# Yujie Tang

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## Research Interests

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

## Education

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

## Appointments

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

## Teaching Experience

Teaching Fellow, Harvard University

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

Teaching Assistant, Caltech

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|---|---|---|
| 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

- Tianpeng Zhang, Ph.D. student (co-advised with Prof. Na Li)
  *Topic: Multi-robot source-seeking algorithms with location estimation*
- Zhaolin Ren, Ph.D. student (co-advised with Prof. Na Li)
  *Topic: Distributed zeroth-order social welfare optimization for multi-agent games*

## Professional Activities

Session Organization

- 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

[P1] Yang Zheng,* **Yujie Tang*** and Na Li. "Analysis of the optimization landscape of linear quadratic Gaussian (LQG) control," submitted to *Mathematical Programming*, under review. Available at https://arxiv.org/abs/2102.04393.

[P2] **Yujie Tang**, Zhaolin Ren and Na Li. "Zeroth-order feedback optimization for cooperative multi-agent systems," accepted by *Automatica*. Available at https://arxiv.org/abs/2011.09728.

Journal Articles

[J1] **Yujie Tang**, Emiliano Dall'Anese, Andrey Bernstein and Steven Low. "Running primal-dual gradient method for time-varying nonconvex problems," to appear in *SIAM Journal on Control and Optimization*. Available at https://arxiv.org/abs/1812.00613.

[J2] 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*, 2022.

[J3] **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.

[J4] 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*. Available at https://arxiv.org/abs/1912.09135.

[J5] **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.

[J6] **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.

[J7] **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.

[J8] **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.

[J9] 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.

*Equal contribution.

[J10] **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

[C1] 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, Jul. 2022. Available at https://arxiv.org/abs/2111.01701.

[C2] 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.

[C3] **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.

[C4] **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.

[C5] **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.

[C6] **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.

[C7] **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.

[C8] **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.

[C9] **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

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*