Guosong Yang

Department of Electrical and Computer Engineering
Rutgers, The State University of New Jersey
94 Brett Road, Piscataway, NJ 08854 USA

✉ guosong.yang@rutgers.edu   📞 +1 (848) 445-5247   🌐 guosong-yang.github.io

RESEARCH INTERESTS

Control theory; switched and hybrid systems; networked and distributed control; optimization; game-theoretic learning; applications in cyber-physical systems (CPS) and cybersecurity.

POSITIONS

Rutgers, The State University of New Jersey, Piscataway, NJ, USA   Sep. 2022–present
Assistant Professor, Department of Electrical and Computer Engineering

University of Illinois at Urbana-Champaign, Urbana, IL, USA   May 2022–Aug. 2022
Postdoctoral Research Associate, Coordinated Science Laboratory
Advisor: Daniel Liberzon

University of California, Santa Barbara, Santa Barbara, CA, USA   Aug. 2017–May 2022
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–Jul. 2017
Doctor of Philosophy in 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 in 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 in Electronic Engineering (First Class Honors), minor in Mathematics
Advisor: Zexiang Li

AWARDS AND HONORS

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

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

Working papers

[W1] Guosong Yang, Radha Poovendran, and João P. Hespanha, "Adaptive learning in two-player Stackelberg games with application to network security," submitted for journal publication

Journals

[J8] Raphael Chinchilla, Guosong Yang, and João P. Hespanha, "Newton and interior-point methods for (constrained) nonconvex–nonconcave minmax optimization with stability and instability guarantees," *Mathematics of Control, Signals, and Systems*, vol. 36, no. 2, pp. 381–421, Jun. 2024

[J7] Guosong Yang, Daniel Liberzon, and João P. Hespanha, "Topological entropy of switched nonlinear and interconnected systems," *Mathematics of Control, Signals, and Systems*, vol. 35, no. 3, pp. 641–683, Sep. 2023

[J6] 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," *Annual Reviews in Control*, vol. 51, pp. 460–476, Apr. 2021

[J5] 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

[J4] 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

[J3] 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

[J2] 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

[J1] 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

[Ch1] 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. Cham, Switzerland: Springer, 2021, pp. 433–463

Conferences

[C15] Kyriakos G. Vamvoudakis, Filippos Fotiadis, João P. Hespanha, Raphael Chinchilla, Guosong Yang, Mushuang Liu, Jeff S. Shamma, and Lacra Pavel, "Game theory for autonomy: From min-max optimization to equilibrium and bounded rationality learning," in *2023 American Control Conference*, San Diego, CA, USA, Jun. 2023, pp. 4363–4380

[C14] Sharad C. Shankar, Guosong Yang, and João P. Hespanha, "State estimation for asynchronously switched sampled-data systems," in *61st IEEE Conference on Decision and Control*, Cancún, Mexico, Dec. 2022, pp. 1–7

[C13] Raphael Chinchilla, Guosong Yang, Murat K. Erdal, Ramon R. Costa, and João P. Hespanha, "A tale of two doses: Model identification and optimal vaccination for COVID-19," in *60th IEEE Conference on Decision and Control*, Austin, TX, USA, Dec. 2021, pp. 3544–3550 (invited paper)

[C12] 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*, Nashville, TN, USA, May 2021, pp. 1–11

[C11] 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, Dec. 2019, pp. 6905–6911

[C10] 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, Apr. 2019, pp. 119–127 (24% acceptance rate, **Best Paper Award winner**)

[C9] 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, Dec. 2018, pp. 5682–5687

[C8] 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, Oct. 2018, pp. 429–436 (invited paper)

[C7] 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, Jun. 2018, pp. 3410–3416

[C6] 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, May 2017, pp. 5182–5187

[C5] 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, Dec. 2016, pp. 465–470 (invited paper)

[C4] 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*, Monterey, CA, USA, Aug. 2016, pp. 1085–1090

[C3] 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, Jul. 2015, pp. 2193–2198

[C2] 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, Dec. 2014, pp. 6240–6245

[C1] 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, Jul. 2014, pp. 1001–1008

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

PRESENTATIONS AND SEMINARS

1. "On topological entropy of switched cascade systems," in *60th Annual Allerton Conference on Communication, Control, and Computing*, Urbana, IL, USA, Sep. 2024 (invited talk)

2. "Adaptive learning in two-player Stackelberg games with application to network security," in *2024 Joint Statistical Meetings*, Portland, OR, USA, Aug. 2024 (invited talk)

3. "Networked cyber-physical systems: Information and control," in *e-TEC Talks @SNU Summer 2021*, Seoul National University, Aug. 2021 (invited virtual seminar)

4. "Topological entropy of switched nonlinear systems," in *24th ACM International Conference on Hybrid Systems: Computation and Control*, May 2021 (virtual talk)

5. "Information and control in networked cyber-physical systems," in *2020 Information Theory and Applications Workshop*, San Diego, CA, USA, Feb. 2020 (invited talk)

6. "Adaptive learning in two-player Stackelberg games with continuous action sets," in *37th Southern California Control Workshop*, University of California, San Diego, San Diego, CA, USA, Jan. 2020

7. "On topological entropy and stability of switched linear systems," in *22nd ACM International Conference on Hybrid Systems: Computation and Control*, Montreal, Canada, Apr. 2019

8. "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, Dec. 2018

9. "On topological entropy of switched linear systems," in *35th Southern California Control Workshop*, University of California, Los Angeles, Los Angeles, CA, USA, Nov. 2018

10. "On topological entropy of switched linear systems with pairwise commuting matrices," in *56th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, USA, Oct. 2018 (invited talk)

11. "Modeling and mitigating the Coremelt attack," in *2018 American Control Conference*, Milwaukee, WI, USA, Jun. 2018

12. "Stabilization of interconnected switched control-affine systems via a Lyapunov-based small-gain approach," in *2017 American Control Conference*, Seattle, WA, USA, May 2017

13. "Analysis of different Lyapunov function constructions for interconnected hybrid systems," in *55th IEEE Conference on Decision and Control*, Las Vegas, NV, USA, Dec. 2016 (invited talk)

14. "Feedback stabilization of a switched linear system with unknown disturbance under data-rate constraints," in *CCDC Seminar Series*, Center for Control, Dynamical Systems, and Computation, University of California, Santa Barbara, Santa Barbara, CA, USA, Nov. 2016 (invited seminar)

15. "Finite data-rate stabilization of a switched linear system with unknown disturbance," in *10th IFAC Symposium on Nonlinear Control Systems*, Monterey, CA, USA, Aug. 2016

16. "Stabilizing a switched linear system with unknown disturbance by sampled and quantized state feed-back," in *11th Coordinated Science Laboratory Student Conference*, University of Illinois at Urbana-Champaign, Urbana, IL, USA, Feb. 2016 (poster presentation, **Best Poster Award winner**)

17. "Stabilizing a switched linear system with disturbance by sampled-data quantized feedback," in *2015 American Control Conference*, Chicago, IL, USA, Jul. 2015

18. "Input-to-state stability for switched systems with unstable subsystems: A hybrid Lyapunov construc-tion," in *53rd IEEE Conference on Decision and Control*, Los Angeles, CA, USA, Dec. 2014

19. "A Lyapunov-based small-gain theorem for interconnected switched systems," in *2nd Midwest Workshop on Control and Game Theory*, University of Notre Dame, Notre Dame, IN, USA, Apr. 2013

TEACHING

Rutgers, The State University of New Jersey, Piscataway, NJ, USA

- 16:332:541 Stochastic Signals and Systems
- 16:332:512 Nonlinear and Adaptive Control
- 14:332:345 Linear Systems and Signals
- 14:332:226 Probability and Random Processes

SERVICE TO THE PROFESSION

Journal review

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

Conference review

- *American Control Conference*
- *IEEE Conference on Decision and Control*
- *IFAC World Congress*
- *IFAC Workshop on Distributed Estimation and Control in Networked Systems*
- *ACM International Conference on Hybrid Systems: Computation and Control*
- *IFAC Conference on Modelling, Identification and Control of Nonlinear Systems*

Conference organization

- Program Committee for *28th ACM International Conference on Hybrid Systems: Computation and Control*, May 2025

- Repeatability Evaluation Program Committee for *26th ACM International Conference on Hybrid Systems: Computation and Control*, May 2023

- Repeatability Evaluation and Posters and Demos Program Committees for *25th ACM International Conference on Hybrid Systems: Computation and Control*, May 2022

- Repeatability Evaluation and Posters and Demos Program Committees for *24th ACM International Conference on Hybrid Systems: Computation and Control*, May 2021

- Session chair for "Switched Systems I" in *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, Dec. 2018