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. Zhou Bolei.

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

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

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

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

EXPERIENCE

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

- Research intern in behavior modeling.

RESEARCH PAPERS

[1] **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]

[2] 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]

[3] 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]

[4] **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]

[5] 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]

[6] 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]

[7] 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]

[8] 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]

[9] 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]

[10] Hao Sun, Ziping Xu, Meng Fang, **Zhenghao Peng**, Jiadong Guo, Bo Dai, and Bolei Zhou. Mopa: a minimalist off-policy approach to safe-rl. 2022 (Deep RL Workshop NeurIPS 2022)

[11] Hao Sun, **Zhenghao Peng**, Bo Dai, Jian Guo, Dahua Lin, and Bolei Zhou. Novel policy seeking with constrained optimization. 2022 (Deep RL Workshop NeurIPS 2022)

[12] 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]

[13] 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]

[14] Boli Fang, **Zhenghao Peng**, Hao Sun, and Qin Zhang. Meta proximal policy optimization for cooperative multi-agent continuous control. In *2022 International Joint Conference on Neural Networks (IJCNN)*, pages 1–8. IEEE, 2022

[15] 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**)

[16] 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]

[17] **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]

[18] **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]

[19] 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]

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

[21] 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]

[22] **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*
University Fellowship	*2023, 2024, UCLA*
The Outstanding Tutors Award 2021 of the Faculty of Engineering	*2021, CUHK*
Teaching Assistant Award	*Term 2, 2020 - 2021, CUHK*
Teaching Assistant Award	*Term 1, 2020 - 2021, CUHK*
Postgraduate Studentship	*2019 - 2022, CUHK*
Zhiyuan Honors Scholarship	*2015 - 2017, SJTU*

RESEARCH EXPERIENCES

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

- Conducted research on the behavior modeling in autonomous driving.
- Paper accepted to ECCV 2024 [1].

ScenarioNet [5] *February 2023 - June 2023*
Supervised by Prof. Zhou Bolei

- Developed ScenarioNet [5], an open-sourced platform for large-scale traffic scenario modeling and simulation. ScenarioNet can load the major autonomous driving datasets into MetaDrive [13].
- 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 [4] *May 2022 - June 2023*
Supervised by Prof. Zhou Bolei

- 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 [16] *July 2021 - November 2021*
Supervised by Prof. Zhou Bolei

- 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 [17] *March 2021 - June 2021*
Supervised by Prof. Zhou Bolei

- 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.
- Please visit https://decisionforce.github.io/EGPO/.

Simulating Realistic Traffic Flow via Multi-agent RL [18] *Feb. 2021 - May 2021*
Supervised by Prof. Zhou Bolei

- 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 [13] *July 2020 - Present*
Supervised by Prof. Zhou Bolei

- 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.
- Please visit 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: NeurIPS, ICML, CVPR, RSS, ICLR, IROS, ICRA, AAAI, TNNLS, CoRL, IJCV
Programming Languages: Python, Matlab, HTML, CSS, C++, etc.
ML Frameworks: Ray, RLLib, TensorFlow, PyTorch, Keras, Jax, etc.
Skills: Git, LaTeX, PyCharm, Keynote, Photoshop, Final Cut, Cantonese, etc.