Yang Hu

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EDUCATION

Bachelor of Computer Science and Technology **2018 ~ 2022 (expected)**

Tsinghua University, Beijing, PRC

- Affiliation: Institute of Interdisciplinary Information Sciences (IIIS), known as ***"Yao Class"***
- Cumulative GPA: ***3.95***, ranking ***1 / 54*** within the institute.

RESEARCH INTERESTS

Optimal control theory, Reinforcement Learning, Optimization

RESEARCH EXPERIENCE

Undergraduate Research Assistant **Sept. 2019 ~ Sept. 2020**

IIIS, Tsinghua University *(Advisor: Prof. Chongjie Zhang)*

- Focus on the empirical side of Reinforcement Learning.
- Implement and improve algorithms in multi-agent reinforcement learning (MARL).
- Design efficient distributed architectures for multi-agent reinforcement learning.

Undergraduate Research Assistant **July 2020 ~ Dec. 2020**

IIIS, Tsinghua University *(Advisor: Prof. Yang Yu)*

- Focus on the social-economical applications of Reinforcement Learning.
- Model the control of the COVID-19 pandemic as a Reinforcement Learning problem.
- Design a novel DDPG-based algorithm to investigate collaboration in multi-agent systems.

Research Internship (remote) **Feb. 2021 ~ present**

CMS, California Institute of Technology *(Advisor: Prof. Adam Wierman)*

- Focus on optimal control theory, esp. Model Predictive Control (MPC).
- Prove novel theoretical performance guarantees for MPC in linear time-varying (LTV) systems.

Research Internship (remote) **Aug. 2021 ~ present**

ECE, Carnegie Mellon University *(Advisor: Prof. Guannan Qu, co-advisor: Prof. Adam Wierman)*

- Focus on optimal control theory, esp. the stabilization of linear systems.
- Study the sample complexity of adaptive stabilization of linear time-invariant (LTI) systems.
- Introduce a novel spectral-decomposition-based approach to learn stabilizing controllers.

PUBLICATIONS

Y. Lin*, ***Yang Hu****, H. Sun*, G. Shi*, G. Qu*, A. Wierman. Perturbation-based Regret Analysis of Predictive Control in Linear Time Varying Systems, 2021, arXiv: 2106.10497.

- Accepted by ***NeurIPS'2021*** as ***Spotlight*** (<3% of all submissions).
- Provide the first input-to-state stability, dynamic regret and competitive ratio results for MPC controllers in LTV systems with general well-conditioned costs.
- Reveal a new reduction from MPC to SOCO that applies to LTV systems.
- Introduce a new perturbation-based analysis framework to analyze the behavior of controllers.

Y. Hu, Z. Zhu, S. Song, X. Liu, Y. Yu. Calculus of Consent via MARL: Legitimating the Collaborative Governance Supplying Public Goods, 2021.

- Accepted by ***NeurIPS'2021 PERLS Workshop*** as Poster.
- Design a novel DDPG-based RL algorithm to learn optimal pandemic-control policies at different collaboration levels.
- Discuss sociological implications of the collaborative patterns in the multi-agent setting.

Y. Hu, G. Qu, A. Wierman. On the Sample Complexity of Stabilizing LTI Systems, 2021.

- Manuscripts in preparation.
- Study the sample complexity of adaptively stabilizing linear time-invariant (LTI) systems.
- Introduce a novel spectral-decomposition-based approach to learn stabilizing controllers.

HONORS AND AWARDS

Undergraduate:

National Scholarship for Undergraduates **2019 & 2021**

- The ***highest honor*** for undergraduates in China.
- Awarded to 1 student of each grade at IIIS every year.

First-class Scholarship at Tsinghua (in memory of Nanxiang Jiang) **2020**

- The ***highest honor*** for junior undergraduates in Tsinghua.
- Awarded to 1 junior student at IIIS every year.

Silver Medal of "Yao Award" at IIIS, Tsinghua **2021**

- Awarded to outstanding senior students at IIIS (1 gold, 2 silver, 4 bronze).

Second-class Scholarship for Freshmen **2018**

Scholarship for the Cultivation of Outstanding Talents **2018 ~ 2021**

High school:

First Prize of National Mathematical Olympiad (First Round) **2016 & 2017**

First Prize of National Olympiad in Informatics in Provinces (NOIP) **2015 & 2017**

Silver Medal of Russian Mathematical Olympiad (10th Grade, Final Round) **2017**

SERVICES

Volunteer at the Tsinghua Undergraduate Admissions Office in Shanghai **2019 & 2020**

- Receive "outstanding service award" in year 2019.

Writing assistant at the Tsinghua Teaching Center for Writing and Communication **2021**

SKILLS

Programming: in Python, C++, Java, and MATLAB.

Mathematics: calculus, linear algebra, probability and stochastic processes, optimization.

Languages: fluent in Chinese and English.

REFERENCES

Adam Wierman, Professor of Computing and Mathematical Sciences

Department of Computing and Mathematical Sciences

California Institute of Technology, Pasadena, CA

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Guannan Qu, Assistant Professor
Department of Electrical and Computer Engineering
Carnegie Mellon University, Pittsburgh, PA
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