YICHENG XU

Mechanical Engineer

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Portfolio

EDUCATION

Ph.D. candidate — Mechanical Engineering
University of California, Irvine — **3.941/4.0** — Sep 2021 - now

Master of Science — Mechanical Engineering
University of California, Irvine — **4.0/4.0** — Sep 2020 - Jun 2021

Bachelor of Science — Automation
Southeast University — **3.6/4.0** — Sep 2016 - Jun 2020
Exchange at UC Irvine in the fourth year

SUMMARY

I am a Ph.D. student at UC Irvine studying Systems and Control under the supervision of Professor Faryar Jabbari. I have an education background in mechanical engineering, especially on optimization and control theory. My current interest is multi-agent systems, anti-windup control, event-triggered control, linear parameter varying systems, distributed optimization on graphs, and control barrier functions.

ACADEMIC EXPERIENCE

Graduate Student Lead — **Mentoring, Photolithography, PCB design** — Sep 2024 - Now

- Lead interdisciplinary research team at UCI's branch of Hacker Fab (https://ethanyxu.com/IrvineHackerFab)
- Spearhead development of optical lithography projects, e.g., tube furnace, spin coater, and patterning.
- Drive fund-raising initiatives and oversee project management. Cultivate collaborative environment as graduate student leader (https://ethanyxu.com/UROP)

Teaching Assistant / Instructor — **Teaching, Communication** — Sep 2021 - Now

- Assist Professor Faryar Jabbari in teaching ENGRMAE 80: Dynamics at University of California, Irvine
- Deliver one-on-one support to enhance student understanding of complex dynamics concepts
- Evaluate and grade homework assignments and exams, ensuring fair assessment

WORK EXPERIENCE

Mechanical Engineer — **Arduino, Solidworks, 3D print** — Jan 2020 - Mar 2020

- Lead development of innovative personal hygiene device for hot, damp, and sanitized towelette delivery
- Collaborate with cross-functional team to optimize product functionality and user experience
- More infomation on https://ethanyxu.com/WhoopyWipes

Mechanical Engineer — **Computer vision, Signal processing, Solidworks** — Sep 2019 - Dec 2019

- Develop hands-free, noninvasive clinical solution for enhanced blood vessel visualization
- Create comprehensive Bill of Materials (BOM) for efficient product manufacturing
- Apply principles of objective and quantifiable assessment in medical device design

Strategy consulting Intership — **Strategy consult, Communication** — Sep 2017 - Dec 2017

- Provide strategic consulting services to a prominent Electric and Electronic Manufacturing company
- Utilize enterprise analysis techniques to identify market opportunities

AWARDS

Provincial Third Prize for National College Mathematical Contest in Modeling — **Modelling, Optimisation** — Sep 2018 - Dec 2018

- Lead team in designing regulation protocol for RGV robots in automated warehouse systems
- Optimize working patterns to minimize robot stop time, enhancing overall efficiency

Excellence Award for 20th electronic design contest of Southeast University — **MCU development(STM32), Circuits** — Apr 2018 - Jun 2018

- Collaborate in team to design feedback control system for DC power under varying load conditions
- Test on bread board with oscilloscope, finalize with PCB board design

First price for 14th RoboCup of Southeast University — **ROS, Python, Pattern recognition** — Dec 2017 - Jan 2018

- Program a robot using ROS for navigation and data collection
- Use OpenCV in Python to recognize and track objects

PUBLICATIONS AND PATENTS

[1] P. Ong, Y. Xu, R. M. Bena, F. Jabbari, and A. D. Ames, "Matrix Control Barrier Functions," Aug. 2025. arXiv: 2508.11795.

[2] Y. Xu and F. Jabbari, "Discrete-Time Leader-Following Multiagent Systems: Saturation Constraints and Event-Triggered Control," *IEEE Transactions on Control of Network Systems*, vol. 12, no. 2, pp. 1354–1368, Jun. 2025. DOI: 10.1109/TCNS.2024.3516578

[3] Y. Xu and F. Jabbari, "Distributed Optimization of Finite Condition Number for Laplacian Matrix in Multi-Agent Systems," Jul. 2025. arXiv: 2507.06440.

[4] Y. Xu and F. Jabbari, "Distributed Optimization of Network Weights for Improved Performance," in *2024 American Control Conference (ACC)*, IEEE, Jul. 2024, pp. 1392–1397. DOI: 10.23919/ACC60939.2024.10644563

[5] Y. Xu and F. Jabbari, "Spline-based parameter varying output feedback synthesis with improved L $_2$ gain," in *2024 IEEE 63rd Conference on Decision and Control (CDC)*, IEEE, Dec. 2024, pp. 1455–1460. DOI: 10.1109/CDC56724.2024.10886461

[6] Y. Xu and F. Jabbari, "Discrete-Time Output Feedback under Bounded Actuators: Single and Multi-agent Problems," in *2022 IEEE 61st Conference on Decision and Control (CDC)*, IEEE, Dec. 2022, pp. 4865–4871. DOI: 10.1109/CDC51059.2022.9992896

[7] Y. Xu, Y. Chen, T. Liu, and W. Chen, "Optimization Algorithm for Power Flow Calculation Using Graph Theory," in *Lecture Notes in Electrical Engineering Proceedings of 2019 Chinese Intelligent Systems Conference*, 2020, pp. 142–150. DOI: 10.1007/978-981-32-9698-5_17

PRESENTATION

1. April 2025, "Distributed optimization of the finite condition number of the Laplacian matrix", Presented at 45th Southern California Control Workshop, San Diego, CA, USA — Program
2. Jul 2024, "Distributed Optimization of Network Weights for Improved Performance", Presented at 2024 American Control Conference (ACC), Toronto, ON, Canada — Presented Paper
3. Jul 2024, "Discrete-Time Output Feedback under Bounded Actuators: Single and Multi-agent Problems", Presented at 2022 IEEE 61st Conference on Decision and Control (CDC), Toronto, ON, Canada — Presented Paper
4. Dec 2022, "Discrete-Time Output Feedback under Bounded Actuators: Single and Multi-agent Problems", Presented at 2022 IEEE 61st Conference on Decision and Control (CDC), Cancun, Mexico — Presented Paper
5. Oct 2019, "Optimization Algorithm for Power Flow Calculation Using Graph Theory", Presented at 2019 Chinese Intelligent Systems Conference (CISC), Haikou, China — Program

SKILLS

Program Language: Matlab, Python, C/C++, Shell, LaTex, HTML

Control Theory: PID Control, Nonlinear Control, Robust Control (H_∞ , l_2 gain and gain scheduling), Event-Triggered Control, Control Barrier Function, Multi-Agent System, Anti-Windup Control, MPC, LQR

Mechanical Engineering: 3D printing, CAD(Solidworks), Lagrangian Mechanic, System Model via first principle, System Identification via Bode Plot, Linear Time-Invariant System,

Electric Engineering: Micro-Controller Develop (Arduino, STM32, RaspberryPi), PCB desgin(Altium Designer, Easy EDA, KiCad), Oscilloscopes, Soldering, Circuits and Signals, Power and Energy System (AC,DC), DSP

Optimization: Convex Optimization, Semi-definite Programming, Numerical Methods (Augmented Lagrangian, Interior Point Method, variations of Newton's method), ADMM

LANGUAGES

English: Professional proficiency

Mandarin: Native speaker