

# SHICONG CEN

shicongc@andrew.cmu.edu

## 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 (Stochastic, Distributed, Asynchronous, etc.) with Applications in Science and Engineering, Federated Learning, Theoretical Reinforcement Learning, Machine Learning Theory.

## RESEARCH EXPERIENCES

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**Carnegie Mellon University**

*August 2019 - Present*

*Research Assistant. Advisor: Prof. Yuejie Chi*

- Focused on efficient optimization methods for decentralized networks [6] and reinforcement learning [1][2][3][4].

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

*October 2018 - January 2019*

*Research Intern*

- Developed convergence guarantees of stochastic variance-reduction methods like SVRG in the distributed setting [5].

**Carnegie Mellon University**

*July 2018 - September 2018*

*Research Intern*

- Conducted research on designing communication-efficient decentralized optimization algorithms [6], supervised by Prof. Yuejie Chi.

**Beijing International Center for Mathematical Research**

*February 2017 - March 2018*

*Research Intern*

- Implemented subsampled Semi-Smooth Newton optimization methods and conducted numerical experiments [7], supervised by Prof. Zaiwen Wen.

## PUBLICATIONS

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[1] **Shicong Cen\***, Fan Chen\*, Yuejie Chi. *Independent Natural Policy Gradient Methods for Potential Games: Finite-time Global Convergence with Entropy Regularization*. arXiv preprint arXiv:2204.05466.

[2] **Shicong Cen**, Yuting Wei, Yuejie Chi. *Fast Policy Extragradient Methods for Competitive Games with Entropy Regularization*. Journal of Machine Learning Research (JMLR), submitted, 2021.

- Short version at NeurIPS 2021.

[3] 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*. arXiv preprint arXiv:2105.11066.

- Short version at NeurIPS 2021 Workshop on Optimization for Machine Learning as an oral presentation.

[4] **Shicong Cen**, Chen Cheng, Yuxin Chen, Yuting Wei, Yuejie Chi. *Fast Global Convergence of Natural Policy Gradient Methods with Entropy Regularization*. accepted to Operations Research.

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

[5] **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.

- A short version was published in NeurIPS 2019 Workshop on Federated Learning for Data Privacy and Confidentiality.

[6] 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.

- A short version was published in International Conference on Artificial Intelligence and Statistics (AISTATS) 2020.

[7] 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.

## TEACHING EXPERIENCES

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**Introduction to ML for Engineers**  
CMU 18-461/18-661

*Summer 2020, Fall 2020*

## HONORS AND AWARDS

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**Nicholas Minnici Dean's Graduate Fellowship**  
*Carnegie Mellon University, College of Engineering*

*February 2022*

**George Nicholson Student Paper Competition Finalist**  
*Institute for Operations Research and the Management Sciences (INFORMS)*

*October 2021*

**Wei Shen and Xuehong Zhang Presidential Fellowship**  
*Carnegie Mellon University, College of Engineering*

*February 2021*

**Dean's Fellow**  
*Carnegie Mellon University, College of Engineering*

*August 2019*

**Silver Medal (3rd)**  
*The 8-th session of S.-T. Yau College Student Mathematics Contests*

*August 2017*

- Teamed, Computational & Applied Mathematics

**Elite undergraduate training program for applied mathematics**  
*School of Mathematical Science, Peking University*

*June 2017*

**Elite undergraduate training program for mathematics**  
*School of Mathematical Science, Peking University*

*September 2016*