Yujie Tang

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Research Interests

- Reinforcement learning, optimization, control theory
- Networked systems, multi-agent systems, cyber-physical networks

Education

09/2013 – 01/2019	Department of Electrical Engineering, California Institute of Technology
	Ph.D. in Electrical Engineering, 2019. Advisor: Steven Low
	M.S. in Electrical Engineering, 2015
03/2018 – 05/2018	Simons Institute for the Theory of Computing, UC Berkeley
	Visiting student
08/2009 – 07/2013	Department of Electronic Engineering, Tsinghua University
	B.S. in Electronic Engineering, 2013

Appointments

08/2022 – present	Department of Industrial Engineering & Management, Peking University
	Assistant Professor
02/2019 – 06/2022	School of Engineering and Applied Sciences, Harvard University
	Postdoctoral Fellow Advisor: Na Li
07/2018 – 09/2018	National Renewable Energy Laboratory
	Summer internship

Teaching Experience

Instructor, Peking University

Spring 2023/2024	Fundamentals of Distributed Optimization	
Fall 2023	How to Write Research Papers	

Teaching Fellow, Harvard University

Spring 2020	Learning, Estimation and Control of Dynamical Systems	APMTH 232

Teaching Assistant, Caltech

Winter 2018	Power System Analysis	EE/CS/EST 135
Winter 2016	Networks: Structure & Economics	CMS/CS/EE 144
Fall 2014	Mathematical Optimization	ACM/CMS 113

Student Advising

Students at Peking University

- Xuhao Wang, Ph.D. student, 2023 – present
- Yingpeng Duan, Master's student, 2022 – present
- Zitang Gou, Master's student, 2023 – present

- Silan Zhang, Undergraduate student, 2023 – present

Professional Activities

Session Organization

- Co-chair of IEEE CDC invited sessions
  2023 *Policy Optimization Methods and Data-Driven Learning-Based Control*
- Co-chair of INFORMS Annual Meeting sessions
  2021 *Data-Driven Optimization and Control for Power Systems*
  2020 *Real-Time and Online Optimization for Power Systems*
  2018 *Time-Varying Optimization and Learning in Power Systems*

Technical Program Committee

- ACM/IEEE International Conference on Cyber Physical Systems (ICCPS), 2020 & 2021.

Reviewer

- Automatica, IEEE Transactions on Automatic Control, IEEE Transactions on Control of Network Systems, IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Sustainable Energy, IEEE Control Systems Letters, Systems & Control Letters
- American Control Conference, IEEE Conference on Decision and Control, Power Systems Computation Conference, Learning for Dynamics & Control (L4DC)

Publications

Preprints

[1] Silan Zhang and **Yujie Tang**. "Zeroth-order Katyusha: An accelerated derivative-free method for composite convex optimization." Available at https://tyj518.github.io/files/Zeroth-Order_Katyusha_1.pdf

[2] Yang Zheng, Chih-fan Pai and **Yujie Tang**. "Benign nonconvex landscapes in optimal and robust control, Part I: Global optimality." Available at https://arxiv.org/abs/2312.15332

[3] Ruiyang Jin, **Yujie Tang** and Jie Song. "Zeroth-order feedback-based optimization for distributed demand response." Available at https://arxiv.org/abs/2311.00372

Journal Articles

[1] Yize Li, Chao Lu, **Yujie Tang**, Chen Fang, Yong Cui. "Dynamic control and time-delayed channel scheduling co-design for voltage control in active distribution networks," *IEEE Transactions on Smart Grid*, vol. 15, no. 2, pp. 1837–1848, 2024.

[2] **Yujie Tang**, Yang Zheng and Na Li. "Analysis of the optimization landscape of Linear Quadratic Gaussian (LQG) control," *Mathematical Programming*, vol. 202, pp. 399–444, 2023. (The first two authors contributed equally.)

[3] Tianpeng Zhang, Victor Qin, **Yujie Tang** and Na Li. "Distributed information-based source seeking," *IEEE Transactions on Robotics*, vol. 39, no. 6, pp. 4749–4767, 2023.

[4] **Yujie Tang**, Zhaolin Ren and Na Li. "Zeroth-order feedback optimization for cooperative multi-agent systems," *Automatica*, vol. 148, 110741, 2023.

[5] **Yujie Tang**, Emiliano Dall'Anese, Andrey Bernstein and Steven Low. "Running primal-dual gradient method for time-varying nonconvex problems," *SIAM Journal on Control and Optimization*, vol. 60, no. 4, pp. 1970–1990, 2022.

[6] Xin Chen, Guanna Qu, **Yujie Tang**, Steven Low and Na Li. "Reinforcement learning for selective key applications in power systems: Recent advances and future challenges," *IEEE Transactions on Smart Grid*, vol. 13, no. 4, pp. 2935–2958, 2022.

[7] Yingying Li, **Yujie Tang**, Runyu Zhang and Na Li. "Distributed reinforcement learning for decentralized linear quadratic control: A derivative-free policy optimization approach," *IEEE Transactions on Automatic Control*, vol. 67, no. 12, pp. 6429–6444, 2022. (The first two authors contributed equally.)

[8] **Yujie Tang**, Vikram Ramanathan, Junshan Zhang and Na Li. "Communication-efficient distributed SGD with compressed sensing," *IEEE Control Systems Letters*, vol. 6, pp. 2054–2059, 2021.

[9] **Yujie Tang**, Junshan Zhang and Na Li. "Distributed zero-order algorithms for nonconvex multi-agent optimization," *IEEE Transactions on Control of Network Systems*, vol. 8, no. 1, pp. 269–281, Mar. 2021.

[10] **Yujie Tang**, Guannan Qu and Na Li. "Semi-global exponential stability of primal-dual gradient dynamics for constrained convex optimization," *Systems & Control Letters*, vol. 144, Oct. 2020.

[11] **Yujie Tang**, Krishnamurthy Dvijotham and Steven Low. "Real-time optimal power flow," *IEEE Transactions on Smart Grid*, vol. 8, no. 6, pp. 2963–2973, Nov. 2017.

[12] **Yujie Tang** and Steven H. Low. "Optimal placement of energy storage in distribution networks," *IEEE Transactions on Smart Grid*, vol. 8, no. 6, pp. 3094–3103, Nov. 2017.

[13] Qiuyu Peng, **Yujie Tang** and Steven Low. "Feeder reconfiguration in distribution networks based on convex relaxation of OPF," *IEEE Transactions on Power Systems*, vol. 30, no. 4, pp. 1793–1804, Jul. 2015.

[14] **Yujie Tang**, Laming Chen and Yuantao Gu. "On the performance bound of sparse estimation with sensing matrix perturbation," *IEEE Transactions on Signal Processing*, vol. 61, no. 17, pp. 4372–4386, Sep. 2013.

Conference Papers

[1] **Yujie Tang** and Yang Zheng. "On the global optimality of direct policy search for nonsmooth $\mathcal{H}_\infty$ output-feedback control," in *Proceedings of the 62nd IEEE Conference on Decision and Control (CDC)*, pp. 6148–6153, 2023.

[2] Zhaolin Ren, **Yujie Tang** and Na Li. "Escaping saddle points in zeroth-order optimization: the power of two-point estimators," in *Proceedings of the 40th International Conference on Machine Learning*, pp. 28914–28975, 2023.

[3] Xin Chen, **Yujie Tang** and Na Li. "Improve single-point zeroth-order optimization using high-pass and low-pass filters," in *Proceedings of the 39th International Conference on Machine Learning*, pp. 3603–3620, 2022.

[4] Tianpeng Zhang, Victor Qin, **Yujie Tang** and Na Li. "Source seeking by dynamic source location estimation," in *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2021.

[5] **Yujie Tang**, Yang Zheng and Na Li. "Analysis of the Optimization Landscape of Linear Quadratic Gaussian (LQG) Control," in *Proceedings of the 3rd Conference on Learning for Dynamics and Control (L4DC)*, pp. 599–610, Jun. 2021. (The first two authors contributed equally.)

[6] **Yujie Tang**, Zhaolin Ren and Na Li. "Zeroth-order feedback optimization for cooperative multi-agent systems,"in *Proceedings of the 59th IEEE Conference on Decision and Control (CDC)*, pp. 3649–3656, Dec. 2020.

[7] **Yujie Tang** and Steven Low. "A second-order saddle point method for time-varying optimization," in *Proceedings of the 58th IEEE Conference on Decision and Control (CDC)*, pp. 3928–3935, Dec. 2019.

[8] **Yujie Tang** and Na Li. "Distributed zero-order algorithms for nonconvex multi-agent optimization," in *Proceedings of the 57th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, pp. 781–786, Sep. 2019.

[9] **Yujie Tang**, Emiliano Dall'Anese, Andrey Bernstein and Steven H. Low. "A feedback-based regularized

primal-dual gradient method for time-varying nonconvex optimization," in *Proceedings of the 57th IEEE Conference on Decision and Control (CDC)*, pp. 3244–3250, Dec. 2018.

[10] **Yujie Tang** and Steven Low. "Distributed algorithm for time-varying optimal power flow," in *Proceedings of the 56th IEEE Conference on Decision and Control (CDC)*, pp. 3264–3270, Dec. 2017.

[11] **Yujie Tang** and Steven H. Low. "Optimal placement of energy storage in distribution networks," in *Proceedings of the 55th IEEE Conference on Decision and Control (CDC)*, pp. 3258–3264, Dec. 2016.

Invited Talks and Contributed Posters

12/2023	Chinese Mathematical Society 2023 Annual Conference *On the Global Optimality of Direct Policy Search for Nonsmooth $\mathcal{H}_\infty$ Output-Feedback Control*
12/2023	IEEE CDC 2023 Pre-Conference Workshop "Distributed Control, Optimization and Learning for Multi-agent Systems" *Model-Free Optimization and Learning for Multi-Agent Systems*
10/2021	Dartmouth College, USA *Linear Quadratic Control from an Optimization Viewpoint*
06/2021	UC Davis, USA *Communication-Efficient Distributed SGD with Compressed Sensing*
06/2021	Learning for Dynamics & Control (L4DC) 2021, Oral Presentation *Analysis of the Optimization Landscape of Linear Quadratic Gaussian (LQG) Control*
11/2020	INFORMS Annual Meeting 2020 *Distributed Reinforcement Learning for Decentralized Linear Quadratic Control: A Derivative-Free Policy Optimization Approach*
06/2020	Learning for Dynamics & Control (L4DC) 2020, Poster Session *Distributed Reinforcement Learning for Decentralized Linear Quadratic Control: A Derivative-Free Policy Optimization Approach*
10/2019	INFORMS Annual Meeting 2019, Seattle, WA, USA *Distributed Zero-Order Algorithms for Nonconvex Optimization*
11/2018	CPS PI Meeting 2018, Alexandria, VA, USA, Poster Session • *Time-Varying Optimization and Real-Time Optimal Power Flow* • *Optimal Placement of Energy Storage in Distribution Networks*
05/2018	Duke University, USA *Real-Time Optimization of Distributed Energy Resources*
11/2017	5th IEEE GlobalSIP, Montreal, Canada *A Distributed Algorithm for Second-Order Real-Time OPF*
06/2017	Zhejiang University & Tsinghua University, China *Planning and Control of Distributed Energy Resources*
04/2017	32nd Southern California Control Workshop, Pasadena, CA, USA *Real-Time Optimal Power Flow*
03/2017	51st Conference on Information Sciences and Systems, Baltimore, MD, USA *Real-Time Optimal Power Flow Based on Quasi-Newton Methods*
11/2016	INFORMS Annual Meeting 2016, Nashville, TN, USA *Real-Time OPF Based on Quasi-Newton Methods*