DONGJIE YU (余冬杰)

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EDUCATION

The University of Hong Kong (HKU) — Sep. 2023 – Present
Ph.D. Student in Computer Science — *Advisor: Prof. Jia Pan*

Tsinghua University (THU) — Sep. 2020 – Jun. 2023
Master of Science in Mechanical Engineering — *Advisor: Prof. Shengbo Li & Prof. Jianyu Chen*

Tsinghua University — Sep. 2016 – Jul. 2020
Bachelor of Engineering in Vehicle Engineering — *Advisor: Prof. Shengbo Li*
- GPA:3.75/4, rank: 4/65 **(top 10%)**
- Awarded with the Excellent Graduate of Tsinghua University **(top 10%)**

Tsinghua University — Sep. 2017 – Jul. 2020
Minor in Computer Application Technology

RESEARCH INTEREST

Imitation Learning (IL), Robotic Manipulation, Reinforcement Learning (RL), Safe RL, Learning-based Control

HONORS AND AWARDS

Hong Kong PhD Fellowship Scheme (HKPFS), Research Grants Council of Hong Kong	2023-2027
HKU Presidential PhD Scholarship (HKU-PS), HKU	2023-2027
Y S and Christabel Lung Postgraduate Scholarship, HKU	2023
Best Student Paper, the 2021 International Conference on Intelligent Vehicles (ICoIV)	2021
Excellent Graduate, Tsinghua University **(top 10%)**	2020
Outstanding Bachelor Thesis, School of Vehicle and Mobility **(top 20%)**	2020
Scholarship of Academic Excellence, Tsinghua University **(top 30%)**	2017, 2018, 2019
Scholarship of Freshmen, School of Vehicle and Mobility **(2/65)**	2016

RESEARCH AND PROJECT EXPERIENCES

(No special marks: leading projects, *co-leading projects, †projects member)

Fine-grained General Bimanual Manipulation* — Oct. 2023 – Present
Postgraduate Student Researcher, Department of Computer Science, HKU
- Proposed a hierarchical imitation learning framework for bimanual manipulation. Trained a high-level keypose predictor forecasting next bimanual keypose to guide low-level trajectory generation and improve per-stage reliability.
- Formulated the low-level policy as a consistency model to avoid iterative denoising in diffusion policy and enhance per-step efficiency during online execution. (Paper 6)
- Simulated and real-world experiments on ALOHA indicated that the proposed framework improves sub-stage and overall success rates while maintaining real-time reaction. Now migrating the proposed approach to a dual franka-sigma system.

Safe Model-based RL with a Distributional Reachability Certificate (DRPO) — May. 2022 – Jul. 2023
Postgraduate Student Researcher, Intelligent Driving Lab, School of Vehicle and Mobility, THU
- Extended the reachability certificate proposed in Project RCRL to a distributional setting to realize robust safety against the model uncertainty in model-based RL.
- Proposed a safe RL framework to resolve distributional reachability constraints and leveraged a shield policy derived from the certificate.
- Evaluated DRPO on several safe RL benchmarks and showed that training time violations were reduced significantly while cumulative rewards were maintained. (Paper 5)

Reachability Constrained RL for Safety-critical Dynamical Systems (RCRL)* — Nov. 2021 – May. 2022
Postgraduate Student Researcher, Intelligent Driving Lab, School of Vehicle and Mobility, THU
- Introduced reachability certificate from Hamilton-Jacobi Reachability to describe forward-invariant state subspace in constrained RL and guided policy updates.

- Evaluated RCRL on 2D quadrotor tracking tasks and robots navigation tasks in simulation. RCRL converged to zero-violation policies with competitive performance. (Paper 4)

Integrated Decision and Control for Autonomous Driving (IDC)†   Jan. 2021 – Dec. 2021

Postgraduate Student Researcher, Intelligent Driving Lab, School of Vehicle and Mobility, THU
- Designed a static path planner for general intersections, together with a velocity-choosing mechanism addressing switch among traffic lights. Results serve as tracking reference for MPC or RL-trained policies. (Patent CN202110990214.8)
- Implemented an attention-based model as decision-making neural networks backbone to deal with dynamic number of surrounding traffic participants. (Paper 3)

Permutation Invariant State Representation for Autonomous Driving (ESC)†   Jun. 2020 – Dec. 2020

Postgraduate Student Researcher, Intelligent Driving Lab, School of Vehicle and Mobility, THU
- Proposed a permutation-invariant representation method (called ESC) to encode dynamic number of participants in autonomous driving. Proved injectivity and representation capability of ESC with theory and empirical experiments. Compared to fixed-permutation methods, ESC reduces approximation error by 62.2%. (Paper 2)
- Adopted attention-based mechanism to address equal weighting in ESC. (Applied in Project IDC)

PUBLICATIONS

Selected Journal and Conference Papers (* equal contribution)

6. **Yu D.***. Xu H.*, Chen Y., et al. BiKC: Keypose-Conditioned Consistency Policy for Bimanual Robotic Manipulation (2024). In International Workshop on the Algorithmic Foundations of Robotics.

5. **Yu D.***, Zou W.*, Yang Y.*, et al. Safe Model-based Reinforcement Learning with an Uncertainty-Aware Reachability Certificate (2023). In IEEE Transactions on Automation Science and Engineering.

4. **Yu D.***, Ma H.*, Li S. E., et al. Reachability Constrained Reinforcement Learning (2022). In International Conference on Machine Learning.

3. Jiang J., Ren Y., Guan Y., Li S. E., Yin Y., **Yu D.**, et al. Integrated Decision and Control at Multi-Lane Intersections with Mixed Traffic Flow (2021). in International Conference on Intelligent Vehicles. **(Best student paper award)**

2. Duan J.*, **Yu D.***, Li S. E., et al. Fixed-Dimensional and Permutation Invariant State Representation of Autonomous Driving (2021). In IEEE Transactions on Intelligent Transportation Systems.

Book Chapter

1. Chapter 9.6.2 (5 pages about application of HJ Reachability in Constrained RL) and Chapter 11.7 (6 pages about common RL libraries and benchmarks) of *Reinforcement Learning for Sequential Decision and Optimal Control* by Shengbo Eben Li. Springer, 2023.

EXTRACURRICULAR ACTIVITIES

Technology Service Team of Work-Study Program at Tsinghua University   Sep. 2020 – Present

Team member
- Offered help for teaching and administrative staff and students in terms of computers, including (re-)installing OS and software, desktop assembly, and software and hardware troubleshooting.
- Awarded with Excellent Team Member of the Month 3 times, Excellent Team Member of the Semester 2 times and **Outstanding Individual** of Work-Study Program of Tsinghua University in 2021 (top 10%).

Student Association of School of Vehicle and Mobility   Feb. 2017 – May. 2018

Member of Sports Association
- Provided volunteering service including training organization, photographing and events publicity for student athletes.
- Won the first runner-up of Ma Yuehan Cup in 2018.

SKILLS

Programming Language: Python, C/C++, MATLAB
Software and Platform: Linux, PyTorch, MATLAB & Simulink, Git
English: IELTS (8.0 (6.5))
Hobby: Football