Guosong Yang

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University of California, Santa Barbara
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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

University of California, Santa Barbara, Santa Barbara, CA, USA — May 2017–Jul. 2017

Visiting Scholar, Department of Electrical and Computer Engineering

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* 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

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*, vol. 32, no. 3, pp. 411–453, Sep. 2020
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," in *Handbook of Reinforcement Learning and Control*, K. G. Vamvoudakis, Y. Wan, F. L. Lewis, and D. Cansever, Eds. Springer, to be published

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

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 (HSCC 2019)*, Montreal, Canada, Apr. 2019 (Best Paper Award winner)
- Presentation at the *57th IEEE Conference on Decision and Control (CDC 2018)*, 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 (Allerton 2018)*, Monticello, IL, USA, Oct. 2018
- Presentation at the *2018 American Control Conference (ACC 2018)*, Milwaukee, WI, USA, Jun. 2018
- Presentation at the *2017 American Control Conference (ACC 2017)*, 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 (CDC 2016)*, 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* (NOLCOS 2016), Monterey, CA, USA, Aug. 2016
- Poster presentation at the *11th Coordinated Science Laboratory Student Conference (CSLSC 2016)*, Urbana, IL, USA, Feb. 2016 (Best Poster Award winner)
- Presentation at the *2015 American Control Conference (ACC 2015)*, Chicago, IL, USA, Jul. 2015
- Presentation at the *53rd IEEE Conference on Decision and Control (CDC 2014)*, 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 reviewer

- *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 reviewer

- *IEEE Conference on Decision and Control* (2019 and 2020)
- *IFAC World Congress* (2020)
- *IFAC Workshop on Distributed Estimation and Control in Networked Systems* (2019)
- *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)

Conference organization

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