Guosong Yang

Department of Electrical and Computer Engineering
University of California, Santa Barbara
5152 Harold Frank Hall, Santa Barbara, CA 93106 USA
guosongyang@ucsb.edu | +1 (217) 979-8066 | guosong-yang.github.io

RESEARCH INTERESTS

Switched and hybrid systems, networked control systems, learning in games, and their applications to cyber-physical systems (CPS) and network security.

ACADEMIC APPOINTMENT

University of California, Santa Barbara, Santa Barbara, CA, USA   Aug. 2017–present

Postdoctoral Scholar, Center for Control, Dynamical Systems, and Computation

Advisor: João P. Hespanha

EDUCATION

University of Illinois at Urbana-Champaign, Urbana, IL, USA   Oct. 2013–Aug. 2017

Doctor of Philosophy, Electrical and Computer Engineering

Dissertation: "Switched and hybrid systems with inputs: Small-gain theorems, control with limited information, and topological entropy"

Advisor: Daniel Liberzon

University of Illinois at Urbana-Champaign, Urbana, IL, USA   Aug. 2011–Aug. 2013

Master of Science, Electrical and Computer Engineering

Thesis: "A Lyapunov-based small-gain theorem for interconnected switched systems"

Advisor: Daniel Liberzon

Hong Kong University of Science and Technology, Kowloon, Hong Kong   Sep. 2007–Jun. 2011

Bachelor of Engineering, Electronic Engineering, minor in Mathematics

Advisor: Zexiang Li

AWARDS AND HONORS

- *ACM SIGBED HSCC Best Paper Award*, 22nd ACM International Conference on Hybrid Systems: Computation and Control, Montreal, Canada, 2019

- *Best Poster Award*, 11th Coordinated Science Laboratory Student Conference, University of Illinois at Urbana-Champaign, Urbana, IL, USA, 2016

- *Graduate College Conference Travel Award*, University of Illinois at Urbana-Champaign, Urbana, IL, USA, 2016

- *University Scholarship*, *School of Engineering Scholarship*, *ECE Outstanding Freshmen Scholarship*, and *The Joseph Lau Luen Hung Charitable Trust Scholarship*, Hong Kong University of Science and Technology, Kowloon, Hong Kong, 2007–2011

Working papers

1. Henrique Ferraz, Guosong Yang, and João P. Hespanha, "Distributed leader-follower model predictive control."

2. Guosong Yang, Daniel Liberzon, and João P. Hespanha, "Topological entropy of nonlinear switched and time-varying systems."

Journals

1. Guosong Yang, Radha Poovendran, and João P. Hespanha, "Adaptive learning in two-player Stackelberg games with application to network security," submitted for publication

2. João P. Hespanha, Raphael Chinchilla, Ramon R. Costa, Murat K. Erdal, and Guosong Yang, "Forecasting COVID-19 cases based on a parameter-varying stochastic SIR model," submitted for publication

3. Guosong Yang, A. James Schmidt, Daniel Liberzon, and João P. Hespanha, "Topological entropy of switched linear systems: General matrices and matrices with commutation relations," *Mathematics of Control, Signals, and Systems*, vol. 32, no. 3, pp. 411–453, Sep. 2020

4. Guosong Yang and Daniel Liberzon, "Feedback stabilization of switched linear systems with unknown disturbances under data-rate constraints," *IEEE Transactions on Automatic Control*, vol. 63, no. 7, pp. 2107–2122, Jul. 2018

5. Kunihisa Okano, Masashi Wakaiki, Guosong Yang, and João P. Hespanha, "Stabilization of networked control systems under clock offsets and quantization," *IEEE Transactions on Automatic Control*, vol. 63, no. 6, pp. 1708–1723, Jun. 2018

6. Andrii Mironchenko, Guosong Yang, and Daniel Liberzon, "Lyapunov small-gain theorems for networks of not necessarily ISS hybrid systems," *Automatica*, vol. 88, pp. 10–20, Feb. 2018

7. Guosong Yang and Daniel Liberzon, "A Lyapunov-based small-gain theorem for interconnected switched systems," *Systems & Control Letters*, vol. 78, pp. 47–54, Apr. 2015

Book chapter

1. Guosong Yang and João P. Hespanha, "Modeling and mitigating link-flooding distributed denial-of-service attacks via learning in Stackelberg games," in *Handbook of Reinforcement Learning and Control*, Kyriakos G. Vamvoudakis, Yan Wan, Frank L. Lewis, and Derya Cansever, Eds. Springer, 2021, to be published

Conferences

1. Guosong Yang, Daniel Liberzon, and João P. Hespanha, "Topological entropy of switched nonlinear systems," in *24th ACM International Conference on Hybrid Systems: Computation and Control*, 2021, to be published

2. Guosong Yang, Radha Poovendran, and João P. Hespanha, "Adaptive learning in two-player Stackelberg games with continuous action sets," in *58th IEEE Conference on Decision and Control*, Nice, France, 2019, pp. 6905–6911

3. Guosong Yang, João P. Hespanha, and Daniel Liberzon, "On topological entropy and stability of switched linear systems," in *22nd ACM International Conference on Hybrid Systems: Computation and Control*, Montreal, Canada, 2019, pp. 119–127 (**Best Paper Award winner**)

4. Guosong Yang and João P. Hespanha, "On topological entropy of switched linear systems with pairwise commuting matrices," in *56th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, USA, 2018, pp. 429–436 (invited paper)

5. Guosong Yang, A. James Schmidt, and Daniel Liberzon, "On topological entropy of switched linear systems with diagonal, triangular, and general matrices," in *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, 2018, pp. 5682–5687

6. Guosong Yang, Hossein Hosseini, Dinuka Sahabandu, Andrew Clark, João P. Hespanha, and Radha Poovendran, "Modeling and mitigating the Coremelt attack," in *2018 American Control Conference*, Milwaukee, WI, USA, 2018, pp. 3410–3416

7. Guosong Yang, Daniel Liberzon, and Zhong-Ping Jiang, "Stabilization of interconnected switched control-affine systems via a Lyapunov-based small-gain approach," in *2017 American Control Conference*, Seattle, WA, USA, 2017, pp. 5182–5187

8. Guosong Yang, Daniel Liberzon, and Andrii Mironchenko, "Analysis of different Lyapunov function constructions for interconnected hybrid systems," in *55th IEEE Conference on Decision and Control*, Las Vegas, NV, USA, 2016, pp. 465–470 (invited paper)

9. Guosong Yang and Daniel Liberzon, "Finite data-rate stabilization of a switched linear system with unknown disturbance," in *10th IFAC Symposium on Nonlinear Control Systems*, vol. 49, no. 18, Monterey, CA, USA, 2016, pp. 1085–1090

10. Guosong Yang and Daniel Liberzon, "Stabilizing a switched linear system with disturbance by sampled-data quantized feedback," in *2015 American Control Conference*, Chicago, IL, USA, 2015, pp. 2193–2198

11. Guosong Yang and Daniel Liberzon, "Input-to-state stability for switched systems with unstable subsystems: A hybrid Lyapunov construction," in *53rd IEEE Conference on Decision and Control*, Los Angeles, CA, USA, 2014, pp. 6240–6245

12. Andrii Mironchenko, Guosong Yang, and Daniel Liberzon, "Lyapunov small-gain theorems for not necessarily ISS hybrid systems," in *21st International Symposium on Mathematical Theory of Networks and Systems*, Groningen, Netherlands, 2014, pp. 1001–1008

GRANT-APPLICATION EXPERIENCE

- Coauthor of the National Science Foundation grant CMMI-1662708: "Switched control systems with limited information: An entropy approach to stabilization and disturbance attenuation," PI: Daniel Liberzon, 2017–2020, Award: $349,540

PRESENTATIONS AND SEMINARS

- Presentation at the *37th Southern California Control Workshop*, University of California, San Diego, CA, USA, Jan. 2020

- Presentation at the *22nd ACM International Conference on Hybrid Systems: Computation and Control*, Montreal, Canada, Apr. 2019 (Best Paper Award winner)

- Presentation at the *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, Dec. 2018

- Presentation at the *35th Southern California Control Workshop*, University of California, Los Angeles, CA, USA, Nov. 2018

- Invited presentation at the *56th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, USA, Oct. 2018

- Presentation at the *2018 American Control Conference*, Milwaukee, WI, USA, Jun. 2018

- Presentation at the *2017 American Control Conference*, Seattle, WA, USA, May 2017

- Seminar at the *Multi-Agent Robotics Lab*, University of California, San Diego, San Diego, CA, USA, Mar. 2017 (Host: Jorge Cortés and Sonia Martínez)

- Seminar at the *Arcak Lab*, University of California, Berkeley, Berkeley, CA, USA, Mar. 2017 (Host: Murat Arcak)

- Seminar at the *Hybrid Systems Laboratory*, University of California, Santa Cruz, Santa Cruz, CA, USA, Feb. 2017 (Host: Ricardo G. Sanfelice)

- Invited presentation at the *55th IEEE Conference on Decision and Control*, Las Vegas, NV, USA, Dec. 2016

- Seminar at the *Center for Control, Dynamical Systems, and Computation*, University of California, Santa Barbara, Santa Barbara, CA, USA, Nov. 2016 (Host: Andrew R. Teel)

- Seminar at the *Cyber-Physical Systems Laboratory*, University of California, Los Angeles, Los Angeles, CA, USA, Oct. 2016 (Host: Paulo Tabuada)

- Presentation at the *10th IFAC Symposium on Nonlinear Control Systems*, Monterey, CA, USA, Aug. 2016

- Poster presentation at the *11th Coordinated Science Laboratory Student Conference*, University of Illinois at Urbana-Champaign, Urbana, IL, USA, Feb. 2016 (Best Poster Award winner)

- Presentation at the *2015 American Control Conference*, Chicago, IL, USA, Jul. 2015

- Presentation at the *53rd IEEE Conference on Decision and Control*, Los Angeles, CA, USA, Dec. 2014

- Presentation at the *2nd Midwest Workshop on Control and Game Theory*, University of Notre Dame, Notre Dame, IN, USA, Apr. 2013

Teaching and mentoring

University of California, Santa Barbara, Santa Barbara, CA, USA

- Mentor for undergraduate student internship: "Remote Tracking of Unmanned Ground Vehicles"

- Mentor for high school student internship: "Motion Planning for Unmanned Ground Vehicles"

University of Illinois at Urbana-Champaign, Urbana, IL, USA

- Teaching assistant for graduate course: "ECE517 Nonlinear and Adaptive Control"

- Teaching assistant for graduate course: "ECE528 Analysis of Nonlinear Systems"

Service to the profession

Journal review

- *IEEE Transactions on Automatic Control*
- *IFAC Automatica*
- *System & Control Letters*
- *Mathematics of Control, Signals, and Systems*
- *Nonlinear Analysis: Hybrid Systems*
- *IEEE Control Systems Letters*
- *Communications in Nonlinear Science and Numerical Simulation*

Conference review

- *American Control Conference* (2017, 2018, and 2021)
- *IEEE Conference on Decision and Control* (2019 and 2020)
- *IFAC World Congress* (2020)
- *IFAC Workshop on Distributed Estimation and Control in Networked Systems* (2019)
- *ACM International Conference on Hybrid Systems: Computation and Control* (2016 and 2017)
- *IFAC Conference on Modelling, Identification and Control of Nonlinear Systems* (2015)

Conference organization

- Program committees for "Repeatability Evaluation" and "Posters and Demos" for the *24th ACM International Conference on Hybrid Systems: Computation and Control*, May 2021
- Chair for session: "Switched Systems I" at the *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, Dec. 2018