Shunwang Sun

World Model – Robotics – Spatial AI – Video Mimic- 3D Perception

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Education

Zhejiang University — *Hangzhou, China*

M.S. in Mechanical Engineering ***Advisor: Lu Guodong and Li Jituo*** *Aug 2024 - Present*

- **Ranking: 1/56** **Average Score: 88.9/100**
- **Awards: National Scholarship (0.2% students), China Ministry of Education**
- **Current Work:** Embodied Tracking via Vision-Language Reasoning and Visual-Inertial Odometry

Yanshan University — *Qinhuangdao, China*

B.S. in Robotics Engineering *Sep 2020 - May 2024*

- **Ranking: 1/29** **Average Score: 89.2/100**
- **Awards and Honors:** First-class Scholarship (3 times), Second-class Scholarship (2 times), **Provincial Outstanding Graduate**, University-level Outstanding Student
- **Thesis:** Design of a Visual Servoing Delta Robot System Based on Convolutional Neural Networks (Real Robot)

Research

Analogy-Augmented Uncertainty-aware Monocular Visual Odometry

Second author, advisor is the first author ***IEEE TCSVT (Top)*** *Mar 2025 - Oct 2025*

- Proposed an **Image-to-Pose analogy augmentation** strategy and Context Attention Uncertainty-aware VO (CUVO) framework to enhance **training data diversity** and **suppress dynamic** interference.
- Demonstrated exceptional accuracy in data-limited scenarios, improving Zero-Shot capabilities by **29.5%** on TartanAir and **23.3%** on KITTI compared to baseline end-to-end VO methods.

MVOFormer: End-to-End Monocular Visual Odometry with Flow-Semantic Transformer

Second author, advisor is the first author ***Submitted to IEEE RAL*** *Nov 2024 – Nov 2025*

- Engineered an end-to-end MVOFormer framework featuring a **Flow-Semantic dual-branch encoder** to jointly capture pixel-level optical flow and object-level semantic priors without auxiliary labels.
- Developed an **Iterative Multimodal Decoder** to progressively suppress dynamic region attention, achieving state-of-the-art Zero-Shot generalization across TartanAir, KITTI, TUM-RGBD, and ETH3D-SLAM benchmarks.

UC-VO: A Hybrid Visual Odometry System with Uncertainty Estimation and Pose Correction

Third author, advisor is the first author ***Submitted to IEEE TRO*** *Sep 2024 – Aug 2025*

- Formulated a tightly coupled Learning and Geometry **hybrid architecture (UC-VO)** that adaptively activates geometric **correction to handle high-uncertainty poses and out-of-distribution (OOD) data**.
- Integrated reprojection correction and multi-frame graph optimization to enable seamless subsystem synergy, significantly improving spatial perception accuracy in cross-domain extreme environments.

Design of Dynamic Embodied Tracking Algorithm based on Visual Representation of VLA

Visiting Student Researcher ***Advisor: Renjing Xu*** *Dec 2025 – Present*

Hong Kong University of Science and Technology (GZ) & Robotics and Autonomous Systems

- Designed a **Vision-Language-Action** (VLA) tracking strategy combining VLM with **Flow Matching** to address inter-module information disconnection in dynamic embodied environments.
- Constructed VLA datasets via Habitat/UE5 and proposed a Parallel Anchor Flow Matching strategy, achieving efficient trajectory denoising in 3 iterations for **faster inference** while maintaining **strong generalization**.

Design of a Visual Servoing Delta Robot System Based on Convolutional Neural Networks

First Author, Independently Completed Entire Workflow *Nov 2023 - May 2024*

- **Single-handedly built a servoing Delta robot from scratch (structure, hardware, and algorithms)** for automated food sorting by conducting rigorous kinematic, rigid-body dynamic, and trajectory planning analyses.
- Deployed a TensorRT-quantized YOLOv7-Tiny-OBB model on an NVIDIA Jetson Orin Nano, achieving real-time detection (14-15 fps) and **95% grasping accuracy** across 19 target varieties.

Competitions

2022 National University Embedded Chip and System Design Competition

Air-Controlled Smart Glasses: Enabling Convenience for All

Leader (1/2), Algorithm and Hardware Engineer *National Level Third Prize (Top10%)* *Sep 2022 - Dec 2022*

- Prototyped **air-controlled smart glasses** for remote gesture interaction, establishing a **real-time hardware-software** co-design loop with wireless image transmission and an edge computing board.
- Reconstructed and deployed a **MobileNet-V2 architecture** in C++ on a Xilinx PYNQ-Z2 FPGA, achieving >90% classification accuracy with 91% DSP utilization under strict compute constraints.

The China Graduate Electronics Design Contest

Intelligent and Assisted Walking System Based on Multi-sensor Fusion and Adaptive Regulation

Leader (1/3), Algorithm and Structural Engineer *Provincial Third Prize* *Mar 2025 - Aug 2025*

- Developed MarSurfer, **an intelligent wearable assisted-walking system** featuring a custom 4WD mechanism and multi-sensor fusion (IMU, pressure, ultrasonic) managed via STM32.
- Implemented a **dual-channel neural network** (CNN and GRU) on a Jetson Nano edge node to adaptively predict user stride and frequency, achieving an **ultra-low inference latency** of 0.92ms.

"Gaojiao Cup" National University Advanced Mapping Technology and Product Information Modeling Innovation Competition	**National Level First Prize (Top3%)**
"Internet+" Innovation and Entrepreneurship Competition	**Provincial Silver and Bronze Prizes**
National University Mathematics Competition	**Provincial Second Prize**
15th China University Computer Design Competition	**Provincial Third Prize**
2025 AdventureX Hackathon	**Seeed Studio: 1st Prize** **D-Robotics: 3rd Prize** **AgileX Robotics: 3rd Prize**

Experience

POSITION

Zhejiang University

- ***Computer Graphics and Engineering Graphics, TA*** *Aug 2024 - Aug 2025*
- ***Qiu Shi Eagle Club Entrepreneurship Class***
  Advisor: Shiquan Wang (Founder of Flexiv Technology) *May 2025 - Present*

- ***Commissary in Charge of Studies*** *Sep 2020 - Jun 2021*
- ***Commissary in Charge of General Affairs*** *Sep 2021 - May 2024*
- ***Head of Baidu PaddlePaddle Navigator Group*** *Oct 2022 - Oct 2021*

SKILLS

- ***Programming&AI: Python, C/C++, Keil-C, Matlab, Git, OpenCV; VLM, Flow Matching; Claude, OpenClaw***
- ***Robotics& Hardware: ROS, Isaac Sim, Gazebo; IoT Chips (Jetson, Raspberry Pi, STM32), SolidWorks, 3D printing***