Zhanyi Sun

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Education

Carnegie Mellon University, Pittsburgh, PA — Aug 2022 — Present
Master of Science in Robotics — GPA: 3.93/4.00
Relevant Coursework: Optimal Control and Reinforcement Learning, Models & Algorithms for Interactive Robotics, Geometry-based Methods in Vision, Mobile Robots

Rice University, Houston, TX — Aug 2018 — May 2022
B.S. in Electrical Engineering and B.A. in Computer Science — GPA: 3.94/4.00
Relevant Coursework: Signals ans Systems, Statistical Machine Learning, Convex Optimization, Computational HRI, Physical Electronics, Algorithmic Robotics

Publications (* indicates equal contribution)

RL-VLM-F: Reinforcement Learning from Vision Language Foundation Model Feedback
Yufei Wang*, **Zhanyi Sun***, Jesse Zhang, Xian Zhou, Erdem Bıyık, David Held†, Zackory Erickson†
Under Review at *International Conference on Machine Learning (ICML)*, 2024
Project Website, Paper

Force-Constrained Visual Policy: Safe Robot-Assisted Dressing via Multi-Modal Sensing
Zhanyi Sun*, Yufei Wang*, David Held†, Zackory Erickson†
IEEE Robotics and Automation Letters (RA-L), 2024
Project Website, Paper

One Policy to Dress Them All: Learning to Dress People with Diverse Poses and Garments
Yufei Wang, **Zhanyi Sun**, Zackory Erickson†, David Held†
Robotics: Science and Systems (RSS), 2023
Project Website, Paper

ViTCoD: Vision transformer acceleration via dedicated algorithm and accelerator co-design
Haoran You, **Zhanyi Sun**, Huihong Shi, Zhongzhi Yu, Yang Zhao, Yongan Zhang, Chaojian Li, Baopu Li, Yingyan Lin
IEEE International Symposium on High-Performance Computer Architecture (HPCA), 2023
Paper, Code

Supertickets: Drawing task-agnostic lottery tickets from supernets via jointly architecture searching and parameter pruning
Haoran You, Baopu Li, **Zhanyi Sun**, Xu Ouyang, Yingyan Lin
European Conference on Computer Vision (ECCV), 2022
Paper, Code

Human-guided motion planning in partially observable environments
Carlos Quintero-Pena*, Constantinos Chamzas*, **Zhanyi Sun**, Vaibhav Unhelkar, Lydia E Kavraki
International Conference on Robotics and Automation (ICRA), 2022
Project Website, Paper

Research Experience

Student Researcher advised by Prof. David Held and Prof. Zackory Erickson — Sep 2022 - Present
Carnegie Mellon University, Robotics Institute

One Policy to Dress Them All: Learning to Dress People with Diverse Poses and Garments

- Designed and implemented a policy distillation algorithm that enabled training a single Reinforcement Learning agent for dressing different people with diverse poses and garments.
- Conducted a human study with 17 participants of different arm poses and garments and achieved a dressing success rate of 86%.

Force-Constrained Visual Policy: Safe Robot-Assisted Dressing via Multi-Modal Sensing

- Designed and implemented a novel multi-modal learning algorithm that enjoys global perception from visual observation and local control from force information for robot-assisted dressing.
- Conducted a human study with 10 participants and demonstrated the proposed method greatly outperforms prior works in terms of both quantitative dressing success rate and user comfort.

RL-VLM-F: Reinforcement Learning from Vision Language Foundation Model Feedback

- Proposed and implemented RL-VLM-F, a preference-based reinforcement learning framework with VLMs for complex manipulation tasks where hand engineering rewards are challenging.
- Demonstrated RL-VLM-F's superior performance in learning rewards and policies in various domains (classic control, rigid, articulated, and deformable objects manipulation) without the need for human supervision

Student Researcher advised by Prof. Yingyan (Celine) Lin Jan 2022 - Aug 2022
Rice University, Electrical Engineering Department

SuperTickets: Drawing Task-Agnostic Lottery Tickets from Supernets via Jointly Architecture Searching and Parameter Pruning

- Implemented a two-in-one training scheme with architecture searching and parameter pruning to identify efficient DNNs from supernets.
- Conducted extensive experiments with 3 CV tasks on 4 datasets, showing the proposed method boosts accuracy and efficiency trade-offs compared to prior work.

ViTCoD: Vision Transformer Acceleration via Algorithm and Accelerator Co-Design

- Designed and implemented a masking method that prunes the attention map up to 90% while maintaining the original performance for Vision Transformer models.
- Implemented reordering algorithms to transform attention map into separate denser and sparser parts and a dedicated two-pronged accelerator that leverages those patterns to boost efficiency.

Student Researcher advised by Prof. Vaibhav Unhelkar and Prof. Lydia E. Kavraki Jan 2021 - Aug 2022
Rice University, Computer Science Department

Human-guided motion planning in partially observable environments

- Designed and implemented a Bayesian Inverse Reinforcement Learning algorithm that interactively learns reward functions from human critiques.
- Designed and implemented an API that leverages human critiques to generate motion plans and demonstrated that our method greatly outperforms baselines by human teaching effort, success rate, and path length.

Constrained-Guided Inverse Reinforcement Learning

- Designed and implemented a novel Inverse Reinforcement Learning algorithm that incorporates human's prior knowledge as extra constraints on the reward function.
- Conducted extensive experiments to demonstrate that the proposed method improves reward learning in terms of accuracy, sample efficiency, and robustness.

Work & Teaching Experience

Software Engineering Intern, Infrastructure Team May 2020 - Aug 2020
Facebook, Inc.

- Designed and implemented a resource manager service that maintains life cycles of various internal testing platforms.
- Designed and implemented a flexible resource managing API that enables other teams to plug in their testing platforms.

Teaching Assistant Jan 2020 - Dec 2021
Rice University, Computer Science Department

- Discrete Math and Algorithmic Thinking (COMP 182) Spring 2020
- Reasoning about Algorithms (COMP 382) Spring 2021
- Algorithmic Robotics (COMP 550, Graduate Level) Fall 2021

Skills

- **Programming:** Python, C, C++, Julia, Java, MATLAB, Verilog, SQL, PHP
- **Libraries:** PyTorch, TensorFlow, Keras, OpenCV, ROS, MuJoCo, Bullet, Blender
- **Physical Robots:** Experience with Sawyer, Franka Panda, and Fetch.

Professional Service

Conference Reviwer

- Conference on Robot Learning (CoRL), 2023
- IEEE International Conference on Robotics and Automation (ICRA), 2024