Peng Yifan

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EDUCATION

Nanjing University of Science and Technology (NJUST, Project 211), Nanjing, China **09. 2022 – 04. 2025**

Master of Engineering in Control Science and Engineering - System Engineering (advised by Prof. Yifei Wu)

- **GPA:** 91.48/100 | ranked 11/390, **(top 3%)**

Nanjing University of Science and Technology (NJUST, Project 211), Nanjing, China **09. 2017 – 06. 2021**

Bachelor of Engineering in Automation

- **GPA:** 3.42/4.0 | ranked 56/188, (top 30%)

WORK EXPERINECE

The Chinese University of Hong Kong, Shenzhen (Laboratory for Intelligent Autonomous Systems) **11. 2024 – Present**

Role: Research Assistant (advised by Prof. Junfeng Wu and Prof. Ziyang Hong)

RESEARCH INTERESTS

- **Event camera-based Visual SLAM in underwater scenes**
- **Deep Learning-based Visual SLAM in dynamic scenes**
- **Robot environment perception and understanding**
- **Multi-robot collaborative SLAM**

PUBLICATIONS

[1] Yifan Peng, Yuze Hong, Ziyang Hong, Apple-Pui Yi Chui and Junfeng Wu. "AquaticVision: Benchmarking Visual SLAM in Underwater Environment with Events and Frames," ***2025 IEEE International Conference on Robotics and Automation(ICRA) Workshop on Field Robotics*** **(CCF-B)**, Atlanta, USA, 2025, **Accepted**, https://arxiv.org/abs/2505.03448.

[2] Yifan Peng, Rui Xv, Wenwen Lu Xiaorui Wu, Yvmeng Xv, Yifei Wu, and Qingwei Chen. "A High-Precision Dynamic RGB-D SLAM Algorithm for Environments with Potential Semantic Segmentation Network Failures." ***Measurement*** **(JCR-Q1, IF = 5.6)**, 2025, **Accepted**, DOI: 10.1016/j.measurement.2025.118090 .

[3] Yifan Peng, Rui Xv, Yvmeng Xv and Yifei Wu. "A Visual SLAM Method Based on Semantic Segmentation Network in Dynamic Scenes," ***2024 IEEE 22nd International Conference on Industrial Informatics (INDIN)***, Beijing, China, 2024, pp. 1-7, doi: 10.1109/INDIN58382.2024.10774274.

RESEARCH EXPERIENCES

1.Underwater robot and Event Camera Project **11. 2024 – Present**

Solve the problem of state estimation and environment perception in underwater scenes while building a more intelligent and autonomous underwater robot system under the supervision of Prof. Junfeng Wu and Prof. Ziyang Hong.

- Research event-based visual SLAM for underwater environments by using DAVIS346 event camera, addressing the event representation challenges in underwater scenarios.
- Build and release the first underwater dataset contains events, frames and IMU data while also provides groundtruth files to help evaluate the performance of underwater visual SLAM or odometry.

Outcomes:

- A conference paper has been accepted at the Workshop on Field Robotics at the 2025 IEEE International Conference on Robotics and Automation(ICRA).
- Publish a multi-modal underwater dataset. Dataset project page: https://sites.google.com/view/aquaticvision-lias

2. Dynamic Visual SLAM Project **02. 2024 – 02.2025**

Mitigate the impact of various dynamic objects on visual SLAM system based on semantic and depth information to achieve high-precision localization and static dense point cloud mapping under the supervision of Prof. Yifei Wu.

- Embedded the ANN semantic segmentation network into ORB-SLAM2 to detect common dynamic objects.
- Proposed an unknown dynamic object recognition algorithm, enabling accurate dynamic object recognition when the semantic segmentation network fails.
- Designed a strategy to remove dynamic features using semantic information and dynamic depth clusters, improving localization accuracy and map quality.
- Developed a static point cloud map creating thread with loop closure constraint to construct high-quality map in dynamic environments.

Conclusion & Outcomes:

- The proposed system achieves top or second localization accuracy on TUM and Bonn datasets compared to most mainstream dynamic SLAM algorithms, while also constructing high-quality static dense point cloud map in real-world dynamic scenes.
- Completed a journal paper and a conference-type paper; Came out with a complete novel RGB-D visual SLAM system.

3. Autonomous Harvesting Robot Project **09. 2023 – 11. 2023**

Developed a complete navigation and localization system for a mobile robot, enabling it to create 2D maps and autonomously cruise along designated waypoints under the supervision of Prof. Yifei Wu, and Prof. Sheng Li.

- Deployed a 2D LiDAR SLAM algorithm based on Cartographer in the mobile robot.
- Designed an autonomous navigation module. Implemented A* and DWA algorithms for path planning.
- Designed a ROS topic-based data interaction module to subscribe odometry data, publish target linear/angular velocities to mobile chassis, and waypoints to the navigation module.

Conclusion & Outcomes:

- Produced a complete navigation and localization system for a mobile robot.

4. Generative AI and Scene Understanding Project (National Natural Science Foundation) **08. 2023 – 02.2025**

Researching the related field's current status, and designing the research content combining generative models with SLAM for spacecraft environment perception and understanding under the supervision of Prof. Yifei Wu, and Prof. Qingwei Chen.

- Conducted extensive research on relevant literature in generative models, multi-robot SLAM, and scene understanding.
- Draft the project proposal based on the given title. Wrote the research background and status, scientific questions, and technical approach sections for the scene understanding part.
- Made the slides for defense and other preparations.

Conclusion & Outcomes:

- Wrote a research proposal that recently passed the preliminary review and defense.

5. Unmanned Vehicle Experimental Platform Project **10. 2022 – 12. 2022**

Design a versatile unmanned vehicle experimental platform and simulate the driving process of an autonomous vehicle on the road under the supervision of Prof. Yifei Wu, and Prof. Sheng Li.

- Designed and built a multifunctional unmanned vehicle experimental platform independently for validating various algorithms.
- Designed a dual-loop localization and obstacle avoidance algorithm for automated driving and multi-vehicle interaction.
- Designed a ROS-based communication program between NVIDIA Jetson Nano and embedded control board.

Conclusion & Outcomes:

- Won the third prize in the multi-vehicle interaction project in the *13th Jiangsu University Student Robot Competition*.
- Produced a complete and versatile development platform for the unmanned vehicle.

6. Visual SLAM System for Quadruped Bionic Robot Project **01. 2021 – 06. 2021**

Researched Visual SLAM techniques in static scenarios for undergraduate thesis under the supervision of Prof. Yifei Wu.

- Reproduced ORB-SLAM2 for indoor/outdoor high-precision localization using the TUM dataset and D435i camera.

- Developed dense point cloud and octree mapping programs using ROS, OpenCV, and PCL.

Conclusion & Outcomes:

- Completed the undergraduate thesis and won the second prize for excellent graduation design in Jiangsu Province.

7. Multi-AGV Warehouse Management System Project **10. 2019 – 05. 2020**

Design of optically guided AGVs to simulate the warehouse management scheduling process under the supervision of Prof. Xin He.

- Designed precise wheeled odometry for accurate robot localization control.
- Implemented A* algorithm for path planning; used PID for motor closed-loop and vision-based robot line-following control.
- Independently completed hardware design and assembly of 3 model AGVs; Completed the embedded software development and joint debugging for each module.

Conclusion & Outcomes:

- Produced two software copyrights and a complete multi-AGV system.

EXTRACURRICULAR ACTIVITIES

Head of the Robotics Innovation Lab (Auto-Robot) 06. 2019 – 03. 2021

Director of the Internet Publicity Department of the Student Union of the School of Automation 06. 2018 – 06. 2019

HONOURS & AWARDS

Scholarships:

- Second Prize for Postgraduate Academic Scholarship in NJUST 2024
- First Prize for Postgraduate Academic Scholarship in NJUST 2023, 2022
- Third Prize of Outstanding Student Scholarship for undergraduate students in NJUST 2021, 2020, 2019, 2018
- Second Prize of Outstanding Student Scholarship for undergraduate students in NJUST 09.2018

Awards:

- Outstanding Graduated Postgraduate Student in NJUST 04. 2025
- **Second Prize of Excellent Graduation Design (Provincial Level)** 06. 2021

Competition honors:

- Third Prize of Multi-vehicle Interaction Project in the *13th Jiangsu University Student Robot Competition* 11. 2022
- Second Prize in the *National College Student Mathematics Competition (Jiangsu Division)* 12. 2020
- Second Prize in the Robotics Adventure Programme in the *2019 Softbank Cup China Robotics Skills Competition* 12. 2019
- **First Prize of *National Student Electronic Design Competition (Jiangsu Division)*** 09. 2019
- **Second Prize in the Four-wheel Vehicle Category of *the 14th NXP Cup Intelligent Vehicle Competition for National Students*** *(East China Region)* 07. 2019
- Third Prize in the Robot Adventure Tour programme in the *9th Jiangsu University Student Robotics Competition* 11. 2018
- Third Prize of the *15th Advanced Mathematics Competition of Jiangsu Province* 07. 2018

SKILLS

Language: Chinese (Native), **English (Proficient with IELTS 6.5, GRE 322)**.

Visual SLAM:

- Theories: feature extraction and matching, pose estimation and optimization, point cloud map creation.
- Learning-based Dynamic Visual SLAM Algorithms: especially detection and handling of dynamic targets.
- Open-source Systems:ESVO2, ORB-SLAM2/3, DS-SLAM, SG-SLAM (code reading and secondary development).

Programming:

- Language: C/C++ (Proficient); Python (Novice).
- Platform: Ubuntu (frequently used command line; code writing and debugging).

Tools: ROS; OpenCV; OpenMMlab; G2O; PCL; GitHub.

Engineering practice: Capable of full robot design and development (hardware design, embedded software development, and related algorithm design and deployment).

Academic abilities: Proficient in academic reading, writing, and drawing; literature research.