YUHONG DENG

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EDUCATION

Tsinghua Shenzhen International Graduate School, Tsinghua University Shenzhen, China
Master of Engineering in Electronic and Information Engineering Aug. 2020 – present
- GPA: 3.85/4.00 (ranking 16/108)
- Selected Courses: Artificial Neural Network (A, top 5%), Introduction to Statistical Learning Theory (A, top 5%), Introduction to Probability theory (A-)

Thesis Title: Learning precise and dexterous manipulation of deformable objects

Department of Mechanical Engineering, Tsinghua University Beijing, China
Bachelor of Engineering in Mechanical Engineering Aug. 2016 – Jul. 2020
- GPA: 3.52/4.00 (ranking 10/20)
- Selected Courses: Programming Fundamentals (A-), System Dynamic and Control (A-), Students Research Training (A+, Honor Level)

Thesis Title: Transmission cable length identification system based on feature point matching

AWARDS

Comprehensive Scholarship (Top 5% of all students), Tsinghua University	Oct. 2022
Academic Rising Star Nominee Award (Top 0.5% of all students), Tsinghua University	Apr. 2021
Scholarship of Achievement in Science and Technology, Tsinghua University	Nov. 2019
Scholarship of Academic Performance, Tsinghua University	Nov. 2019
The First Prize in the 37th Challenge Cup (Top 1% of all students), Tsinghua University	Oct. 2019
The First Prize of Robotic Innovation Competition, Chinese Association for Artificial Intelligence	Oct. 2018

PUBLICATIONS

Journals

[1] H.P. Liu, **Y.H. Deng**, D. Guo, B. Fang, F.C. Sun and W. Yang. An Interactive Perception Method for Warehouse Automation in Smart Cities, IEEE Transactions on Industrial Informatics, vol. 17, no. 2, pp. 830-838, Feb. 2021. (IF:11.648, Q1, DOI: 10.1109/TII.2020.2969680)

Conference

[2] **Y.H. Deng**, C.K. Xia, X.Q. Wang and L.P. Chen. Deep Reinforcement Learning Based on Local GNN for Goal-Conditioned Deformable Object Rearranging, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.

[3] **Y.H. Deng**, C.K. Xia, X.Q. Wang and L.P. Chen. Graph-Transporter: A Graph-based Learning Method for Goal-Conditioned Deformable Object Rearranging Task, IEEE International Conference on Systems, Man and Cybernetics (SMC), 2022.

[4] **Y.H. Deng**, D. Guo, X.F. Guo, N.F Zhang, H.P Liu, and F.C Sun. MQA: Answering the Question via Robotic Manipulation, Robotics: Science and System (RSS), 2021. (DOI: 10.15607/rss.2021.xvii.044)

[5] **Y.H. Deng**, X.F. Guo, Y.X. Wei, K. L, B. Fang, D. Guo, H.P Liu, and F.C Sun. Deep Reinforcement Learning for Robotic Pushing and Picking in Cluttered Environment, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019, pp. 619-626. (DOI: 10.1109/IROS40897.2019.8967899)

RESEARCH INTERESTS

- Vision-based robotic manipulation policies learning
- Reinforcement learning and imitation learning
- Intelligent embodied agents

RESEARCH EXPERIENCE

Intern, Tencent Robotics X Lab Shenzhen, China
Advisor: Lipeng Chen, Researcher of Tencent Robotics X Lab Jan. 2022 – Oct. 2022
Vision-Based Goal-Conditioned Rearrangement Tasks of 1D (rope) and 2D (cloth) Deformable Objects
- Proposed an efficient representation strategy based on dynamic graphs that can accurately parameterize the object configuration and capture the deformable dynamics

- Proposed a light local Graph Neural Network (GNN) learning to update representation graphs and infer the optimal manipulation sequence of pick and place actions with two dynamically updated graphs
- Conducted physical and simulation experiments to verify the performance of our model on rearrangement tasks. The average success rate is beyond 90% both in simulation and reality
- Trained the local Graph Neural Network in multi-task learning and got comparable performance with single-task learning
- Published the paper [2] and submitted a paper to Complex & Intelligent Systems

Precise Manipulation of Grape with Dual-Arm Manipulator
- Designed a planning algorithm to control the ABB dual-Arm manipulator to insert a grape with a needle
- Optimized path planning in action space to avoid joint singularity and improved task success rate
- Maintained and optimized ROS-based projects

Master Student, Tsinghua Artificial Intelligence and Robot Laboratory, Tsinghua University   Shenzhen, China
Advisor: Xueqian Wang, Professor of Automation, Tsinghua University   Sep. 2020 – present
1D deformable object (rope) manipulation task
- Proposed a method to represent the configurations of deformable objects with graph structure defined by handcrafted rules
- Improved a deformable object manipulation planning framework based on Full Convolution Network (FCN) with graph representation and Graph Convolution Network (GCN)
- Established a dataset and quantitative metrics to evaluate the performance of our framework on several tasks
- Published the paper [3]

Research Assistant, Department of Computer Science, Tsinghua University   Beijing, China
Advisor: Huaping Liu, Professor of Computer Science, Tsinghua University   Sep. 2017 – May. 2021
Intelligent Robotic Grasping in Cluttered Scene
- Designed a new composite robotic hand with suction cup and gripper
- Trained the deep Q-network that can actively explore (push) cluttered scene in simulation and transferred the deep Q-network to reality. Robots with active exploration capabilities have a 25% increase in grasping success
- Published the paper [5] and the paper [1]

A Novel Question Answering Task via Robotic Manipulation
- Proposed and formulated a novel task, Manipulation Question Answering (MQA), where the robot performs manipulation actions to actively explore the environment in order to answer a given question
- Established a novel MQA dataset in V-rep simulator and established a corresponding benchmark
- Provided a baseline model for MQA task, the baseline model was composed of a natural language processing module, a computer vision module and an action planning module
- Improved the baseline model with a dynamic scene graph to represent scene semantics and a GRU-based structure to tackle manipulation sequence planning task
- Published the paper [4] and submitted a paper to ACM/IEEE International Conference on Human-Robot Interaction

Paper Reviewer
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

Conference Attended
- 2021 Robotics: Science and System (RSS), Virtual Conference
- 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Macau, China
- 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Virtual Conference

SKILLS

Programming Language: Proficient in Python, C++, Matlab
Design/ CAD: Proficient in Mechanical Design (Solidworks, AutoCAD)
Robotics Related: Proficient in Microcontroller (STM32, Arduino) and manipulators of UR series and ABB series; Frequent user of ROS, Pybullet, Mujoco and V-rep
Machine Learning Related: Frequent user of PyTorch and Tensorflow; Proficient in deep learning and reinforcement learning