

# Guosong Yang

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## RESEARCH INTERESTS

Switched and hybrid systems. Networked control systems. Learning in games. Applications to cyber-physical systems (CPS) and network security.

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## 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

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## 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  
Advisor: Zexiang Li

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## AWARDS AND HONORS

- *ACM SIGBED HSCC Best Paper Award* at the 22nd ACM International Conference on Hybrid Systems: Computation and Control, 2019
- *Best Poster Award* at the 11th Coordinated Science Laboratory Student Conference, University of Illinois at Urbana-Champaign, 2016
- *Graduate College Conference Travel Award*, University of Illinois at Urbana-Champaign, 2016
- *University Scholarship, School of Engineering Scholarship, ECE Outstanding Freshmen Scholarship, The Joseph Lau Luen Hung Charitable Trust Scholarship*, Hong Kong University of Science and Technology, 2007–2011

- *Gold medal*, 8th Asian Physics Olympiad, 2007

## PUBLICATIONS

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### Working papers (preprints available)

1. G. Yang, D. Liberzon, and J. P. Hespanha, “Topological entropy of nonlinear switched and time-varying systems.”
2. H. Ferraz, G. Yang, and J. P. Hespanha, “Distributed leader-follower model predictive control.”
3. G. Yang, R. Poovendran, and J. P. Hespanha, “Adaptive learning in Stackelberg games with an application to network security.”

### Journals publications

1. G. Yang, A. J. Schmidt, D. Liberzon, and J. P. Hespanha, “Topological entropy of switched linear systems: General matrices and matrices with commutation relations,” *Mathematics of Control, Signals, and Systems*, submitted for publication
2. G. Yang and D. Liberzon, “Feedback stabilization of a switched linear system with an unknown disturbance under data-rate constraints,” *IEEE Transactions on Automatic Control*, vol. 63, no. 7, pp. 2107–2122, Jul. 2018
3. K. Okano, M. Wakaiki, G. Yang, and J. 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
4. A. Mironchenko, G. Yang, and D. Liberzon, “Lyapunov small-gain theorems for networks of not necessarily ISS hybrid systems,” *Automatica*, vol. 88, pp. 10–20, Feb. 2018
5. G. Yang and D. Liberzon, “A Lyapunov-based small-gain theorem for interconnected switched systems,” *Systems & Control Letters*, vol. 78, pp. 47–54, Apr. 2015

### Book chapter

1. G. Yang and J. P. Hespanha, “Modeling and mitigating link-flooding distributed denial-of-service attacks via learning in Stackelberg games,” submitted for publication

### Conference proceedings

1. G. Yang, R. Poovendran, and J. P. Hespanha, “Adaptive learning in two-player Stackelberg games with continuous action sets,” in *58th IEEE Conference on Decision and Control*, 2019, pp. 6905–6911
2. G. Yang, J. P. Hespanha, and D. Liberzon, “On topological entropy and stability of switched linear systems,” in *22nd ACM International Conference on Hybrid Systems: Computation and Control*, 2019, pp. 119–127 (**Best Paper Award winner**)
3. G. Yang and J. P. Hespanha, “On topological entropy of switched linear systems with pairwise commuting matrices,” in *56th Annual Allerton Conference on Communication, Control, and Computing*, 2018, pp. 429–436 (invited paper)
4. G. Yang, A. J. Schmidt, and D. Liberzon, “On topological entropy of switched linear systems with diagonal, triangular, and general matrices,” in *57th IEEE Conference on Decision and Control*, 2018, pp. 5682–5687

5. G. Yang, H. Hosseini, D. Sahabandu, A. Clark, J. P. Hespanha, and R. Poovendran, “Modeling and mitigating the Coremelt attack,” in *2018 American Control Conference*, 2018, pp. 3410–3416
6. G. Yang, D. Liberzon, and Z.-P. Jiang, “Stabilization of interconnected switched control-affine systems via a Lyapunov-based small-gain approach,” in *2017 American Control Conference*, 2017, pp. 5182–5187
7. G. Yang, D. Liberzon, and A. Mironchenko, “Analysis of different Lyapunov function constructions for interconnected hybrid systems,” in *55th IEEE Conference on Decision and Control*, 2016, pp. 465–470 (invited paper)
8. G. Yang and D. 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, 2016, pp. 1085–1090
9. G. Yang and D. Liberzon, “Stabilizing a switched linear system with disturbance by sampled-data quantized feedback,” in *2015 American Control Conference*, 2015, pp. 2193–2198
10. G. Yang and D. Liberzon, “Input-to-state stability for switched systems with unstable subsystems: A hybrid Lyapunov construction,” in *53rd IEEE Conference on Decision and Control*, 2014, pp. 6240–6245
11. A. Mironchenko, G. Yang, and D. Liberzon, “Lyapunov small-gain theorems for not necessarily ISS hybrid systems,” in *21st International Symposium on Mathematical Theory of Networks and Systems*, 2014, pp. 1001–1008

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#### 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

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#### 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, CA, USA, Mar. 2017 (Host: Jorge Cortés and Sonia Martínez)
- Seminar at the *Hybrid Systems Laboratory*, University of California, 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, CA, USA, Nov. 2016 (Host: Andrew R. Teel)
- Seminar at the *Cyber-Physical Systems Laboratory*, University of California, 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*, 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

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#### 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

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#### SERVICE TO THE PROFESSION

##### **Journal reviewer**

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

##### **Conference reviewer**

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

- *IFAC Workshop on Distributed Estimation and Control in Networked Systems* (2019)

**Conference organization**

- Co-chair for session: Switched Systems I at the *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, Dec. 2018