

# SHICONG CEN

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Personal website: <https://shicongc.me/>

Google Scholar: <https://scholar.google.com/citations?user=QIRWZf8AAAAJ>

## EDUCATION

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**Carnegie Mellon University, Pittsburgh**

*August 2019 - Present*

Ph.D. Candidate

Department of Electrical and Computer Engineering

**Peking University**

*September 2015 - July 2019*

Bachelor of Science, Information and Computing Science

Double major in Computer Science

## RESEARCH INTERESTS

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Optimization Theory, Reinforcement Learning, Game Theory.

## HONORS AND AWARDS

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**Rising Stars in Data Science**

*October 2023*

*University of Chicago, Data Science Institute*

**JP Morgan Chase AI Research PhD Fellowship**

*June 2023*

*JP Morgan Chase & Co.*

**Wei Shen and Xuehong Zhang Presidential Fellowship**

*February 2023*

*Carnegie Mellon University, College of Engineering*

**Boeing Fellowship**

*January 2023*

*Carnegie Mellon University, College of Engineering*

**IEEE CDC Student Travel Award**

*September 2022*

*IEEE Control Systems Society (CSS)*

**Nicholas Minnici Dean's Graduate Fellowship**

*February 2022*

*Carnegie Mellon University, College of Engineering*

**George Nicholson Student Paper Competition Finalist**

*October 2021*

*Institute for Operations Research and the Management Sciences (INFORMS)*

**Wei Shen and Xuehong Zhang Presidential Fellowship**

*February 2021*

*Carnegie Mellon University, College of Engineering*

**Dean's Fellow**

*August 2019*

*Carnegie Mellon University, College of Engineering*

**Silver Medal (3rd)**

August 2017

*The 8-th session of S.-T. Yau College Student Mathematics Contests*

- Teamed, Computational & Applied Mathematics

**Elite Undergraduate Training Program for Applied Mathematics**

June 2017

*School of Mathematical Science, Peking University***Elite Undergraduate Training Program for Mathematics**

September 2016

*School of Mathematical Science, Peking University***RESEARCH EXPERIENCES**

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**Carnegie Mellon University**

August 2019 - Present

*Research Assistant. Advisor: Prof. Yuejie Chi*

- Focusing on efficient optimization methods for decentralized networks and reinforcement learning.

**Google Research**

June 2023 - December 2023

*Student Researcher. Mentor: Dr. Jincheng Mei*

- Exploring policy optimization theory for reinforcement learning.

**Meta AI Research**

May 2022 - Aug 2022

*Research Intern. Mentor: Dr. Lin Xiao*

- Focused on efficient optimization methods for competitive reinforcement learning.

**Machine Learning Theory Group, Microsoft Research Asia**

October 2018 - January 2019

*Research Intern. Mentor: Dr. Huishuai Zhang*

- Developed convergence guarantees of stochastic variance-reduction methods like SVRG in the distributed setting.

**Carnegie Mellon University**

July 2018 - September 2018

*Research Intern. Advisor: Prof. Yuejie Chi*

- Conducted research on designing communication-efficient decentralized optimization algorithms.

**Beijing International Center for Mathematical Research**

February 2017 - March 2018

*Research Intern. Advisor: Prof. Zaiwen Wen*

- Implemented subsampled Semi-Smooth Newton optimization methods and conducted numerical experiments.

**PUBLICATIONS**

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**Note:** \* indicates equal contribution.**Preprints**

- [1] **Shicong Cen**, Jincheng Mei, Hanjun Dai, Dale Schuurmans, Yuejie Chi, Bo Dai. *Beyond Expectations: Learning with Stochastic Dominance Made Practical*. International Conference on Machine Learning (ICML), submitted.

**Peer-reviewed Journals**

- [1] **Shicong Cen**, Yuting Wei, Yuejie Chi. *Fast Policy Extragradient Methods for Competitive Games with Entropy Regularization*. Journal of Machine Learning Research (JMLR), accepted.

[2] Wenhao Zhan\*, **Shicong Cen\***, Baihe Huang, Yuxin Chen, Jason D. Lee, Yuejie Chi. *Policy Mirror Descent for Regularized Reinforcement Learning: A Generalized Framework with Linear Convergence*. SIAM Journal on Optimization, vol. 33, no. 2, pp. 1061-1091, 2023.

[3] **Shicong Cen**, Chen Cheng, Yuxin Chen, Yuting Wei, Yuejie Chi. *Fast Global Convergence of Natural Policy Gradient Methods with Entropy Regularization*. Operations Research, vol. 70, no. 4, pp. 2563-2578, 2022.

• **2021 INFORMS George Nicholson Student Paper Competition Finalist.**

[3] Boyue Li, **Shicong Cen**, Yuxin Chen, Yuejie Chi. *Communication-Efficient Distributed Optimization in Networks with Gradient Tracking and Variance Reduction*. Journal of Machine Learning Research (JMLR) 21(180):1-51, 2020.

[4] **Shicong Cen**, Huishuai Zhang, Yuejie Chi, Wei Chen, Tieyan Liu. *Convergence of Distributed Stochastic Variance Reduced Methods without Sampling Extra Data*. IEEE Transactions on Signal Processing, vol. 68, pp. 3976-3989, 2020.

[5] Andre Milzarek, Xiantao Xiao, **Shicong Cen**, Zaiwen Wen, and Michael Ulbrich. *A Stochastic Semi-Smooth Newton Method for Nonsmooth, Nonconvex Optimization*. SIAM Journal on Optimization 29(4), 2916-2948.

### Peer-reviewed Conference Proceedings

[1] **Shicong Cen**, Yuejie Chi, Simon S. Du, Lin Xiao. *Faster Last-iterate Convergence of Policy Optimization in Competitive Reinforcement Learning*. International Conference on Learning Representations (ICLR), 2023. (Authors are listed alphabetically.)

[2] Ruicheng Ao, **Shicong Cen**, Yuejie Chi. *Asynchronous Gradient Play in Zero-Sum Multi-agent Games*. International Conference on Learning Representations (ICLR), 2023. (Authors are listed alphabetically.)

[3] **Shicong Cen\***, Fan Chen\*, Yuejie Chi. *Independent Natural Policy Gradient Methods for Potential Games: Finite-time Global Convergence with Entropy Regularization*. IEEE Conference on Decision and Control (CDC), 2022, **invited paper**.

[4] **Shicong Cen**, Yuting Wei, Yuejie Chi. *Fast Policy Extragradient Methods for Competitive Games with Entropy Regularization*. Conference on Neural Information Processing Systems (NeurIPS) 2021.

[5] Boyue Li, **Shicong Cen**, Yuxin Chen, Yuejie Chi. *Communication-Efficient Distributed Optimization in Networks with Gradient Tracking and Variance Reduction*. International Conference on Artificial Intelligence and Statistics (AISTATS) 2020.

### PROFESSIONAL SERVICE

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**Conference Reviewer** (year in parentheses): NeurIPS, ICLR, ICML, MLSys.

**Journal Reviewer**: SIAM Journal on Optimization, IEEE Transactions on Signal Processing.

**Mini-symposium Organizer**:

*Policy Optimization Methods for Reinforcement Learning and Control*, 2023 SIAM Conference on Optimization (OP23)

### INVITED TALKS

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**Fast Policy Optimization for Competitive Games**

*University of Washington*

*August 2022*

**Fast Policy Optimization for Regularized Reinforcement Learning**

*International Conference on Continuous Optimization (ICCOPT)*

*July 2022*

*California Institute of Technology*

*March 2021*

**STUDENT MENTORSHIP**

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Ruicheng Ao, *Peking University*

*Summer 2022*

Fan Chen, *Peking University*

*Spring 2022*

**TEACHING EXPERIENCES**

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**Introduction to ML for Engineers**

*Summer 2020, Fall 2020*

*CMU 18-461/18-661*