Zhenghao PENG

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EDUCATION

University of California, Los Angeles (UCLA) *September 2022 - Present*

- PhD student at the Department of Computer Science, supervised by Prof. Bolei Zhou.

The Chinese University of Hong Kong (CUHK) *August 2019 - July 2022*

- MPhil student at the Department of Information Engineering, supervised by Prof. Bolei Zhou.

Shanghai Jiao Tong University (SJTU) *Sept. 2015 - July 2019*

- Bachelor of Engineering and member of Zhiyuan Honors Program.
- Research assistant supervised by Prof. Li Jiang.

EXPERIENCE

Waymo LLC, Mountain View, CA *June 2023 - September 2023*

- Research intern in behavior modeling.
- Mentored by Wenjie Luo, Justin Fu, and Rowan McAllister.

RESEARCH PAPERS

[1] **Zhenghao Peng**, Zhizheng Liu, and Bolei Zhou. Data-efficient learning from human interventions for mobile robots. *preprint*, 2020 (Preprint)

[2] **Zhenghao Peng**, Wenjie Luo, Yiren Lu, Tianyi Shen, Cole Gulino, Ari Seff, and Justin Fu. Improving agent behaviors with rl fine-tuning for autonomous driving. *European Conference on Computer Vision*, 2024 (**ECCV 2024**)[PDF]

[3] Yunsong Zhou, Michael Simon, **Zhenghao Peng**, Sicheng Mo, Hongzi Zhu, Minyi Guo, and Bolei Zhou. Simgen: Simulator-conditioned driving scene generation. *Advances in Neural Information Processing Systems*, 2024 (**NeurIPS 2024**) [PDF, Website]

[4] Brandon J. McMahan, **Zhenghao Peng**, Bolei Zhou, and Jonathan C. Kao. Shared autonomy with ida: Interventional diffusion assistance. *Advances in Neural Information Processing Systems*, 2024 (**NeurIPS 2024**) [PDF]

[5] **Zhenghao Peng**, Wenjie Mo, Chenda Duan, Quanyi Li, and Bolei Zhou. Learning from active human involvement through proxy value propagation. *Advances in Neural Information Processing Systems*, 2023 (**NeurIPS 2023 *Spotlight***) [PDF, Website]

[6] Quanyi Li*, **Zhenghao Peng***, Lan Feng, Zhizheng Liu, Chenda Duan, Wenjie Mo, and Bolei Zhou. Scenarionet: Open-source platform for large-scale traffic scenario simulation and modeling. *Advances in Neural Information Processing Systems*, 2023 (**NeurIPS 2023**) [PDF , Code , Website]

[7] Linrui Zhang, **Zhenghao Peng**, Quanyi Li, and Bolei Zhou. Cat: Closed-loop adversarial training for safe end-to-end driving. In *7th Annual Conference on Robot Learning*, 2023 (**CoRL 2023**) [PDF, Code, Website]

[8] Lan Feng*, Quanyi Li*, **Zhenghao Peng***, Shuhan Tan, and Bolei Zhou. Trafficgen: Learning to generate diverse and realistic traffic scenarios. In *2023 International Conference on Robotics and Automation (ICRA)*. IEEE, 2023 (**ICRA 2023**) [PDF, Code, Website]

[9] Zhenghai Xue, **Zhenghao Peng**, Quanyi Li, Zhihan Liu, and Bolei Zhou. Guarded policy optimization with imperfect online demonstrations. In *International Conference on Learning Representations*, 2023 (**ICLR 2023**) [PDF, Code, Website]

[10] Quanyi Li, **Zhenghao Peng**, Haibin Wu, Lan Feng, and Bolei Zhou. Human-AI shared control via policy dissection. *Advances in Neural Information Processing Systems*, 2022 (**NeurIPS 2022**)[PDF, Code, Website]

[11] Qihang Zhang, **Zhenghao Peng**, and Bolei Zhou. Learning to drive by watching youtube videos: Action-conditioned contrastive policy pretraining. *European Conference on Computer Vision*, 2022 (**ECCV 2022**)[PDF, Code, Website]

[12] Quanyi Li*, **Zhenghao Peng***, Zhenghai Xue, Qihang Zhang, and Bolei Zhou. Metadrive: Composing diverse driving scenarios for generalizable reinforcement learning. *IEEE transaction on Pattern Analysis and Machine Intelligence*, 2021 (**TPAMI**) [Paper, Code, Website]

[13] Mingxin Huang, Yuliang Liu, **Zhenghao Peng**, Chongyu Liu, Dahua Lin, Shenggao Zhu, Nicholas Yuan, Kai Ding, and Lianwen Jin. Swintextspotter: Scene text spotting via better synergy between text detection and text recognition. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2022 (**CVPR 2022**)

[14] Quanyi Li*, **Zhenghao Peng***, and Bolei Zhou. Efficient learning of safe driving policy via human-AI copilot optimization. In *International Conference on Learning Representations*, 2022 (**ICLR 2022**) [PDF, Code, Website]

[15] **Zhenghao Peng***, Quanyi Li*, Chunxiao Liu, and Bolei Zhou. Safe driving via expert guided policy optimization. In *5th Annual Conference on Robot Learning*, 2021 (**CoRL 2021**) [PDF, Code, Website, Poster]

[16] **Zhenghao Peng**, Quanyi Li, Ka Ming Hui, Chunxiao Liu, Bolei Zhou, et al. Learning to simulate self-driven particles system with coordinated policy optimization. *Advances in Neural Information Processing Systems*, 34, 2021 (**NeurIPS 2021**) [PDF, Code, Website, Poster]

[17] Quanyi Li*, **Zhenghao Peng***, Qihang Zhang, Chunxiao Liu, and Bolei Zhou. Improving the generalization of end-to-end driving through procedural generation. *arXiv preprint arXiv:2012.13681*, 2020 [PDF, Repo, Website]

[18] **Zhenghao Peng**, Hao Sun, and Bolei Zhou. Non-local policy optimization via diversity-regularized collaborative exploration. *arXiv preprint arXiv:2006.07781*, 2020 [PDF]

[19] Zhuoran Song, Dongyu Ru, Ru Wang, Hongru Huang, **Zhenghao Peng**, Jing Ke, Xiaoyao Liang, and Li Jiang. Approximate random dropout. In *Design, Automation & Test in Europe Conference & Exhibition, 2019. DATE'19*. IEEE, 2019 [PDF]

[20] **Zhenghao Peng**, Xuyang Chen, Chengwen Xu, Naifeng Jing, Xiaoyao Liang, Cewu Lu, and Li Jiang. Axnet: Approximate computing using an end-to-end trainable neural network. In *Proceedings of the 2018 International Conference on Computer-Aided Design. ICCAD'18*. IEEE/ACM, 2018 [PDF]

AWARDS AND HONORS

Amazon Fellowship	*2024-2025, UCLA*
University Fellowship	*2023, 2024, UCLA*
The Outstanding Tutors Award 2021 of the Faculty of Engineering	*2021, CUHK*
Teaching Assistant Award	*Term 1 & Term 2, 2020 - 2021, CUHK*
Postgraduate Studentship	*2019 - 2022, CUHK*
Zhiyuan Honors Scholarship	*2015 - 2017, SJTU*

RESEARCH EXPERIENCES

Human-in-the-loop Learning for Real World Mobile Robots *June 2024 - September 2024*

- Applied human-in-the-loop learning on mobile robots, a quadruped robot dog and a delivery robot, to solve social navigation tasks [1]. Webpage: `https://metadriverse.github.io/pvp4real/`

Behavior Modeling in Autonomous Driving *June 2023 - September 2023*
Mentored by Justin Fu, Wenjie Luo and Rowan McAllister

- Improve multi-agent behavior modeling in autonomous driving via RL finetuning.
- Paper accepted to ECCV 2024 [2].

ScenarioNet [6] *February 2023 - June 2023*
Supervised by Prof. Bolei Zhou

- Developed ScenarioNet [6], an open-sourced platform for large-scale traffic scenario modeling and simulation. ScenarioNet can load the major autonomous driving datasets into MetaDrive [12].
- Defined a unified scenario description format containing HD maps and detailed object annotations used to convert different data sources.
- Please visit https://metadriverse.github.io/scenarionet/.

Reward-free Human-in-the-loop Policy Learning [5] *May 2022 - June 2023*
Supervised by Prof. Bolei Zhou

- Proposed the Proxy Value Propagation (PVP) algorithm for human-in-the-loop reward-free policy learning, introduced several technical innovations that stabilizes the training and boosts the safety performance, learning efficiency and user experience.
- Please visit https://metadriverse.github.io/pvp/.

Efficient Learning through Human-AI Copilot [14] *July 2021 - November 2021*

- Proposed the Human-AI Copilot (HACO) algorithm for human-in-the-loop RL that trains agents from human interventions, partial demonstrations and free exploration, even without reward.
- HACO achieves high sample efficiency, high safety and low human cognitive cost.
- Please visit https://decisionforce.github.io/HACO/.

Safe Reinforcement Learning System via Expert in the Loop [15] *March 2021 - June 2021*

- Proposed an Expert Guided Policy Optimization (EGPO) framework for safe RL, which incorporates the guardian mechanism in the interaction of agent and environment to ensure safe and efficient exploration. The experiments on safe driving shows EGPO can achieve training and test-time safety and better performance. Webpage: https://decisionforce.github.io/EGPO/

Simulating Realistic Traffic Flow via Multi-agent RL [16] *Feb. 2021 - May 2021*

- Developed a novel MARL method called Coordinated Policy Optimization (CoPO) to incorporate social psychology principle to learn neural controller for a population of autonomous driving vehicles.
- The vehicles population learned by CoPO achieves superior performance and exhibits complex and socially compliant behaviors that improve the traffic efficiency and safety.
- Please visit: https://decisionforce.github.io/CoPO/

Autonomous Driving Simulator MetaDrive [12] *July 2020 - Present*
Supervised by Prof. Bolei Zhou

- Developed the MetaDrive, an open-ended and highly customizable driving simulator.
- Utilized procedural generation to generate infinite driving scenes with different road networks and traffic flows. Webpage: https://metadriverse.github.io/metadrive/

TALKS

- Human-in-the-loop Agent Learning, EECS 598: Action and Perception Guest Lecture, invited by: Stella Yu, May 2024

TEACHING EXPERIENCES

- CS260R Reinforcement Learning at UCLA, Fall, 2023-24
- CS269 Seminar on Reinforcement Learning at UCLA, Fall, 2022-23
- IERG5350 Reinforcement Learning at CUHK, Term 1, 2021-22
- CSCI2100E Data Structures at CUHK, Term 2, 2020-21
- IERG5350 Reinforcement Learning at CUHK, Term 1, 2020-21
- IERG6130 Seminar on Reinforcement Learning at CUHK, Term 2, 2019-20

MISCELLANEOUS

Reviewer Service: NeurIPS, ICML, CVPR, ECCV, ICLR, CoRL, RSS, IROS, ICRA, AAAI, TNNLS, IJCV