YINGYING LI

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RESEARCH INTERESTS

Intersection of control theory, machine/reinforcement learning, and optimization, with applications to cyber-physical systems, power systems, Internet of Things, smart cities, robotics, etc.

APPOINTMENT

University of Illinois at Urbana-Champaign (UIUC) September 2021 - present
Postdoctoral Scholar
Coordinated Science Laboratory
Mentor: Prof. Jeff Shamma

EDUCATION

Harvard University September 2015 - July 2021
Ph.D. in Applied Mathematics
John A. Paulson School Of Engineering and Applied Sciences
Advisor: Prof. Na Li

University of Science and Technology of China (USTC) September 2011 - May 2015
B.S. in Applied Mathematics
Advisors: Prof. Zhouwang Yang & Prof. Jack Koolen

OTHER RESEARCH EXPERIENCE

MIT-IBM Watson AI Lab June 2020 - September 2020
Research Intern
Mentor: Subhro Das

University of Western Australia (UWA) June 2014 - August 2014
Summer research program with UWA scholarship
Mentors: Prof. Michael Small and Prof. Kevin Judd

HONORS & AWARDS

Editor's Choice of Automatica September 2020
Awarded to one article out of over fifty published articles in monthly volumes of Automatica.

Future Digileaders November 2019
Selected early-career female researchers in the broad area of digitalization.
Organized as a workshop at KTH Royal Institute of Technology.

Winner of the Three Minute Thesis Competition at UWA August 2014
Awarded to one visiting student per year for winning the research communication competition at UWA.

National Scholarship in China 2014
Awarded yearly to top 0.1% students in China.

Outstanding Student Scholarship at USTC 2013, 2012
Awarded yearly to top 3% students at USTC.

Outstanding Freshman Scholarship at USTC 2011
Awarded yearly to top 5% freshman students at USTC.

TEACHING EXPERIENCES

- **Teaching Fellow** at Harvard: ES/AM 155 Feedback Control Systems in 2016. Ratings: 4.4/5.0.
- **Teaching Assistant** at USTC: Mathematical Analysis B1 in 2014.

PUBLICATIONS

Preprints

1. Yingying Li, Subhro Das, Jeff Shamma, Na Li. Safe Adaptive Learning-based Control for Constrained Linear Quadratic Regulators with Regret Guarantees. [pdf]

Journal Publications

1. **[TAC]** Yingying Li, Yujie Tang (equal contribution), Runyu Zhang, Na Li. "Distributed Reinforcement Learning for Decentralized Linear Quadratic Control: A Derivative-Free Policy Optimization Approach," *IEEE Transactions on Automatic Control*, to appear in vol. 67, no. 12, Dec. 2022. [pdf]
2. **[TSG]** Xin Chen, Yingying Li, Jun Shimada, Na Li. "Online Learning and Distributed Control for Residential Demand Response," *IEEE Transactions on Smart Grid*, vol. 12, no. 6, pp. 4843-4853, Nov. 2021. [pdf]
3. **[TAC]** Yingying Li, Guannan Qu, Na Li. "Online Optimization with Predictions and Switching Costs: Fast Algorithms and the Fundamental Limit," *IEEE Transactions on Automatic Control*, vol. 66, no. 10, pp. 4761-4768, Oct. 2021. [pdf]
4. **[Automatica]** Yingying Li, Qinran Hu, Na Li. "A Reliability-aware Multi-armed Bandit Approach to Learn and Select Users in Demand Response," *Automatica*, vol. 119, pp. 109015, Sep. 2020. [pdf] (**Editor's Choice**)
5. **[PRE]** Michael Small, Yingying Li, Thomas Stemler, Kevin Judd. "Growing Optimal Scale-free Networks via Likelihood," *Physical Review E*, vol. 91, no. 4, pp. 042801, Apr. 2015. [pdf]

Machine Learning Conference Publications

1. **[AAAI 2021]** Yingying Li, Subhro Das, Na Li. "Online Optimal Control with Affine Constraints," *35th AAAI Conference on Artificial Intelligence*, 2021. [pdf] (**Acceptance rate 21%**)
2. **[NeurIPS 2020]** Yingying Li, Na Li. "Leveraging Predictions in Smoothed Online Convex Optimization via Gradient-based Algorithms," *34th Conference on Neural Information Processing Systems*, 2020. [pdf] (**Acceptance rate 20.1%**)
3. **[L4DC 2020]** Yingying Li, Yujie Tang (equal contribution), Runyu Zhang, Na Li.. "Distributed Reinforcement Learning for Decentralized Linear Quadratic Control: A Derivative-Free Policy Optimization Approach," *2nd Annual Conference on Learning for Dynamics and Control*, 2020. [pdf]
4. **[NeurIPS 2019]** Yingying Li, Xin Chen, Na Li. "Online Optimal Control with Linear Dynamics and Predictions: Algorithms and Regret Analysis," *33rd Conference on Neural Information Processing Systems*, 2019. [pdf] (**Acceptance rate 21.2%**)
5. **[ICML workshop 2019]** Yingying Li, Aoxiao Zhong, Guannan Qu, Na Li. "Online Markov Decision Processes with Time-varying Transition Probabilities and Rewards," *Real-world Sequential Decision-making Workshop at ICML*, 2019. [pdf]

Control Conference Publications

1. **[ACC 2021]** Runyu Zhang, Yingying Li, Na Li. "On the Regret Analysis of Online LQR Control with Predictions," *American Control Conference*, 2021. [pdf]
2. **[ACC 2019]** Yingying Li, Na Li. "Online Learning for Markov Decision Processes in Nonstationary Environ-

ments: A Dynamic Regret Analysis," *American Control Conference*, 2019. [pdf]

3. **[CDC 2018]** Yingying Li, Na Li. "Learning and Selecting the Right Customers for Reliability: A Multi-armed Bandit Approach," *57th IEEE Conference on Decision and Control*, 2018. [pdf]
4. **[ACC 2018]** Yingying Li, Guannan Qu, Na Li. "Using Predictions in Online Optimization with Switching Costs: A Fast Algorithm and A Fundamental Limit," *American Control Conference*, 2018. [pdf]
5. **[ACC 2017]** Yingying Li, Na Li. "Mechanism Design for Reliability in Demand Response with Uncertainty," *American Control Conference*, 2017. [pdf]

OTHER TALKS

- *Real-time Decision Making in Control and Optimization with Performance and Safety Guarantees*
  Rigorous Systems Research Group Seminar at the Department of Computing and Mathematical Sciences, California Institute of Technology, January 2022.
- *Safe Adaptive Learning-based Control for Constrained Linear Quadratic Regulators with Regret Guarantees*
  IFAC TC Virtual Seminar Series on Optimal Control - Data-driven Methods in Control, December 2021.
- *Learning and Controlling Dynamical Systems with Uncertainties: Regret, Fundamental Limits, and Safety*
  MIT-IBM Watson AI Lab Biweekly Seminar, November 2020.
- *Online Convex Optimization With Predictions: Algorithm Design And Fundamental Limits*
  2020 INFORMS Annual Meeting, November 2020.
- *Learning and Selecting Users for Achieving Reliability in Demand Response: A Multi-armed Bandit Approach*
  2019 INFORMS Annual Meeting, October 2019.

PATENTS

- Online Optimal Control under Constraints. U.S. Patent Application, 17/386589, 2021.

SERVICES AND ACTIVITIES

- **Program Committee** for the 4th Annual Learning for Dynamics and Control Conference (L4DC 2022).
- **Program Committee** for the 25th International Symposium on Mathematical Theory of Networks and Systems (MTNS 2022).
- **Volunteer** for the 60th Conference on Decision and Control (CDC 2021).
- **Moderator** for 3rd Annual Learning for Dynamics & Control Conference (L4DC 2021).
- **Volunteer** for 2018 Harvard Control Workshop/Reunion with Prof. Yu-Chi Ho.
- **Volunteer teacher** at the Eighth Grade Science & Engineering Showcase in Cambridge in 2017.
- **Mentor** for Harvard GSAS Host Student Program for International Students in 2017 and 2016.
- **Mentor** for Harvard SEAS Host Student Program for International Students in 2016.
- **Reviewer for journals**: IEEE Transactions on Automatic Control, Automatica, IEEE Transactions on Control of Network Systems (TCNS), IEEE Power Engineering Letters (PES), Systems & Control Letters, IEEE Transactions on Smart Grid, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), International Journal of Information Management, Journal of Machine Learning Research (JMLR), Signal Processing, etc.;
- **Reviewer for conferences**: NeurIPS, International Conference on Artificial Intelligence and Statistics (AISTATS), International Conference on Learning Representations (ICLR), L4DC, CDC, ACC, MTNS, IEEE Conference on Control Technology and Applications (CCTA), IEEE International Symposium on Information Theory (ISIT), IEEE SmartGridComm, etc.