Zihan Ding

Curriculum Vitae

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Education

2021.08– **Princeton University**, Princeton, NJ, U.S.
- **Ph.D.** in Electrical and Computer Engineering
- **M.A.** in Electrical and Computer Engineering (2023)
- Advisor: Chi Jin

2018.09– 2019.09 **Imperial College London**, London, U.K.
- **M.Sc.** in Computing (Machine Learning Specialism) with **Distinction** degree
- Robot Learning Laboratory
- Advisor: Edward Johns

2014.09– 2018.07 **University of Science and Technology of China**, Hefei, Anhui, China.
- **B.Sc.** in Photoelectric Information Science and Engineering (Physics)
- **B.Eng.** in Computer Science and Technology
- Advisor: Jinming Cui, Yunfeng Huang

Research Interests

Deep Reinforcement Learning, Foundational Multimodal Models, Diffusion Generative Modeling, Multi-Agent RL, Robot Learning.

Publications

2020 Authored Book **Deep Reinforcement Learning: Fundamentals, Research and Applications**, *Hao Dong, **Zihan Ding**, Shanghang Zhang Eds.*, Springer 2020 ISBN 978-981-15-4094-3, 1st ed.
[Homepage][eBook]

2022 Authored Book **Machine Learning System: Design and Implementation**, *Luo Mai, Hao Dong et al*, Tsinghua University Press 2022 ISBN, Author of Chapter: Reinforcement Learning System.
[Homepage]

2025 Preprint **Learning World Models for Interactive Video Generation**, *Taiye Chen**, *Xun Hu**, ***Zihan Ding****, *Chi Jin*.
[Paper]

2025 Preprint **LLM Economist: Large Population Models and Mechanism Design in Multi-Agent Generative Simulacra**, *Seth Karten, Wenzhe Li, **Zihan Ding**, Samuel Kleiner, Yu Bai, Chi Jin.*
[Paper][Code]

2025 Preprint **ClutterDexGrasp: A Sim-to-Real System for General Dexterous Grasping in Cluttered Scenes**, *Zeyuan Chen*, Qiyang Yan*, Yuanpei Chen*, Tianhao Wu, Jiyao Zhang, **Zihan Ding**, Jinzhou Li, Yaodong Yang, Hao Dong.*
[Paper][Website]

2025 **Variable-Friction In-Hand Manipulation for Arbitrary Objects via Diffusion-Based Imitation Learning**, *Qiyang Yan, **Zihan Ding**, Xin Zhou, Adam J. Spiers*, International Conference on Robotics and Automation (ICRA) 2025.
[Paper][Website]

2024 Preprint **Generative Diffusion Modeling: A Practical Handbook**, ***Zihan Ding**, Chi Jin.*
[Paper]

2024 **DOLLAR: Few-Step Video Generation via Distillation and Latent Reward Optimization**, ***Zihan Ding**, Chi Jin, Difan Liu, Haitian Zheng, Krishna Kumar Singh, Qiang Zhang, Yan Kang, Zhe Lin, Yuchen Liu*, International Conference on Computer Vision (ICCV) 2025.
[Paper][Website]

2024 **How to beat a Bayesian Adversary?**, ***Zihan Ding**, Kexin Jin, Jonas Latz, Chenguang Liu (alphabetic order)*, European Journal of Applied Mathematics.
[Paper]

2024 Preprint **Reinforcement Learning in High-frequency Market Making**, *Yuheng, Zheng, **Zihan Ding**.*
[Paper]

2024 **Diffusion World Model: Future Modeling Beyond Step-by-Step Rollout for Offline Reinforcement Learning**, ***Zihan Ding**, Amy Zhang, Yuandong Tian, Qinqing Zheng*, The 12th International Conference on Learning Representations (ICLR) 2024 Workshop GenAI4DM.
[Paper]

2024 **Constraint-Aware Diffusion Models for Trajectory Optimization**, *Anjian Li, **Zihan Ding**, Adji Bousso Dieng, Ryne Beeson*, The 5th International Conference on Dynamic Data Driven Applications Systems (DDDAS) 2024.
[Paper]

2024 **FightLadder: A Benchmark for Competitive Multi-Agent Reinforcement Learning**, *Wenzhe Li, **Zihan Ding**, Seth Karten, Chi Jin*, The 41st International Conference on Machine Learning (ICML) 2024.
[Paper][Website]

2024 **DiffuSolve: Diffusion-based Solver for Non-convex Trajectory Optimization**, *Anjian Li, **Zihan Ding**, Adji Bousso Dieng, Ryne Beeson*, The 12th International Conference on Learning Representations (ICLR) 2024 Workshop GenAI4DM.
[Paper]

2023 **Consistency Models as a Rich and Efficient Policy Class for Reinforcement Learning**, ***Zihan Ding***, *Chi Jin*, 12th International Conference on Learning Representations (ICLR) 2024.
[Paper][Code]

2023 Preprint **Survey of Consciousness Theory from Computational Perspective: At the Dawn of Artificial General Intelligence**, ***Zihan Ding****, *Xiaoxi Wei**, *Yidan Xu**.
[Paper]

2023 **Representation Learning for Low-rank General-sum Markov Games**, *Chengzhuo Ni, Xuezhou Zhang, Yuda Song, **Zihan Ding**, Chi Jin, Mengdi Wang*, 11th International Conference on Learning Representations (ICLR) 2023.
[Paper]

2023 **Learning a Universal Human Prior for Dexterous Manipulation from Human Preference**, ***Zihan Ding***, *Yuanpei Chen, Allen Z. Ren, Shixiang Shane Gu, Hao Dong, Chi Jin*, Robotics Science and Systems (RSS) 2023 Workshop on Learning Dexterous Manipulation.
[Paper]

2022 Preprint **A Deep Reinforcement Learning Approach for Finding Non-Exploitable Strategies in Two-Player Atari Games**, ***Zihan Ding****, *Dijia Su**, *Qinghua Liu, Chi Jin*.
[Paper][Code]

2022 **Learning Distributed and Fair Policies for Network Load Balancing as Markov Potential Game** , *Zhiyuan Yao**, ***Zihan Ding****, 36th Conference on Neural Information Processing Systems (NeurIPS) 2022.
[Paper][Code]

2022 **Multi-Agent Reinforcement Learning for Network Load Balancing in Data Center**, *Zhiyuan Yao, **Zihan Ding**, Thomas Clausen*, 31th ACM International Conference on Information and Knowledge Management (CIKM) 2022.
[Paper][Code]

2022 **Not Only Domain Randomization: Universal Policy with Embedding System Identification**, ***Zihan Ding***, Robotics Science and Systems (RSS) 2023 Interdisciplinary Exploration of Generalizable Manipulation Policy Learning: Paradigms and Debates Workshop.
[Paper][Code]

2021 **CDT: Cascading Decision Trees for Explainable Reinforcement Learning**, ***Zihan Ding***, *Pablo Hernandez-Leal, Gavin Weiguang Ding, Changjian Li, Ruitong Huang*.
[Paper][Code]

2021 **Probabilistic Mixture-of-experts for Efficient Deep Reinforcement Learning**, *Jie Ren, Yewen Li,* ***Zihan Ding****, Wei Pan, Hao Dong.*
[Paper][Code]

2021 **Reinforced Workload Distribution Fairness**, *Zhiyuan Yao,* ***Zihan Ding****, Thomas Clausen*, Machine Learning for Systems Workshop at 35th Conference on Neural Information Processing Systems (NeurIPS) 2021.
[Paper][Code]

2021 **Efficient Reinforcement Learning Development with RLzoo**, ***Zihan Ding****, Tianyang Yu, Yanhua Huang, Hongming Zhang, Luo Mai and Hao Dong*, ACM Multimedia Open Source Software Competition 2021.
[Paper][Code]

2021 **DMotion: Robotic Visuomotor Control with Unsupervised Forward Model Learned from Videos**, *Haoqi Yuan, Ruihai Wu, Andrew Zhao, Haipeng Zhang,* ***Zihan Ding****, Hao Dong*, International Conference on Intelligent Robots and Systems (IROS) 2021.
[Paper][Website]

2021 **Sim-to-Real Transfer for Robotic Manipulation with Tactile Sensory**, ***Zihan Ding****, Ya-Yen Tsai, Wang Wei Lee, Bidan Huang*, International Conference on Intelligent Robots and Systems (IROS) 2021.
[Paper]

2021 **Bayesian Optimization for Wavefront Sensing and Error Correction**, *Zhonghua Qian,* ***Zihan Ding****, Mingzhong Ai, Yongxiang Zheng, Jinming Cui, Yunfeng Huang, Chuanfeng Li, Guangcan Guo*, Chinese Physics Letters.
[Paper]

2021 **DROID: Minimizing the Reality Gap using Single-shot Human Demonstration**, *Ya-Yen Tsai, Hui Xu,* ***Zihan Ding****, Chong Zhang, Edward Johns, Jie Shao, and Bidan Huang*, IEEE Robotics and Automation Letters (RA-L) .
[Paper]

2020 **Crossing The Gap: A Deep Dive into Zero-Shot Sim-to-Real Transfer for Dynamics**, *Eugene Valassakis,* ***Zihan Ding*** *and Edward Johns*, International Conference on Intelligent Robots and Systems (IROS) 2020.
[Paper][Website][Video]

2020 **Sim-to-Real Transfer for Optical Tactile Sensing**, ***Zihan Ding****, Nathan F. Lepora and Edward Johns*, International Conference on Robotics and Automation (ICRA) 2020.
[Paper][Code][Video]

2020 **Arena: A General Evaluation Platform and Building Toolkit for Multi-Agent Intelligence**, *Yuhang Song, Jianyi Wang, Thomas Lukasiewicz, Zhenghua Xu, Mai Xu,* ***Zihan Ding****, and Lianlong Wu*, The Thirty-Fourth AAAI Conference on Artificial Intelligence 2020.
[Paper][Code]

2019 **Fast and High-Fidelity Readout of Single Trapped-Ion Qubit via Machine-Learning Methods**, ***Zihan Ding***, *Jinming Cui, Yunfeng Huang, Chuanfeng Li, Tao Tu, Guangcan Guo*, Physical Review Applied.
[Paper][Code]

2019 **Tensor Super-Resolution with Generative Adversarial Nets: A Large Image Generation Approach**, ***Zihan Ding***, *Xiao-Yang Liu, Miao Yin*, International Joint Conference on Artificial Intelligence (IJCAI) Human Brain Artificial Intelligence Workshop 2019.
[Paper][Code]

2018 **Deep Reinforcement Learning for Intelligent Transportation Systems** , *Xiao-Yang Liu,* ***Zihan Ding****, Sem Borst, Anwar Walid*, NeurIPS Workshop on Machine Learning for Intelligent Transportation Systems 2018.
[Paper][Code]

2018 **Accelerated Exhaustive Eye Glints Localization Method for Infrared Video Oculography**, ***Zihan Ding***, *Jiayi Luo, Hongping Deng*, Proceedings of the 33rd Annual ACM Symposium on Applied Computing, SAC '18.
[Paper][Code]

Open-Source Projects

2022 **MARS**, *principal developer*, [Repo], multi-agent reinforcement learning library.

2022 **FinRL**, *contributor*, [Repo], an open-source library for stock trading w/ RL.

2019 **TensorLayer RL Tutorials**, *principal developer*, [Repo], tutorials for RL.

2019 **RLzoo**, *principal developer*, [Repo], single-agent reinforcement learning library.

Work Experiences

2022.09–Present **Graduate Research Assistant**, Princeton University, New Jersey.

- Machine learning and reinforcement learning.

2025.05–Present **Research Scientist Intern**, Meta GenAI, Menlo Park, hosted by Kunpeng Li and MovieGen team.

2024.05–2024.12 **Research Scientist Intern**, Adobe Inc., Research Lab, San Jose, advised by Yuchen Liu, Krishna Kumar Singh, Zhe Lin.

- Few-step Video Generation Model.

2023.05–2023.12 **Research Scientist Intern**, Meta, FAIR Lab, New York, advised by Qinqing Zheng, Amy Zhang, Yuandong Tian.

- Offline Model-based Reinforcement Learning.

2021.03–2021.08 **Research Scientist Intern**, Inspir.ai, Beijing, China.

- Multi-agent Reinforcement Learning; Game Theory.

2020.09–2021.03 **Research Scientist Intern**, Tencent, Robotics X Lab, Shenzhen, Guangdong, China.

- Sim-to-real Methods for Robotics Control with Tactile Sensory.

2020.02–2020.06 **Research Scientist Intern**, Borealis AI, Toronto, Ontario, Canada.

- Explainable Reinforcement Learning Based on Differentiable Decision Tree.

Research Experiences

2019.09–2020.01 **Research Intern**, Imperial College London, Robot Learning Lab, advised by Dr. Edward Johns.

- Sim-to-real Reinforcement Learning for Robotic Arm Control with Tactile Sensor

2017 **Undergraduate Research**, USTC, Immersive Multimedia Communication Laboratory, advised by Prof. Zhibo Chen.

- Competition of NeurIPS 2017: Learning to Run

2016–2018 **Undergraduate Research**, USTC, CAS Key Laboratory of Quantum Information, advised by Dr. Jinming Cui and Prof. Yunfeng Huang.

- Machine Learning assisted Qubit Readout in Trap-ion System.

Talks

2024.04 **Intel AI, Deep Learning Community of Practice**, Diffusion World Model for Offline Model-based Reinforcement Learning.

2024.03 **University of Liverpool, Liverpool Robotics Journal club**, Sim-to-Real Transfer For Dexterous Robotic Manipulation.

2024.03 **Princeton Language & Intelligence: Vision Language Seminar**, Break the Mystery of Sora.

2024.02 **PIXL: Princeton ImageX Labs**, Efficient Large-Scale Video Generation.

Teaching

2025 Spring **Princeton COS 435 / ECE 433**, *Introduction to Reinforcement Learning*, by Prof. Ben Eysenbach, Graduate Teaching Assistant.

2023 Fall **Princeton ECE 571**, *Deep Learning Networks*, by Prof. Sun-Yuan Kung, Graduate Teaching Assistant.

Honors & Awards

2018 **Best Undergraduate Thesis Award at USTC 2018**, **top 2** in the major.

2017 **NeurIPS 2017: Learning to Run Competition**, $\mathbf{4^{th}/479}$.

2016 **DJI RoboMaster AI Challenge 2016**, $\mathbf{3^{rd}/40}$.

Academic Services

Organization Committee:.

- Human in the Loop Learning (HiLL) Workshop at NeurIPS 2022
- FinRL Contest at ACM ICAIF 2023

Reviewer of Conferences and Journals:.

- Conference on Neural Information Processing Systems (NeurIPS) 2025
- European Conference on Computer Vision (ECCV) 2024
- International Conference on Machine Learning (ICML) 2024
- International Conference on Robotics and Automation (ICRA) 2024
- International Conference on Learning Representations (ICLR) 2024
- IEEE Robotics and Automation Letters (RA-L) 2023
- International Conference on Computer Vision (ICCV) 2023
- The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR) 2023
- International Conference on Learning Representations (ICLR) 2023
- Association for the Advancement of Artificial Intelligence (AAAI) 2023
- Conference on Neural Information Processing Systems (NeurIPS) 2022
- International Conference on Machine Learning (ICML) 2022
- International Conference on Robotics and Automation (ICRA) 2022
- 56th Conference on Information Sciences and Systems (CISS) 2022
- International Conference on Artificial Intelligence and Statistics (AISTATS) 2022
- Conference on Neural Information Processing Systems (NeurIPS) 2021
- IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) 2021
- International Conference on Intelligent Robots and Systems (IROS) 2021
- IEEE Robotics and Automation Letters (RA-L) 2021
- NeurIPS 2020 Quantum Tensor Networks in Machine Learning Workshop
- NeurIPS 2019 Autonomous Driving Workshop
- IEEE Access

Skills

- **Languages**
  Python, C++, C#, Prolog
- **Frameworks**
  PyTorch, TensorFlow (v1.&v2.), TensorLayer
- **Tools**
  HTML, React, git, LaTeX, ROS, MuJoCo, Unity3D, PyRep, SolidWorks, AutoCAD, Mathematics, MATLAB, OpenCV