

Yunfan Lu

RESEARCH ENGINEER · ROBOTICS AND EMBEDDED SYSTEM · SINGAPORE PR

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Work Experience

Senior Robotics Software Engineer

Singapore

DYSON TECHNOLOGY, UPSTREAM ROBOTICS / ROBOT LEARNING LAB

May 2022 - Present

- Led the Development of an extensive software integration platform for evaluating robotics algorithms, ranging across perception, state estimation, planning and control, for both mobile robots and robot arms, in both simulations (Pybullet, Unity) and real world.
- Implemented and improved state-of-the-art imitation and reinforcement learning algorithms for the robot learning software stack to facilitate robot learning research.
- Co-authored a paper developing a comprehensive benchmark for mobile manipulation. Took charge of running large-scale experiments to evaluate state-of-the-art algorithms on large variety of tasks, using multiple GPU clusters. The paper is in review of CORL 2024.

Robotics Research Engineer

Singapore

NATIONAL UNIVERSITY OF SINGAPORE, ADAPTIVE COMPUTING LAB

July 2019 - Feb 2022

- Assisted research in the area of smart household robot applications under supervision of Prof David Hsu.
- Integrated research projects with state-of-the-art computer vision, speech recognition, planning, manipulation and indoor navigation to build a robot butler that communicates with and serves people.
- Delivered milestone demonstrations to external visitors. Videos available [here](#).
- Developed and maintained robot software system architecture to enforce software consistency and cleanliness. Unified all pre-existing codes into a consistent framework.

Embedded Software Engineer

Singapore

CREATIVE TECHNOLOGY PTE LTD

July 2017 - Jun 2019

- Developed key user interaction and data communication modules for new Super X-FI flagship product series.
- Developed C++ test programs and Python test scripts across platforms to ensure the quality and stability of products.
- Collaborated extensively with other teams to ensure efficient module integration and debugging.

Education

National University of Singapore

Singapore

MASTER IN ARTIFICIAL INTELLIGENCE, RESEARCH TRACK

Aug 2020 - Aug 2023

- CGPA 4.9/5.00. Academic Excellence Award.
- Distinction in courses including Advanced Topics in Robotics, AI Planning and Decision Making, Uncertainty Modelling in AI and Theory and Algorithms for Machine Learning.
- Master thesis focuses on harnessing deep learning to accelerate motion planning for mobile manipulators in household environments. Paper in submission to TRO.

Nanyang Technological University

Singapore

B.E. IN ELECTRICAL AND ELECTRONIC ENGINEERING

Aug 2013 - Jun 2017

- Specialization: Intelligent system and control.
- First Class Honours / CGPA 4.55/5.00.
- Scholarship: NTU Science and Engineering Scholarship in recognition of academic excellence.
- Achieved 17 Distinctions in engineering courses, including Robotics and Automation, Computational Intelligence, Modelling and Control, Engineering Mathematics and Data Structure and Algorithms.

Publications & Projects

Neural Randomized Planning for Whole-Body Robot Motion

In submission to Transaction on
Robotics

PUBLICATION, FIRST AUTHOR

[paper link](#)

- Proposed a novel hybrid learning-planning algorithms to address the slow speed of whole-body motion planning for high DOF mobile manipulators in household environments.
- The method iteratively uses learning to bias the sampling of planner. Learner helps planner to focus on promising regions for each local connection problem, improving efficiency of planning in high-dimensional spaces. Planner systematically stitch these local solutions together to find solutions for the global motion planning, scaling up to complicated environments.
- Performed extensive experiments in both simulation and real-world, showing that the algorithm significantly outperforms existing classical and learning-based motion planning algorithms. Videos available [here](#)

INVIGORATE, Interactive Visual Grounding and Grasping in Clutter

[Robotics: Science and System 2021](#)

PUBLICATION, CO-FIRST AUTHOR

[paper link](#)

- Researched and developed a robot system that interactively grasps a user-specified target object in cluttered environments.
- The system integrates learning and planning by treating neural networks' outputs as noisy observations. Using learnt observation models, it performs principled POMDP planning to synthesize an optimal action sequence including grasping and asking questions to retrieve the target object.
- Implemented the proposed system on a Fetch robot. Conducted extensive real-world experiments to evaluate the system's performance.

Ab Initio Particle-based Object Manipulation

[Robotics: Science and System 2021](#)

PUBLICATION, CO-AUTHOR

[paper link](#)

- Helped implementing real robot experiment to evaluate the method's performance.
- Paper published in Robot Science and Systems 2021.

Custom Flight Controller

[Open-source project](#)

SELF-INITIATED PROJECT

[project link](#)

- Developed a custom quadcopter flight controller software from scratch using C++ on STM32F103.
- Implemented all necessary software components such as SBUS driver, state estimation service using Madgwick AHRS filter and multi-loop PID controller.
- Implemented custom features such as tuning PID using transmitter.
- Tested on custom-built quadcopter with self-made circuit board. Able to fly in both attitude rate control and attitude control mode.

Skills

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| Programming | Python, C++, C, ROS, ROS2 |
| Knowledge | Deep learning, reinforcement learning, motion planning, planning under uncertainty, classical control, optimal control |
| Languages | English, Chinese |