design & Bilateral Control 2026.04 – Present
Embodied Haptics & Teleoperation System · Core Member Guangzhou, China

- Designed multi-link mechanism for finger and palm kinematics balancing wearability, lightweight structure, and power transmission;
- Modeled full mechanical assembly in SolidWorks; integrated custom 1D/3D force sensor fixtures aligned with finger motion trajectories;
- Implemented closed-loop impedance control between measured tactile feedback and motor torque output, optimizing contact realism.

Hip-Assist Exoskeleton: Dynamics Modeling & Gait Control 2026.09 – Present
Wearable Robotics Project · Mechanics & Multibody Simulation Guangzhou, China

- Engineered human-machine compliant joint mechanisms and derived lower-limb coupled multibody dynamics models;
- Conducted inverse dynamics and kinematic simulations across standard gait phases, obtaining peak torque requirements and calibrating assistive torque curves.

Autonomous Transport & Obstacle-Avoidance Mobile Robot 2024.09 – 2025.12
Campus Robotics Competition · Mechanical & Hardware Lead Guangzhou, China

- Led CAD modeling, structural FEA analysis, machining, and assembly of chassis and 2-DoF gripper end-effector;
- Developed embedded firmware in C for BLDC motor actuation, sensor filtering, and autonomous obstacle-avoidance logic.

Professional Experience

China Mobile (Hangzhou) R&D Institute · Humanoid Robotics Lab 2026.01 – 2026.03
Structural Simulation Intern Hangzhou, China

- Performed finite element static analysis and structural stiffness verification for humanoid robotic shank and ankle modules in ANSYS;
- Analyzed contact stress and deformation under severe foot-strike impact cases, authoring formal engineering reports that drove topological mass reduction.

Technical Skills

- **Robotics & AI**: Reinforcement Learning (RL), Path Planning (A*, RRT), ROS2, Gazebo, PyBullet, MuJoCo, Linux/Ubuntu, Git;
- **Languages & Tools**: Python (NumPy, SciPy, Matplotlib), C / C++, MATLAB, VS Code, Keil;
- **CAD & Simulation**: SolidWorks (3D Modeling, Assembly, Technical Drawings), ANSYS (Structural FEA), AutoCAD.

Honors & Target Objective

- **Honors**: SCUT Merit Student Scholarship; One-Star Certified Volunteer of SCUT (2025);
- **Academic Goal**: Applying for Fall 2028 MPhil / PhD programs in Hong Kong (Targeting Embodied AI, RL, Social Navigation & Planning).