SHIWEI PAN

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RESEARCH INTERESTS

Smart Manufacturing & Industrial AI; Embodied AI for Physical Tasks; Robotics and Intelligent Systems; Learning-based Perception, Planning, and Decision-making; Vision-Language Models for Industrial Inspection

EDUCATION

Tongji University, Shanghai, China — Sep 2022 – Jun 2026
B.Eng. in Intelligent Manufacturing Engineering
GPA: 4.55/5.0
National Scholarship Recipient; Outstanding Student Award
Relevant Coursework: Machine Vision, Industrial Big Data Analytics, Artificial Intelligence, Robotics, Intelligent Production Systems, Optimization Methods

RESEARCH EXPERIENCE

Undergraduate Researcher — Intelligent Construction Robotics — 2024 – 2026
Tongji University, Key University Research Project — *Shanghai, China*

- Built a high-fidelity simulation environment in **NVIDIA Isaac Sim** for autonomous bricklaying, covering scene construction, sensor modeling, and synthetic data generation to support perception development and system-level testing.
- Designed robotic **kinematics, trajectory planning, and manipulation workflows** for pick-and-place and bricklaying tasks, with focus on sim-to-real transfer challenges.
- Developed a **ROS-based mobile robot navigation pipeline** integrating LiDAR sensing, odometry fusion, SLAM, path planning, and MPC-based motion control; validated in both simulation and physical environments.
- Integrated perception, mapping, planning, and control into deployable end-to-end embodied workflows; contributed to technical documentation and publication-oriented research outputs.

Undergraduate Thesis: Multimodal Inspection Agent for Industrial Defect Detection — 2025 – Present
Tongji University — *Shanghai, China*

- Designed a **multimodal inspection pipeline** integrating task understanding, ROI localization, promptable segmentation (SAM3/Grounding DINO), and structured result interpretation using vision-language models.
- Proposed an **LLM-based adaptive routing strategy** for segmentation method selection, enabling dynamic switching between text-prompt-driven and ROI-guided approaches, with improved performance on fine-grained defect localization.
- Implemented an **LLM-orchestrated crop-and-zoom inspection loop** — the model autonomously calls a cropping tool to magnify suspicious regions for fine-grained detail verification, achieving an **8% improvement in multimodal defect detection accuracy** on the MVTec AD benchmark.

PUBLICATIONS

Pan, Shiwei, Jiaxue Li, Xiaoxiao Lv, and Wenrui Jin.
Efficient Trajectory Planning for a 4-DOF Robotic Arm with Curve Interpolation and Gaussian Process Inference for Pick-and-Place Manipulation Tasks.
Robotica, Cambridge University Press, 2025. Published online May 15, 2025.
DOI: 10.1017/S0263574725000530

INDUSTRY EXPERIENCE

Digital Product Manager Jan 2026 – April 2026
Hesai Technology *(leading LiDAR manufacturer)* *Shanghai, China*

- Digitalized the full **MES equipment inspection lifecycle** — designed configurable inspection templates, automated task creation and assignment, implemented formula-driven auto-validation against preset thresholds, and built a structured review-and-approval submission flow, replacing a previously manual, paper-based process.
- Modeled **parallel electrical testing routes (PIP / DIP) for the Sharpa dexterous hand** in the MES, enabling the two test stages to execute concurrently rather than sequentially; reduced monthly idle waiting time by **15 hours** and improved overall line throughput.
- Developed an **AI-driven CRM automation module** enabling customers to query order status, shipment progress, and estimated delivery via natural-language interaction, significantly reducing manual inquiry handling load on operations staff.

Digital Transformation Intern Jun 2025 – Dec 2025
Maersk *Shanghai, China*

- Developed an **AI-driven procurement analysis pipeline** using LLM-based workflows to extract structured data from unstructured supplier quotations; integrated ChromaDB for semantic retrieval.
- Applied Total Cost of Ownership (TCO) modeling for supplier evaluation, contributing to a **15% improvement in procurement decision efficiency**.
- Built automated feedback and analytics workflows in Power Automate & Power BI to strengthen data-driven monitoring across supply-chain operations.

Data Project Manager Dec 2023 – Sep 2024
Sapien AI *Beijing, China*

- Managed large-scale AI data projects including **MathGPT** and autonomous-driving **point-cloud annotation**; designed semi-automated annotation pipelines and quality-evaluation frameworks.
- Built a real-time progress monitoring and anomaly detection system, contributing to an **8% improvement in annotation accuracy**.

SKILLS

Programming	Python, C++, JavaScript, ROS, MATLAB
AI & ML	Deep Learning, Computer Vision, LLMs, Vision-Language Models, Explainable AI, RAG
Robotics	Kinematics, Motion Planning, SLAM, MPC, Sim-to-Real Transfer, Embodied AI
Simulation	NVIDIA Isaac Sim, MuJoCo, ROS2, Synthetic Data Generation
Manufacturing	Smart Manufacturing, MES Systems, Industrial AI, Process Optimization

AWARDS & HONORS

- National Scholarship Recipient
- Outstanding Student Award, Tongji University
- Second Prize, Shanghai Mathematical Modeling Competition
- Bronze Medal, University Physics Competition (USA)