JING ZHANG

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Education

Chalmers University of Technology, Sweden　　　　　　　　　　　　**Aug. 2022 – Jun. 2024**
Systems, Control and Mechatronics, Msc　　　　　　　　　　　　　　　　*GPA: 4.5/5.0*
- Workshop: Interpretable approaches in human-machine interaction, Oct. 24 - 25, 2023

University of Electronic Science and Technology of China, China　　　**Aug. 2016 – Jun. 2020**
Microelectronics Science and Engineering, BEng　　　　　　　　　　　　*GPA: 3.45/4.0*

Research Experience

Learning Graph Structures for Collaborative Tasks　　　　　　　　**Oct. 2023 – Dec. 2023**
Supervisor: Assoc. Prof. Karinne Ramirez-Amaro, Prof. Peter Damaschke　*Chalmers University of Technology*
- Extracted semantic representations to bridge low-level data with grounding symbols in graphs, enhancing robots' problem-solving and reasoning capabilities.
- Automatically generated graph structures from human demonstrations via virtual reality (VR) and allocated activities in collaborative tasks for Collaborative Robots (Cobots).

Hierarchical Reinforcement Learning based on Planning Operators　　**Jun. 2023 – Sept. 2023**
Supervisor: Associate Prof. Karinne Ramirez-Amaro　　　　　　　　*Chalmers University of Technology*
- Developed dual-purpose operators based on preconditions and postconditions which is suitable for both holistic planning and as standalone, reusable policies.
- Proposed a framework that integrates symbolic planning with hierarchical reinforcement learning, empowering robots to learn and execute the correct sequence of actions for long-horizon manipulation tasks.
- Successfully validated the proposed method in a cube-stacking scenario, attaining a 97.2% planning success rate and a 68% reduction in training time. This work has been submitted to the *International Conference on Robotics and Automation (ICRA)*.

Learning-based method for sampling-based path planning　　　　　　**Jul. 2021 – Jan. 2022**
Supervisor: R.A.P. Jiankun Wang, Prof. Max Q.-H. Meng　　　*Southern University of Science and Technology*
- Integrated learning-based tree selection strategy motivated by multi-armed bandit problem with sampling-based path planning.
- Introduced an elliptical area constraint for the sampling district and leveraged search-based technology to improve the speed by over 63%.
- Implemented a constrained learning-based approach to RRT* and benchmarked it against the conventional RRT* algorithm, demonstrating the effectiveness of the proposed method.

Publication

- J. Zhang and K. Ramirez-Amaro, "Hierarchical reinforcement learning based on planning operators," *arXiv preprint https://arxiv.org/abs/2309.14237*, Sept. 2023 (submitted to ICRA 2024).

Course Projects

Autonomous Navigation and Rearrangement　　　　　　　　　　　　**Dec. 2023 – Present**
Supervisor: Associate Prof. Karinne Ramirez-Amaro　　　　　　　　*Chalmers University of Technology*
- Developing an ontology-based reasoning system to enhance task identification and execution, thereby improving the robot's interactive capabilities and adaptability within various environments.
- Integrating SLAM for precise mapping and localization; designing and implementing Learning-Based RRT* for advanced path planning coupled with MPC for accurate trajectory tracking.
- Implementing a comprehensive methodology that combines environmental data collection, reasoning, navigation, and rearrangement, empowering robots to autonomously make informed decisions, identify tasks, and efficiently navigate.

Stable Diffusion Model and ControlNet-Based Image Colorization　　**Oct. 2023 – Oct. 2023**
Supervisor: Prof. Lennart Svensson　　　　　　　　　　　　　　　*Chalmers University of Technology*
- Developed dual-purpose operators based on preconditions and postconditions which is suitable for both holistic planning and as standalone, reusable policies.
- Utilized natural language prompts to guide the colorization process, achieving results that align more closely with human preferences and high-level color descriptions.
- Demonstrated superior performance on key metrics such as Fréchet Inception Distance (FID), outperforming traditional CNN and GAN-based colorization methods.

Work Experience

Southern University of Science and Technology | *Research Assistant* **Aug. 2021 – Jan. 2022**
- Implemented global and local planning algorithms for an airport trolley collection project, successfully integrating obstacle-avoidance capabilities for robots.
- Conducted research in learning-based path planning algorithms for mobile robots.
- Implemented graph-search technique and learning-based path planning algorithms for mobile robot navigation.

ANGSemi Microelectronics(Shanghai) Co., Ltd | *Analog Circuit Design Engineer* **Jul. 2020 – Apr. 2021**

Project: LCD drive circuit | *R&D Department* *Feb. 2021 – Apr. 2021*
- Developed and verified I2C-based programming and trimming circuit which is highly flexible, reusable, and can effectively prevent misuse by its password circuit.
- Developed current reference module and bandgap reference module(1.21V, 32ppm/℃) with high PSRR(75dB).
- Developed high stability operational amplifier, achieved 97° phase margin and 104dB low-frequency gain.

Project: Low dropout linear regulator | *R&D Department* *Oct. 2020 – Jan. 2021*
- Developed and verified over-temperature protection module and current-limiting protection module.
- Developed trim module and error amplifier, allowing chip to be used at 1.2V-5.5V supply voltage.
- Achieved ultra-low power dissipation with 1μA quiescent current.