

# Wenhao Ding

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## Education

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

## Research Interests

My research advances robot learning from the data perspective with a focus on two axes:

**Expand data coverage:** generating critical scenarios and data for scaling up safety and robustness.

**Improve data efficiency:** discovering underlying structures of tasks and skills for generalization.

## Professional Experience

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

## Publication

### Conference and Journal Paper

- [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*
- [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*
- [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*
- [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*

6. [NeurIPS'22] Generalizing Goal-Conditioned Reinforcement Learning with Variational Causal Reasoning  
*Wenhao Ding, Haohong Lin, Bo Li, Ding Zhao*
7. [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*
8. [CoRL'22] CausalAF: Causal Autoregressive Flow for Goal-Directed Safety-Critical Scenes Generation  
*Wenhao Ding, Haohong Lin, Bo Li, Ding Zhao*
9. [RA-L'21] Multimodal Safety-Critical Scenarios Generation for Decision-Making Algorithms Evaluation  
*Wenhao Ding, Baiming Chen, Bo Li, Kim Ji Eun, Ding Zhao*
10. [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*
11. [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*
12. [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*
13. [IROS'20] Learning to Collide: An Adaptive Safety-Critical Scenarios Generating Method  
*Wenhao Ding, Baiming Chen, Minjun Xu and Ding Zhao*
14. [ICRA'20] CMTS: Conditional Multiple Trajectory Synthesizer for Generating Safety-critical Driving Scenarios  
*Wenhao Ding, Mengdi Xu and Ding Zhao*
15. [ICRA'19] A New Multi-vehicle Trajectory Generator to Simulate Vehicle-to-Vehicle Encounters  
*Wenhao Ding, Wenshuo Wang and Ding Zhao*
16. [T-ASLP'19] Adaptive Multi-scale Detection of Acoustic Events  
*Wenhao Ding and Liang He*
17. [DCASE'19] Prior Knowledge-based Regularization for Sound Event Localization and Detection  
*Wenhao Ding\*, Jingyang Zhang\* and Liang He*
18. [Interspeech'19] Multi-Scale Time-Frequency Attention for Acoustic Event Detection  
*Jingyang Zhang, Wenhao Ding, Jintao Kang and Liang He*
19. [Interspeech'18] MTGAN: Speaker Verification through Multitasking Triplet Generative Adversarial Networks  
*Wenhao Ding and Liang He*
20. [ROBIO'18] Hierarchical Reinforcement Learning Framework towards Multi-agent Navigation  
*Wenhao Ding, Shuaijun Li and Huihuan Qian*
21. [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**

22. 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**

23. 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*  
Preprint arXiv:2311.10747
24. Your Room is not Private: Gradient Inversion Attack for Deep Q-Learning  
*Miao Li, \*Wenhao Ding, Ding Zhao*  
Preprint arXiv:2306.09273
25. 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
26. 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

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## Honors & Awards

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

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## Academic Services

**Conference Reviewer:** ICML 22-23, ICLR 22-24, NeurIPS 21-23 (top reviewer), AISTATS 23-24, ECCV 22, CVPR 22-24, ICCV 21-23, ICRA 20-24, IROS 20-23, ICME 20-23  
**Journal Reviewer:** TMLR, IEEE RA-L, IEEE Access, IEEE T-ITS, IEEE TII, IEEE MM  
**Organizer:** CVPR 2023 Secure and Safe Autonomous Driving Workshop and Challenge  
 ICRA 2022 SeasonDepth Challenge  
**Program Committee:** NeurIPS 2022 ML4AD Workshop  
 NeurIPS 2022 TSRML Workshop  
 IJCAI 2022 AI4AD Workshop and Challenge

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## 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  
*University of Pennsylvania, USA (online), host by Prof. Rahul Mangharam*

*Feb 28 2022*

Safety-critical Scenarios Generation for Autonomous Vehicles  
*Stanford University, USA (online), host by Prof. Mykel Kochenderfer*

*Jan 31 2022*