Ruochu Yang

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Summary

I am a Ph.D. student in School of ECE at Georgia Tech. My research interests revolve around AI planning, underwater robotics, and visual SLAM, with a particular focus on integrating AI models with task and motion planning in autonomous robotic systems.

EDUCATION

Ph.D. in Electrical and Computer Engineering, Georgia Institute of Technology — **Jan 2022 - Present**

M.S. in Electrical and Computer Engineering, Georgia Institute of Technology — **Jan 2020 - Dec 2021**

B.Eng. in Artificial Intelligence, Nankai University — **Sep 2015 - Jun 2019**

PUBLICATIONS

1. **Yang, R.** *et al. OceanChat: Piloting Autonomous Underwater Vehicles in Natural Language* in *ICRA* (2024), submitted.

2. **Yang, R.** *et al. Real-time Autonomous Glider Navigation Software* in *MTS/IEEE OCEANS Limerick* (2023), accepted.

3. **Yang, R.** *et al. General Anomaly Detection of Underwater Gliders Validated by Large-scale Deployment Dataset* in *MTS/IEEE OCEANS Gulf Coast* (2023), accepted.

4. **Yang, R.** *et al. Anomaly Detection of Underwater Gliders Verified by Deployment Data* in *IEEE Underwater Technology* (2023), 1–10.

5. **Yang, R.** *et al. A flexible rope crane experiment system* in *Applications of Modelling and Simulation* **3** (2019), 11–17.

AWARDS & HONORS

Gong Neng Scholarship, Nankai University — **Jun 2019**

Excellent Undergraduate of the College of Artificial Intelligence, Nankai University — **Jun 2019**

Annual Outstanding Volunteer of the Communist Youth League, Nankai University — **Jun 2017**

EXPERIENCE

Graduate Research Assistant — **Aug 2021 - Present**
School of Electrical and Computer Engineering, Georgia Tech, US — Advisor: Prof. Fumin Zhang
- Developed a closed-loop LLM-guided robotic planning algorithm to pilot autonomous underwater vehicles in natural language.
- Applied LSTM to learning piece-wise constant ocean flow dynamics partitioned by K-means.
- Developed a real-time glider autonomous navigation Python software for the underwater robotics community.
- Utilized a CLLE-based anomaly detection algorithm to monitor gliders in the ocean in real time.

Autonomous Vehicle Developing Intern — **Feb 2021 - Aug 2021**
Cruise LLC, San Francisco, US — Managers: Chenglin Xu, Devin Looney
- Developed a unified Python API to remotely control multiple power supplies on component test benches.
- Composed test cases of A100/A110 autonomous vehicle product-level requirements and analyzed test results.
- Researched power mode interaction workflow between vehicle computing system and power distribution board.

Undergraduate Research Assistant — **Aug 2018 - Nov 2019**
College of Artificial Intelligence, Nankai University, China — Advisor: Prof. Jing Yuan
- Improved the ORB-SLAM algorithm to run robustly in challenging indoor scenes such as texture loss and motion blur.
- Combined the LSD-SLAM algorithm with the ORB-SLAM algorithm to promote accuracy of localization and mapping.
- Developed a C++ module to extract multiple principal planes from 3D dense point clouds.

PROJECTS

Super U^2-Net, Georgia Tech — **Jan 2023 - May 2023**
- Developed an efficient Salient Object Detection (SOD) model Super U^2-Net based on the backbone U^2-Net.
- Evaluated three SOD models Spectral Residual Saliency Detection, U^2-Net, and Super U^2-Net on the DUTS Image Dataset.

3D Pac-Man Game, Georgia Tech — **Nov 2020 - Dec 2020**
- Developed an interactive 3D pac-man game in C++ with four ghosts, one square maze, fifty coins, three powerups and one pac-man.
- Tested the game in real time on local machine and PACE-ICE server with 93% passing rate.

Iterative Methods of Linear and Nonlinear Systems, Georgia Tech — **Apr 2020 - May 2020**
- Based on CG and PCG iterative methods, designed an FFT algorithm to accelerate floating-point operation in solving high-dimensional linear equations, and reduced overall computation runtime complexity from $O(n^3)$ to $O(nlogn)$.
- Applied Newton and Quasi-Newton methods to solve high-dimensional dense matrices, and combined them with linear iterative methods to search possible solutions in 3D Euclidean space.

Design of Image Retrieval System, Institute of Computing Technology, Chinese Academy of Sciences — **Jul 2018 - Aug 2018**
- Given a target image, implemented a global-local feature detection algorithm to retrieve top 10 most similar images from database of 1000 samples in 3 seconds.
- Designed an interactive user interface to select the target image, retrieved images, and processing time for quantitative evaluation.

TRS Robot Competition (2nd place), Institute of Automation, Chinese Academy of Sciences — **Feb 2018 - Mar 2018**
- Set up the simulation environment in V-rep, and implemented path planning to navigate around the house while avoiding obstacles.
- Based on visual recognition, implemented motion planning to pick up specified objects and put them into specified trash cans.