Yunfu Deng

Contact Information

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Research Interest

My research focuses on robot foundation models and reinforcement learning for robotic control. I develop methods for evaluating large-scale robot foundation models through off-policy evaluation and benchmarking frameworks. My work explores representation learning from multi-modal sensory data (vision, tactile, proprioception) to enable robust generalization across diverse tasks and environments. I also investigate dynamics predictive models and world models that learn environment dynamics for efficient planning and decision-making.

Education

University of Wisconsin, Madison, WI
Ph.D. Student in Computer Science *Sept. 2022 - Present*

Rutgers University, New Brunswick, NJ
M.S. in Electrical and Computer Engineering *May 2022*

Central China Normal University, Wuhan, China
B.Eng. in Computer Science (with Honors) *Jun. 2019*

Selected Publications

Yunfu Deng, Josiah Hanna *Abstract Sim2Real through Approximate Information States* (**IEEE RA-L**, Present on Neurips 2025 Workshop on Embodied World Models for Decision Making and IROS 2026),

Shiyang Lu, Abdeslam Boularias, Yunfu Deng, Kostas Bekris. *Self-Supervised Learning of Object Segmentation from Unlabeled RGB-D Videos.* **ICRA 2023**.

Liam Schramm, Yunfu Deng, Edgar Granados, Abdeslam Boularias. *USHER: Unbiased Sampling for Hindsight Experience Replay.* **CoRL 2022**.

Yunfu Deng, Kun Xu, Yue Hu, Yunduan Cui, Gengzhao Xiang, Zhongming Pan. *Learning Effectively from Intervention for Visual-based Autonomous Driving.* **ITSC 2022**.

Employment and Experience

Mitsubishi Electric Research Laboratories
Research Intern May 2025 – Aug. 2025

- **State Representation Learning for Robot Control**
  - Contributed to developing a pose-based visual servoing method, submitted to ACC 2026.
  - Extend the framework for articulated object manipulation, submitted to RA-L.

DiDi Labs
Research Intern June 2024 – Sept. 2024

- **Data-Driven Simulator Development**
  - Contributed to developing a Waymax-style data-driven driving simulator.
- **Enhancing Autonomous Driving Foundation Models**
  - Developed autonomous driving models leveraging reinforcement learning from human feedback (RLHF) with ranking-based human preference.

Bytedance Research
Research Intern June 2023 – Sept. 2023

- **Improving Long-Horizon Language-Conditioned Robotic Manipulation**
  - Developed a long-horizon robotic manipulation foundation model that integrates vision, language, and control modalities.

- Enhanced the model using ranking-based reinforcement learning from physical human feedback, improving the success rate from 9.3% to 42.7% on the CALVIN benchmark.

University of Wisconsin, Madison
Ph.D. Student Sept. 2022 – Present

- **Learning Complex Robotics Task in Abstract Simulator**

  - Developed a framework using Approximate Information State, enable Sim2Real transfer from abstract simulator to real-world settings.

  - Achieved policy transfer for various robotic tasks, including navigation and bipedal locomotion.
- **Sim-to-Real Transfer via Cross-Domain Bisimulation** - Developed a framework for learning domain-invariant representations under partial observability, enabling zero-shot policy transfer between heterogeneous simulation environments.

  - Extended generalized bisimulation metrics to cross-domain POMDP settings, submitted to RSS 2026.
- **Scalable Policy Evaluation for Robotics** - Proposed Intra-Option FQE for evaluating option-level policies from primitive trajectories without behavior policy annotations. Submitted to ICML 2026.

  - Developing a large-scale robotics OPE benchmark on Open X-Embodiment, bridging OPE theory and practical robotics model evaluation.

Rutgers University, New Brunswick
Graduate Research Assistant Sept. 2021 – Aug. 2022

- **Avoiding Risky Behavior in Robotics Tasks**

  - Proposed USHER, an unbiased sampling algorithm for Hindsight Experience Replay (HER), correcting hindsight bias in stochastic environments with importance sampling. Achieved higher success rates and rewards in robotic tasks while preserving sample efficiency. **(CoRL 2022)**
- **Self-Supervised Object Segmentation with Contrastive Learning**

  - Designed a self-supervised learning system for object segmentation from unlabeled RGB-D videos. Utilized 3D reconstruction, graph matching, and contrastive learning to achieve state-of-the-art results in cluttered environments. **(ICRA 2023)**

Chinese Academy of Sciences, Shenzhen Institute of Advanced Technology
Research Assistant Sept. 2019 – Sept. 2022

- **Learning to Drive from Human Feedback**

  - Developed a hierarchical imitation learning framework for vision-based driving, leveraging expert interventions to improve efficiency and match or surpass state-of-the-art performance on CARLA and NoCrash benchmarks.(**ITSC 2022**)

Professional Services

Conference Reviewer: IROS (2021-2024), ICRA (2022-2024), ITSC 2022, CoRL (2023-2025)