WEI PAN

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EDUCATION

Southern University of Science and Technology Sep. 2022 — June. 2026 (expected)
B.S. in Robotics Engineering, Department of Mechanical and Energy Engineering GPA: 3.8/4.0

Relevant Course Grades

Robot Modeling and Control: 97/100 A+
Computer Vision: 93/100 A
Mechanical Design: 93/100 A
AI and Machine Learning: 95/100 A
Robotic Actuation System: 95/100 A
Fundamentals of Control Engineering: 92/100 A-

RESEARCH INTEREST

Fascinated by the combination of **Robotics and AI**, I aim to develop robots with powerful, robust and generalizable ability across various tasks, with particular interests in generative learning and computer vision.

RESEARCH EXPERIENCES

UAV Perception and Navigation*(Ongoing)* Mar. 2025 — Present
Supervisor: Prof. Boyu Zhou STAR LAB, Southern University of Science and Technology

- Training **diffusion model** to improve perception ability of UAV on non-Lambertian surfaces, eg. transparent windows of houses
- Optimizing **diffusion model** deployment on NVIDIA Jetson Orin NX.

Manipulation with Video Generation Model and Pose Estimation [1] Jul. 2024 — Jan. 2025
Supervisor: Prof. Wei Zhang CLEAR LAB, Southern University of Science and Technology

- Introduced an innovative closed-loop system that combines **generative visual prediction** with pose estimation **independent of specific tasks**.
- Utilized **Rectified Flow** for **efficient video generation** which is capable for real-time inference for downstream close-loop pose estimation.
- Proposed RGB-only input for end effector pose estimation using **Vision Transformer** (ViT).
- Implemented comprehensive **random exploration** algorithms for data collection.
- Evaluated on LIBERO benchmark, achieve best performance on Libero-Spatial and Libero-Goal among current video prediction methods.

Centaur Robot for Load-carriage Walking Assistance Oct. 2024 — Feb. 2025
Supervisor: Prof. Chenglong Fu HAR LAB, Southern University of Science and Technology

- Proposed **reinforcement learning** based control strategy for the centaur robot. Designed reward functions to make the centaur robot has well-performed load-bearing walking ability in multi-load-bearing and multi-terrain environment.
- **Simulation to real-world deployment**, developed real-time control system on Intel NUC using ROS and OnnxRuntime framework. **Simulation-to-simulation transfer**, from Legged Gym to MuJoCo deployment to verify policy and history state encoder on different domains.
- Presented mechanical design, modeling and evaluation of **new wearable load-assistive robot** which forms a human-Centaur quadruped system.

Functional Electrical Stimulation and Rehabilitation Sep. 2023 — Mar. 2024
Supervisor: Prof. Chenglong Fu HAR LAB, Southern University of Science and Technology

- [2] proposed a multi-channel electrical stimulation system to achieve precise control of hand gripping in stroke patients and assist in hand function rehabilitation.
- [3] presented a refined framework utilizing an inertial measurement unit (IMU) for the real-time recognition of grasp intentions in stroke patients

PUBLICATIONS

[1] C. Zhang, X. Zhang, L. Zheng, **W, Pan**, and W. Zhang, "Generative visual foresight meets task-agnostic pose estimation in robotic table-top manipulation," *Underreview*, 2024.

[2] J. Sun, G. Huang, C. Lin, **W, Pan**, K. H. Cheng, G. Gou, *et al.*, "Flexible multi-channel electrical stimulation system for assisting grasping in patients with hemiplegia," in *2024 International Conference on Advanced Robotics and Mechatronics (ICARM)*, 2024.

[3] G. Gou, K. H. Cheng, J. Sun, C. Lin, **W, Pan**, G. Huang, *et al.*, "Imu-based prediction of multiple grasping gesture intentions for enhanced functional electrical stimulation control*," in *2024 International Conference on Advanced Robotics and Mechatronics (ICARM)*, 2024.

COMPETITION EXPERIENCES

Robocon National University Robotics Competition ***Team Leader***
National First Prize, National Second Prize Sep. 2023 — Jul. 2024

- Managed a team of over 25 members for one year, as well as leading the vision of localization algorithm implementaion of two robots.
- Created a ball object detection dataset on Roboflow, trained a **YOLOv8** model, and completed TensorRT deployment(180% latency improvement than using onnx) on Jetson Orin NX for real-time onboard ball detection task.
- Mapping using **FAST-LIO2**, and performed relocation using **ICP (Iterative Closest Point)**, implemented both on simulation(Gazebo) and real-world.
- Control implementation such as PID and LQR, as well as communication protocols including CAN, USART, SPI. SD card driver implementation on STM32F427 for logging.
- Built mechanical system and modeling of two robots from scratch.

National University FPGA and Embedded System Competition ***Team Leader***
National Second prize Sep.2023 — Dec. 2024

- Developed a multi-channel high-performance ionic electronic skin perception system based on Xilinx ZYQN 7020, achieve 2000 Hz sensing frequency, programming using FPGA.
- Developed a real-time master machine software for perception visualization using Qt framework.

National University Physics Experiment Simulation Competition ***Team Member***
National Second prize Jul.2023 — Sep. 2023

- Developed two-dimensional diffraction simulation program based on mobile phone screen grating experiment.
- Utilized Qt framework design UI and realize 3D model interaction. Use C++ and QML language to program.

SKILLS

Programming Skills	Python, C/C++, Java, MATLAB
Libraries and Tools	Pytorch, Sklearn, MuJoCo, ROS/ROS2, TensorRT, OpenCV, ONNX Runtime Legged Gym/Isaac Gym,rsl_rl,Docker/Docker Compose,Point Cloud Libriry Eigen, ARM Cortex-M embedded development, Qt
Mechanical Design	Solidworks, Fusion 360