Yifeng Zhu

Ph.D. student, Computer Science Department
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Objective

My goal is to develop robots and systems to solve tasks in daily life autonomously so that the way of living would be more convenient. My research lies in the intersection of imitation learning, control, motion planning, reinforcement learning, and multi-agent systems.

Education

University of Texas, Austin **Aug 2019 – Now**
Ph.D. student, Computer Science Department
Co-Advisors: Prof Yuke Zhu and Prof. Peter Stone

Carnegie Mellon University **Sep 2017 – Jun 2018**
Visiting Student, Machine Learning Department (Scholarship sponsered)
Advisor: Prof. Manuela Veloso

Zhejiang University **Sep 2014 – Jun 2018**
Major: Automation + English, Bachelor's Degree in Engineering & Arts
GPA: 3.93 / 4.00, Undergraduate Thesis 4.0/4.0

Publications (selected)

[1] **Yifeng Zhu**, Jonathan Tremblay, Stan Birchfield, Yuke Zhu. Hierarchical Planning for Long-Horizon Manipulation with Geometric and Symbolic Scene Graphs. *International Conference on Robotics and Automation* **(ICRA)**, *2021.*[**Arxiv**] [**Video**]

[2] Guanya Shi, **Yifeng Zhu**, Jonathan Tremblay, Stan Birchfield, Fabio Ramos, AnimashreeAnandkumar, Yuke Zhu. Fast Uncertainty Quantification for Deep Object Pose Estimation. *International Conference on Robotics and Automation* **(ICRA)**, *2021.*[**Arxiv**] [**Video**]

[3] **Yifeng Zhu**, Devin Schwab, Manuela Veloso. Learning Primitive Skills for Mobile Robots. *International Conference on Robotics and Automation* **(ICRA)**, *2019.* [**Pdf**] [**Video**]

[4] Devin Schwab, **Yifeng Zhu**, Manuela Veloso. Reinforcement Learning with Tensor State and Action Spaces. *Neural Information Processing Systems (NeurIPS) Deep Reinforcement Learning Workshop, 2018.*[**Pdf**]

[5] Devin Schwab, **Yifeng Zhu**, Manuela Veloso. Learning Skills for Small Size League RoboCup. *RoboCup International Symposium 2018.* **(Oral & Nominated for Best Paper Award)**[**Pdf**]

[6] Devin Schwab, **Yifeng Zhu**, Manuela Veloso. Zero Shot Transfer Learning for Robot Soccer. Extended Abstract. *Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems.*[**Pdf**]

[7] **Yifeng Zhu**, Yongsheng Zhao, Lisen Jin, Jun Wu, Rong Xiong. Towards High Level Skill Learning: Learn to Return Table Tennis Ball Using Monte-Carlo Based Policy Gradient Method. *IEEE International Conference on Real-time Computing and Robotics*, 2018. **(Oral & Nominated for Best Paper Award)**[**Pdf**]

Employment

NVIDIA, Redmond
Research Intern **Jun 2020 – Aug 2020**

Sony Corporation, Tokyo
Intern, Sony Global Internship Program **Apr 2019 – Aug 2019**

Carnegie Mellon University, Pittsburgh
Research Associate, Machine Learning Department **Aug 2018 - Feb 2019**

Teaching

University of Texas, Austin
Graduate Teaching Assistant **Jan 2021 – May 2021**
- CS 343: *Aritificial Intelligence.*

Graduate Teaching Assistant **Aug 2020 – Dec 2020**
- CS 391R: *Robot Learning.*

Graduate Teaching Assistant **Aug 2019 – Dec 2019**
- CS 394R: *Reinforcement Learning: Theory and Practice.*

Research Experiences

NVIDIA, Redmon
Research Intern **Jun 2020 – Aug 2020**
Mentor: Stan Birchfield
• Focused on hierarchical scene graphs for robot manipulation tasks, which resulted in ICRA 2021 publication.
• Co-authored fast uncertainty quantification of pose estimation problems, which resulted in ICRA 2021 publication.

Sony Corporation, Tokyo
Sony Global Internship Program **Apr 2019 – Aug 2019**
Mentor: Dr. Michael Spranger
• Developed a cooking robot system, including a skill learning component.
• Accomplished several plating tasks for the cooking robot.
• The plating task video was presented at Sony's exhibition booth during IJCAI 2019.

Carnegie Mellon University, Pittsburgh
CORAL Laboratory, Research Associate **Aug 2018 – Feb 2019**
Advisor: Prof. Manuela Veloso
• Tested policy which was trained in robot soccer simulation to the real world and the work was accepted to ICRA.
• Introduced human-advice into reinforcement learning framework using action masking as a hard constraint.

Carnegie Mellon University, Pittsburgh
CORAL Laboratory, Visiting Student **Sep 2017 – Jun 2018**
Advisor: Prof. Manuela Veloso
• Supported by Undergraduate Thesis Project Scholarship from Zhejiang University.
• Trained policies invariant to different numbers of agents or different sizes of image input in robot-soccer-related problems and an Atari game 'Breakout'.
• Trained basic skills for robot soccer using DDPG in simulation.
• Participated in RoboCup 2018 on behalf of CMU in a team of four, and won the **2nd place**. Worked intensively in log analysis, vision system, and robot hardware.

University of California, Los Angeles
Biomechatronics Laboratory, Research Intern **Jul 2017 – Sep 2017**
Advisor: Prof. Veronica Santos
• Classified test subjects' surgical skill of simulated open surgery into expert level and novice level.
• Analyzed data from low-cost IMU sensors attached to suturing devices.
• Designed a frequency feature based on the change of orientation.
• Used Support Vector Machine and statistical method Bootstrapping for classification.
• Presented in CSST Program Poster Session.[**Poster Link**]
• Co-authored an abstract in a clinical meeting.

Zhejiang University, China
Robotics Laboratory, Research Assistant **Jul 2016 – Jul 2017**
Advisor:Prof. Rong Xiong
• Joined research group on humanoid table tennis robot platform.
• Conducted the task of learning a policy of actions for the humanoid robot to return the ball using deep reinforcement learning, and had a first-authored paper which got the oral presentation and nominated as a best paper finalist.
• Developed a visualization platform using Qt-interface and OpenGL.
• Analyzed the rebound model between a spinning ball and a racket.
• Contributed to the construction of a learning framework for real-time detection and localization of balls in different colors, and co-authored in a publication.

Awards and Scholarships

RoboCup 2018 Small Size League, Montreal **Jun 2018**
Silver Medal, on behalf of CMU.

Undergraduate Thesis Project Scholarship **Sep 2017 – May 2018**

Cross-disciplinary Scholars in Science and Technology Scholarship **2017**

National Olympiad in Informatics in Provinces (NOIP), China **Nov 2012**
First Class Prize, High School Group.

Projects

Real-time planning in a dynamic environment [Video]
Carnegie Mellon University, Pittsburgh **Oct 2018 – Dec 2018**

- Real-time planning for vehicle parking in an environment with dynamic obstacles.
- Modeled obstacles' estimation, implemented multi goals for the planner, designed visualization and wrote python bindings for the planner in C++.
- Optimized the computation for both collision checking and cost update in the map.

Instructor: Prof. Maxim Likhachev

Skills and Interests

Programming Language
C++, C, Matlab, Python, Rust, Microcontroller Programming

Language
Chinese (native), English (professional proficiency), Japanese (fluent)

Framework & Tools
ROS, LaTex, Emacs, Tensorflow, Pytorch, Protobuf, AutoCAD, MuJoco, Singularity Image