

# Dan Qiao

(+86) 17801010541 | danqiao@link.cuhk.edu.cn | <https://qiaodan-cuhk.github.io>

## EDUCATION

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<b>PhD student, Computer Science</b> <i>Chinese University of Hong Kong, Shenzhen</i>	Sep.2022 – Present <i>Shenzhen, China</i>
<b>Master of Science, Automotive Engineering</b> <i>Beijing University of Aeronautics and Astronautics   GPA: 3.6</i>	Sep.2018 – Jul. 2021 <i>Beijing, China</i>
<b>Bachelor of Science, Automotive Engineering</b> <i>Beijing University of Aeronautics and Astronautics   GPA: 3.2</i>	Sep. 2014 – Jul. 2018 <i>Beijing, China</i>

## INTERNSHIP

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<b>RA, Computer Science</b> <i>Chinese Academy of Science, Institute of Automation</i>	Sep.2021 – June. 2022 <i>Beijing, China</i>
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## PUBLICATIONS & PREPRINTS

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- W. Li, **D. Qiao**, B. Wang, X. Wang, B. Jin, H. Zha\*, Semantically Aligned Task Decomposition in Multi-Agent Reinforcement Learning, Preprint, [arXiv:2305.10865](https://arxiv.org/abs/2305.10865). 2023.
- D. Qiao**, J. Zhang\*, Y. Zhang, S. Xiao, H. Chen, Privacy-preserved Fully Decentralized Multi-agent Reinforcement Learning for Networked Social Systems, Draft & Patent. 2022.
- D. Qiao**, G. Wen, Z. Peng\*, Novel Saturated Nussbaum-type Function based Adaptive Distributed Consensus Control of Multi-agent Systems with Unknown Arbitrary Control Directions, Preprint, [arXiv:2201.09453](https://arxiv.org/abs/2201.09453). 2021.
- S. Yang, Y. Hua, **D. Qiao**, Y. Lian, Y. Pan\*, Y. He, A coupled electrochemical-thermal-mechanical degradation modelling approach for lifetime assessment of lithium-ion batteries, *Electrochimica Acta*, vol. 326, 2020.

## RESEARCH EXPERIENCE

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- Diffusion Models in Offline MARL (Ongoing)** Oct. 2023 – Present  
*Diffusion Models, Offline MARL*
- Investigating the application of diffusion models to offline MARL to improve ood coordination among agents.
- Semantically Aligned Task Decomposition in MARL** Mar. 2023 – Oct. 2023  
*MARL, Language Model-based Subgoal Generation, Credit Assignment*
- Leveraging Pretrained Language Models prompting with Chain of Thought (CoT) to articulate potential task goals and facilitate goal decomposition. Incorporate language-grounded RL to train each agent's goal-conditioned policy with self-reflection mechanism to re-planning.
- Mechanism Design for Social Dilemmas in Multi-agent RL** Sep. 2022 – Sep. 2023  
*Mixed-motive MARL, Social Welfare, Social Dilemma*
- Introducing an indirect reciprocity mechanism into mixed-motive MARL environments to foster enduring cooperation among a large population of anonymous, one-shot interaction, and self-interested agents. Crafting a bottom-up reputation system to uphold collaboration in repeated game scenarios.
- Differential Privacy Preserved Decentralized MARL for Social Networked Systems** Nov. 2021 – Mar. 2022  
*Fully Decentralized MARL, Differential Privacy, Social Foundation Systems*
- Introduce the Laplace noise-based Differential Privacy technique into the *QD*-Learning to protect the Q-value which may be associated with the agent's privacy information. Provide the theoretical boundary analysis with mean square convergence and expectation convergence of the Q-value.
- Nussbaum Functions based Formation Control with Unknown Control Directions** July 2020 – Apr. 2021  
*Unknown Actuator Failures and Nonlinearities, Control Theory*
- Propose a novel lemma of Nussbaum-type functions to overcome the limitation of the identical unknown control directions assumptions and control shock. Designed a distributed control algorithm for the consensus problem of multi-agent system with Lyapunov stability analysis.
- Others**  
*Multi-agent Consensus Control, Opinion Dynamics, Generative Models*

## SKILLS & INTEREST

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IELTS 6.5 (Reading 7.5 Listening 6.5 Written 6.0 Speaking 6.0), Pytorch  
Writing blog, Skiing, and Editing video.