

Wenhao Ding

✉ wenhaod@andrew.cmu.edu 🌐 www.wenhao.pub 🎮 GilgameshD in wenhaoding

Education

Carnegie Mellon University, Pittsburgh, USA <i>Ph.D. Mechanical Engineering</i>	<i>Aug 2019 - May 2024</i>
Carnegie Mellon University, Pittsburgh, USA <i>M.S. Machine Learning</i>	<i>Jan 2021 - Dec 2022</i>
Tsinghua University, Beijing, China <i>B.Eng. Electronic Engineering</i>	<i>Aug 2014 - July 2018</i>

Professional Experience

NVIDIA Research, Santa Clara, USA <i>Research Scientist, Autonomous Vehicle Group</i>	<i>June 2024 - Now</i>
NVIDIA Research, Santa Clara, USA <i>Research Scientist Intern, Autonomous Vehicle Group</i>	<i>July 2023 - December 2023</i>
Amazon Lab126, Sunnyvale, USA <i>Applied Scientist Intern</i>	<i>May 2022 - Aug 2022</i>
Bosch Center for Artificial Intelligence, Pittsburgh, USA <i>Machine Learning Research Intern</i>	<i>May 2021 - Aug 2021</i>
Chinese University of HongKong, HongKong, China <i>Research Assitant</i>	<i>July 2017 - Sep 2017</i>

Research Interests

I work on deep generative models, reinforcement learning, and causal discovery. My research advances autonomous systems from data perspective:

- Data Acquisition:** generating critical and diverse scenarios for expanding data coverage.
- Data Representation:** discovering the underlying structure of data for generalization and robustness.
- Data Consumption:** designing in-context and fine-tuning strategy for continual model learning.

Publications

Conference and Journal Paper

- [RAL'24] Safety-aware Causal Representation for Trustworthy Reinforcement Learning in Autonomous Driving
*Haohong Lin, **Wenhao Ding**, Zuxin Liu, Yaru Niu, Jiacheng Zhu, Yuming Niu, Ding Zhao*
- [ICRA'24] Your Room is not Private: Gradient Inversion Attack for Deep Q-Learning
*Miao Li, **Wenhao Ding**, Ding Zhao*
- [NeurIPS'23] Seeing is not Believing: Robust Reinforcement Learning against Spurious Correlation
Wenhao Ding, Laixi Shi*, Yuejie Chi, Ding Zhao*
- [ICML'23] Bayesian Reparameterization of Reward-Conditioned Reinforcement Learning with Energy-based Models
Wenhao Ding, Tong Che*, Ding Zhao, Marco Pavone*

5. [ICRA'23] Learning to View: Decision Transformers for Active Object Detection
Wenhao Ding, Nathalie Majcherczyk, Mohit Deshpande, Xuwei Qi, Ding Zhao, Rajasimman Madhivanan, Arnie Sen
6. [T-ITS'23] A Survey on Safety-critical Scenario Generation for Autonomous Driving – A Methodological Perspective
Wenhao Ding, Chejian Xu, Haohong Lin, Bo Li, Ding Zhao
7. [CoRL'23] What Went Wrong? Closing the Sim-to-Real Gap via Differentiable Causal Discovery
Peide Huang, Xilun Zhang, Ziang Cao, Shiqi Liu, Mengdi Xu, Wenhao Ding, Jonathan Francis, Bingqing Chen, Ding Zhao
8. [NeurIPS'22] Generalizing Goal-Conditioned Reinforcement Learning with Variational Causal Reasoning
Wenhao Ding, Haohong Lin, Bo Li, Ding Zhao
9. [NeurIPS'22] SafeBench: A Benchmarking Platform for Safety Evaluation of Autonomous Vehicles
Chejian Xu, Wenhao Ding*, Weijie Lyu, Zuxin Liu, Shuai Wang, Yihan He, Hanjiang Hu, Ding Zhao, Bo Li*
10. [CoRL'22] CausalAF: Causal Autoregressive Flow for Goal-Directed Safety-Critical Scenes Generation
Wenhao Ding, Haohong Lin, Bo Li, Ding Zhao
11. [RA-L'21] Multimodal Safety-Critical Scenarios Generation for Decision-Making Algorithms Evaluation
Wenhao Ding, Baimimng Chen, Bo Li, Kim Ji Eun, Ding Zhao
12. [ICRA'21] Context-Aware Safe Reinforcement Learning for Non-Stationary Environments
Baiming Chen, Zuxin Liu, Jiacheng Zhu, Mengdi Xu, Wenhao Ding, Liang Li, Ding Zhao
13. [AISTATS'21] Deep Probabilistic Accelerated Evaluation: A Certifiable Rare-Event Simulation Methodology for Black-Box Autonomy
Mansur Arief, Zhiyuan Huang*, Guru Kumar, Yuanlu Bai, Wenhao Ding, Henry Lam, Ding Zhao*
14. [NeurIPS'20] Task-Agnostic Online Reinforcement Learning with an Infinite Mixture of Gaussian Processes
Mengdi Xu, Wenhao Ding, Jiacheng Zhu, Zuxin Liu, Baiming Chen, Ding Zhao
15. [IROS'20] Learning to Collide: An Adaptive Safety-Critical Scenarios Generating Method
Wenhao Ding, Baiming Chen, Minjun Xu and Ding Zhao
16. [ICRA'20] CMTS: Conditional Multiple Trajectory Synthesizer for Generating Safety-critical Driving Scenarios
Wenhao Ding, Mengdi Xu and Ding Zhao
17. [ICRA'19] A New Multi-vehicle Trajectory Generator to Simulate Vehicle-to-Vehicle Encounters
Wenhao Ding, Wenshuo Wang and Ding Zhao
18. [T-ASLP'19] Adaptive Multi-scale Detection of Acoustic Events
Wenhao Ding and Liang He
19. [DCASE'19] Prior Knowledge-based Regularization for Sound Event Localization and Detection
Wenhao Ding, Jingyang Zhang* and Liang He*
20. [Interspeech'19] Multi-Scale Time-Frequency Attention for Acoustic Event Detection
Jingyang Zhang, Wenhao Ding, Jintao Kang and Liang He
21. [Interspeech'18] MTGAN: Speaker Verification through Multitasking Triplet Generative Adversarial Networks
Wenhao Ding and Liang He

22. [ROBIO'18] Hierarchical Reinforcement Learning Framework towards Multi-agent Navigation
Wenhao Ding, Shuaijun Li and Huihuan Qian
23. [ROBIO'18] Vehicle Pose and Shape Estimation through Multiple Monocular Vision
Wenhao Ding, Shuaijun Li, Guilin Zhang, Xiangyu Lei and Huihuan Qian

Workshop Paper and Preprint

24. CaDRE: Controllable and Diverse Generation of Safety-Critical Driving Scenarios using Real-World Trajectories
Peide Huang, Wenhao Ding, Jonathan Francis, Bingqing Chen, Ding Zhao
Preprint arXiv:2403.13208
25. RealGen: Retrieval Augmented Generation for Controllable Traffic Scenarios
Wenhao Ding, Yulong Cao*, Ding Zhao, Chaowei Xiao, Marco Pavone*
Preprint arXiv:2312.13303
26. Semantically Controllable Scene Generation with Guidance of Explicit Knowledge
Wenhao Ding, Bo Li, Kim Ji Eun, Ding Zhao
Environment Generation for Generalizable Robots (EGG) Workshop at **RSS** 2023
Knowledge and Logical Reasoning in the Era of Data-driven Learning Workshop at **ICML** 2023
27. Certifiable Deep Importance Sampling for Rare-Event Simulation of Black-Box Systems
Mansur Arief, Yuanlu Bai, Wenhao Ding, Shengyi He, Zhiyuan Huang, Henry Lam, Ding Zhao
Preprint arXiv:2111.02204
28. Trustworthy Reinforcement Learning Against Intrinsic Vulnerabilities: Robustness, Safety, and Generalizability
Mengdi Xu, Zuxin Liu*, Peide Huang*, Wenhao Ding, Zhepeng Cen, Bo Li, Ding Zhao*
Preprint arXiv:2209.08025

Honors & Awards

2022 - Qualcomm Innovation Fellowship Winner, North America
 2022 - CMU K&L Gates Presidential Fellowship, College of Engineering Nominee
 2022, 2023 - NeurIPS Scholar Award
 2018 - Tsinghua University Outstanding Bachelor Thesis Award (5%)
 2016 - Fellowship of Spark Talents Program (50 recipients in Tsinghua per year)

Academic Services

Demonstrations Chair:	2024 IEEE International Automated Vehicle Validation Conference
Organizer:	2023 CVPR Secure and Safe Autonomous Driving Workshop and Challenge 2022 ICRA SeasonDepth Challenge
Program Committee:	2022 NeurIPS ML4AD Workshop 2022 NeurIPS TSRML Workshop 2022 IJCAI AI4AD Workshop and Challenge
Conference Reviewer:	ICML 22-24, ICLR 22-24, NeurIPS 21-23, CoRL 24, AISTATS 23-24, ECCV 22-24, CVPR 22-24, ICCV 21-23, ICRA 20-24, IROS 20-24, IJCAI 24, ICME 20-23, IV 24
Journal Reviewer:	TMLR, IEEE RA-L, IEEE T-ITS, IEEE Access, IEEE TII, IEEE MM

Invited Talks

Critical Scenario Generation for Trustworthy Autonomy <i>ZhiDongXi MOOCs (online)</i>	<i>June 8 2023</i>
Critical Scenario Generation for Trustworthy Autonomy <i>Department of Electronic Engineering, Tsinghua, China, host by Prof. Liang He (online)</i>	<i>Apr 12 2023</i>
Critical Scenario Generation for Trustworthy Autonomy <i>AISOC Lab, CMU, USA, host by Prof. Fei Fang</i>	<i>Mar 21 2023</i>
Generalizing Goal-Conditioned Reinforcement Learning with Variational Causal Reasoning <i>AI Timer, China (online)</i>	<i>Feb 16 2023</i>
Safety-critical Scenarios Generation with Causal Discovery <i>Wayve, UK (online)</i>	<i>Oct 26 2022</i>
Safety-Critical Driving Scenario Generation – and What Lessons We Have Learned <i>University of Pennsylvania, USA (online), host by Prof. Rahul Mangharam</i>	<i>Feb 28 2022</i>
Safety-critical Scenarios Generation for Autonomous Vehicles <i>Stanford University, USA (online), host by Prof. Mykel Kochenderfer</i>	<i>Jan 31 2022</i>