Xinxiang **Guo**

Ph.D. Student in Systems Theory · Researcher in Game Theory and Optimization

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Education

University of Chinese Academy of Sciences — *Sep 2023 – Jun 2026*
Ph.D. in Systems Theory, Mathematics — *Beijing*

National University of Singapore — *Jul 2025 – Jan 2026*
Exchange Research Student in Economics) — *Singapore*

University of Chinese Academy of Sciences — *Sep 2020 – Jun 2023*
M.S. in Computational Mathematics, Mathematics — *Beijing*

Jilin University — *Sep 2016 – Jun 2020*
B.S. in Information and Computing Science, Mathematics — *Changchun, Jilin*

Internship Experience & Research Projects

Baidu Inc. — *Beijing*
Algorithm Engineer — *May 2023 – Aug 2023*

- Researched open-source LLM deployment and fine-tuning; investigated power-market trading strategies.
- Developed and containerized the Ava smart-control simulation interface in Ava robot project.
- Built control-logic framework for HVAC assistant in HVAC + ERNIE Bot project, enabling intelligent Q&A, fault diagnosis, and autonomous control.
- Conducted performance testing comparing GPT-4 vs. ERNIE Bot.

CAS Strategic Priority Program A "Data-driven Multi-agent Systems: Games, Optimization and Control" — *Beijing*
Researcher — *Oct. 2021 – Oct. 2024*

- Developed online-learning-based adversarial decision-making algorithms for complex, dynamic and uncertain environments; implemented simulation frameworks and analyzed theoretical performance guarantees.
- Designed optimal decision algorithms with provable convergence properties; collaborated on deriving optimal strategies against fictitious play in infinitely repeated games.
- Analyzed the evolutionary dynamics of game systems combining myopic best response and the Hedge algorithm.

MoST Innovation 2030 Major Project "Game-Theoretic Decision Making under Incomplete Information" — *Beijing*
Researcher — *Sep. 2021 – Sep. 2023*

- Explored frontier research topics such as learning in games, algorithmic game theory, and reinforcement learning.
- Proposed optimal counter-strategies against no-regret learning algorithms in repeated games.
- Characterized the evolutionary behavior of learning-driven game-theoretic systems.

MoST Key Program "Mathematical Theory and Algorithms for Key Technologies in New-Energy Power Systems" — *Beijing*
Researcher — *Dec. 2023 – Present*

- Modeled the interaction between upper-layer grid operators and lower-layer users in power markets using Stackelberg and stochastic games.
- Analyzed demand response equilibria under real-time pricing, and established optimal pricing theory for electricity markets.
- Proposed novel equilibrium-solving algorithms that combine accelerated regularization techniques with value iteration for randomly terminating stochastic games.

Publications

- **Guo X**, Mu Y, Yang X. Periodicity in hedge-myopic system and an asymmetric NE-solving paradigm for two-player zero-sum games. *Dynamic Games and Applications*, 2025
- **Guo X**, Mu Y, Yang X. Periodicity in dynamical games driven by Hedge and myopic best response. *CDC 2024*
- **Guo X**, Mu Y. Regularized minimax-V learning in markov games. *FAW 2025*

- **Guo X**, Mu Y. Taking myopic best response against Hedge. *CCC 2023*
- **Guo X**, Mu Y. DTHBR: An asymmetric NE-solving paradigm. *CCC 2025* (Accepted)
- **Guo X**, Mu Y. Optimal strategy against Hedge. *arXiv:2312.09472*, 2023.
- **Guo X**, Zhang J et al. Last-iterate convergence via alternating dynamics. *NeurIPS 2025* (Submitted)
- Zhang J, **Guo X** (Co-first Author) et al. Heterogeneous learning in time-varying games. *AAAI 2026* (Submitted)

International Conferences

- IJTCS – Frontier of Algorithmic Wisdom, Paris, Jun 2025
- IEEE CDC 2024, Milano, Dec 2024
- GAMES 2024, Beijing
- ICM 2022 "Game Theory and Applications", Online
- East Asia Game Theory 2024, Jeju island
- Chinese Control Conference 2024, 2023, 2022

Honors & Awards

- UCAS Outstanding Student: 2021, 2023, 2025
- National Scholarship for Master Students: Sep 2022
- IWACIII 2023 Session Best Presentation Award

Skills

Mathematical Foundation

- Proficient in mathematical analysis, matrix theory, probability, optimization.

Machine Learning & Deep Learning

- Familiar with AlphaGo, AlphaZero, DeepStack, GANs, clustering, SVM, AdaBoost.
- Hands-on with CNN, RNN, LSTM, reinforcement learning (Q-learning, value/policy iteration).

Programming

- Python, MATLAB; clean coding style and strong engineering practices.

Certifications & Others

- English: CET-6 (628)
- Credentials: Securities Qualification Certificate, National Computer Rank Exam Level-2