# Yixiao Wang

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## 🎓 Education

**University of California, Berkeley**                                   **California, USA**

PhD student in Mechanical Engineering, GPA: 4.0/4.0                   Sept. 2022 – Present

- Research Interests: Behavior representation and prediction, Planning and optimization, Diffusion model
- Research Advisor: Prof. Masayoshi Tomizuka, Member of the National Academy of Engineering

**Northwestern University**                                              **Illinois, USA**

Master in Mechanical Engineering, GPA: 4.0/4.0                      Sept. 2019 – June 2021

**Shanghai Jiao Tong University**                                       **Shanghai, China**

Master in Mechanical Engineering                                      Sept. 2018 – Mar. 2021

B.S. in Mechanical Engineering, GPA: 3.8/4.3 Rank: 5%             Sept. 2014 – June 2018

## 🖥 Selected Publications

- **Yixiao Wang**\*, Yifei Zhang\*, Mingxiao Huo\*, Ran Tian, Xiang Zhang, Yichen Xie, Chenfeng Xu, Pengliang Ji, Wei Zhan, Mingyu Ding, Masayoshi Tomizuka, *Sparse Diffusion Policy: A Sparse, Reusable, and Flexible Policy for Robot Learning*, Under Review.
- **Yixiao Wang**, Chen Tang, Lingfeng Sun, Simone Rossi, Yichen Xie, Chensheng Peng, Thomas Hannagan, Stefano Sabatini, Nicola Poerio, Masayoshi Tomizuka, Wei Zhan, *Optimizing Diffusion Models for Joint Trajectory Prediction and Controllable Generation*, ECCV 2024.
- Haotian Lin, **Yixiao Wang**†, Mingxiao Huo, Chensheng Peng, Zhiyuan Liu, Masayoshi Tomizuka, *Optimizing Diffusion Models for Joint Trajectory Prediction and Controllable Generation*, IROS 2024.

## 🖥 Selected Research Experience

**Distributed Multi-agent Interaction with Imagined Potential Games**          Mar. 2024 – Present

- Formulate a distributed multi-agent interactive policy as an imagined potential game solution, imagine negotiation between agents, and solve it in an imagined centralized setting. It can plan multi-agent actions, especially when other distributed planners do not have a solution, such as in a deadlock situation.

**Efficient and Reusable Diffusion Policy for Multi-task Learning**            Dec. 2023 – Present

- Design a sparse and computationally efficient vision encoder and diffusion policy network as well as training strategy for multi-task learning to extract shared knowledge across tasks and prevent forgetting in continuous learning. Test multi-task and continuous learning in Robomimic, showing enhanced performance, few-shot ability, and fast fine-tuning on new tasks.

**Towards Efficient and Explainable Representation in Diffusion**             Oct. 2023 – Present

- Compress and extract features in diffusion model, and investigate diminishing mechanism. Test in semantic correspondence datasets including SPair-71K and rank 1st.

**Optimizing Diffusion Model for Controllable Joint Trajectory Prediction**   Aug. 2023 – Feb. 2024

- Optimize the diffusion model with an explicit solution in a conditional multi-agent setting and propose a computationally effective gradient-based sampling method. Test on the Argoverse 2 dataset, showing enhanced performance with fewer diffusion steps compared to the vanilla diffusion model and previous guided sampling methods.

**Socially-compliant MCTS-based Interactive Planning**                       Oct. 2022 – Feb. 2023

- Formulate a socially-compliant behavior model as a Nash Game for a distributed multi-agent setting and utilize Monte Carlo Tree Search (MCTS) to solve for interactive planning for each agent. Test in a closed-

loop autonomous driving simulator, demonstrating controllable, safe, and diverse trajectory simulations.

### Imitating Human Driver through Trajectory Prediction <span style="float:right">Jan. 2022 – Aug. 2022</span>

- Decouple the imitation learning objectives into priors learned as trajectory prediction tasks, and injected human-defined objectives learned as lightweight plug-in modules. It provides a customized warm start for the planning module, accelerating the optimization process. Test on closed-source data, demonstrating reliable and rapid adaptability when transferring to unseen scenarios or new traffic rules.

### Toolpath Designing for Hub Surface Grinding <span style="float:right">Oct. 2020 – Mar. 2021</span>

- Proposed an boundary detection method based on Delaunay triangulation and Depth First Search, increasing the detection efficiency.
- Formed a sweeping surface segmentation module for arbitrary geometry.
- Calculated feed velocity and path spacing to minimize average residual volumes.
- Converted grinding interval movement designing into a TSP and solved it to decrease the production time.

### Manufacturing Analysis and Toolpath Designing <span style="float:right">Jan. 2020 – Mar. 2021</span>

- Analyzed heat transfer process and residual stress distribution in the manufacturing procedure, determined and validated the key factors influencing the final product property, designed a toolpath to improve the mechanical property of the product based on above analysis results.

### Large Cylinder Machining Process and Mechanism Analysis <span style="float:right">Mar. 2017 – June 2018</span>

- Analyzed the structural stiffness of the large cylinder using finite element method and simulated the distortion during the machining process.
- Designed the support structure for machining to decrease the distortion in the machining area and compensate it into feed length.

## ⚙ Skills

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| **Languages** | English - Fluent, Chinese - Native |
| **Technical Skills** | Pytorch, Python, C++, Matlab, Abaqus, UG |

## ◈ Selected Scholarship & Honor

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| Outstanding Graduates of Shanghai Jiao Tong University | Dec. 2020 |
| Outstanding Graduates of Shanghai City (21/415) | June 2018 |
| Scholarship of Shanghai City (9/415) | Dec. 2017 |
| First Prize of SGMW Scholarship (Top 10%) | Oct. 2016 |
| INESA Scholarship (Top 20%) | Dec. 2015 |