Shuo Han   *Curriculum Vitae*

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           University of Illinois at Chicago
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RESEARCH INTERESTS

Control and autonomy; Optimization algorithms; Multi-agent systems; Distributed computing

EMPLOYMENT

Assistant Professor of Electrical and Computer Engineering   08/2017–present
University of Illinois at Chicago

Postdoctoral Researcher in Electrical and Systems Engineering   10/2013–07/2017
University of Pennsylvania, Philadelphia, PA
Hosts: George J. Pappas and Ufuk Topcu

EDUCATION

Ph.D. in Electrical Engineering   06/2014
California Institute of Technology, Pasadena, CA
Advisor: Richard M. Murray
Thesis: *Optimal uncertainty quantification via convex optimization and relaxation*
(Defended on September 26, 2013)

M.S. in Electrical Engineering   06/2008
California Institute of Technology, Pasadena, CA

M.E. in Electronic Engineering with high distinction   07/2006
Tsinghua University, Beijing, China

B.E. in Electronic Engineering   07/2003
Tsinghua University, Beijing, China

SELECTED HONORS AND AWARDS

Graduation Day Speaker, Information Theory and Applications Workshop   2015
Best Student Paper Award Finalist, American Control Conference   2013
Atwood Fellowship, Electrical Engineering, Caltech   2006–2007

RESEARCH SUPPORT

Ongoing

DARPA, *Game-Theoretic Reasoning and Synthesis of Defense with Strategic Deception and Counter-Deception*, $500,000, 01/2022–12/2023, Role: Subawardee. Share: $150,000.

NSF, *HDR TRIPODS: UIC Foundations of Data Science Institute*, 01/2020–12/2022, $1,500,000. Role: Senior Personnel. Share: $100,000.

Completed

UIC Discovery Partners Institute (DPI) Seed Fund, *Control of High-Speed Autonomous Vehicles in Complex Environments Using Onboard Computing*, 07/2019–06/2021, $100,000. Role: PI. Share: $50,000.

ADVISING

PhD Students (as Advisor/Co-Advisor)

Current:

Yansong Li, UIC, 08/2020–present

Shuo Wu, UIC, 08/2022–present

Former:

Fragkiskos Koufogiannis, University of Pennsylvania, 2013–2017 (as mentor)
Thesis: *Privacy In Multi-Agent And Dynamical Systems*

Fei Miao, University of Pennsylvania, 2014–2016 (as mentor)
Thesis: *Data-Driven Dynamic Robust Resource Allocation*
Charles Hallac and Sarah Keil Wolf Award (Best Doctoral Dissertation Award in ESE), 2016

MS Students (as Advisor/Co-Advisor)

Former:

Paolo Ceppi, UIC, 08/2021–05/2022

Peng Zou, UIC, 06/2020–05/2021

Eleonora D'Alessandro, UIC/Politecnico di Torino, 12/2019–09/2020
Thesis: *Imitation Learning for Autonomous Highway Merging with Safety Guarantees*
Nominated for the Outstanding Thesis and Dissertation Award at the Graduate College

Graduate Students (as Thesis Committee Member)

Yangqing Liu, PhD, UIC, 03/2022
Thesis: *Stochastic Methods and Convex Optimization in Electromagnetic Inverse Scattering*

Matteo Pallomo, MS, UIC/Politecnico di Torino, 05/2019
Thesis: *A Framework for Robotic Grasping and Handover with an Underactuated Three-Fingered Hand*

Michele Giovanni Calvi, MS, UIC/Politecnico di Torino, 12/2018
Thesis: *Runtime Monitoring of Cyber-Physical Systems Using Data-Driven Models*

Undergraduate Students

Current:

Guanda Chen, Undergraduate Researcher, SUSTech, 06/2022–present

Xinyi Wei, Undergraduate Researcher, SUSTech, 06/2022–present

Former:

Junze Deng, Undergraduate Researcher, SUSTech, 06/2021–05/2022

Chongyang Shi, Undergraduate Researcher, SUSTech, 06/2021–05/2022

Philip Korus, Abhiishek Muralidhar, JuanCarlos Paez, Senior Design, UIC, 10/2021–05/2022
Project Title: *Stabilization of Rocket with Canards*

Amanda Martinez, Marvin Rivera, Juan Saavedra, Abigail Villanueva, Senior Design, UIC, 10/2020–05/2021
Project Title: *Walker with Standing Assist*

Emily Chen, Chloé le Comte, Allison Higgins, Lina Huang, Senior Design, University of Pennsylvania, 2015–2016
Project Title: *Going Viral: Resource Allocation Planning Tool for Infectious Diseases*
Societal Impact Award from the ESE department, 2016

TEACHING EXPERIENCE

University of Illinois at Chicago:
ECE 594   Convex Optimization (Fall 2019, Fall 2020, Fall 2021)
ECE 550   Linear Systems Theory and Design (Spring 2018, Spring 2019, Spring 2020, Spring 2021, Spring 2022)
ECE 451   Control Engineering (Fall 2017, Fall 2018)
ENGR 494   Autonomous Vehicles (guest lecturer, Spring 2019)

University of Pennsylvania:
ESE 605   Modern Convex Optimization (Spring 2017)

PROFESSIONAL SERVICE

Conference Invited Session Organizer

Privacy in Systems and Control, American Control Conference, 2016
Co-organizer: George J. Pappas

Privacy in Systems and Control, IEEE Conference on Decision and Control, 2014
Co-organizers: Jerome Le Ny and George J. Pappas

Reviewer

Journals
ACM Transactions on Cyber-Physical Systems
Annual Reviews in Control
Automatica
European Journal of Operational Research
IEEE Control Systems Letters

IEEE Open Journal of Control Systems
IEEE Transactions on Automatic Control
IEEE Transactions on Control of Network Systems
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Power Systems
IEEE Robotics and Automation Letters
IEEE Transactions on Signal Processing
Information and Inference: A Journal of the IMA
Transportation Research Part D: Transport and Environment

Conferences
ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)
ACM International Conference on Hybrid Systems: Computation and Control (HSCC)
American Control Conference (ACC)
IEEE Conference on Decision and Control (CDC)
IEEE International Conference on Robotics and Automation (ICRA)
IEEE International Conference on Smart Grid Communications (SmartGridComm)
International Federation of Automatic Control (IFAC) World Congress

University Service

Committee member, Tenure-track faculty search in ECE, 2018–2020

Organizer, ECE departmental seminar, 2021–2022

Outreach

Judge, SIMIODE[1] Challenge Using Differential Equations Models (SCUDEM) V, 2021

Judge, UIC Impact & Research Week, 2021

PUBLICATIONS

Journal Publications

[1]   Sumukha Udupa, Abhishek Kulkarni, Shuo Han, Nandi Leslie, Charles Kamhoua, and Jie Fu, "Synthesizing attack-aware control and active sensing strategies under reactive sensor attacks," *IEEE Control Systems Letters*, 2022.

[2]   Shuo Han, "Gradient methods with dynamic inexact oracles," *IEEE Control Systems Letters*, vol. 5, no. 4, pp. 1163–1168, Oct. 2021.

[3]   Fei Miao, Sihong He, Lynn Pepin, Shuo Han, Abdeltawab Hendawi, Mohamed E Khalefa, John A. Stankovic, and George Pappas, "Data-driven distributionally robust optimization for vehicle balancing of mobility-on-demand systems," *ACM Transactions on Cyber-Physical Systems*, vol. 5, no. 2, Jan. 2021, ISSN: 2378-962X. DOI: 10.1145/3418287.

[4]   Shuo Han, "Systematic design of decentralized algorithms for consensus optimization," *IEEE Control Systems Letters*, vol. 3, no. 4, pp. 966–971, 2019.

[5]   Fei Miao, Shuo Han, Shan Lin, Qian Wang, John Stankovic, Abdeltawab Hendawi, Desheng Zhang, Tian He, and George J. Pappas, "Data-driven robust taxi dispatch under demand uncertainties," *IEEE Transactions on Control Systems Technology*, vol. 27, no. 1, pp. 175–191, 2019.

[6] Shuo Han and George J. Pappas, "Privacy in control and dynamical systems," *Annual Review of Control, Robotics, and Autonomous Systems*, vol. 1, no. 1, 2018.

[7] Fragkiskos Koufogiannis, Shuo Han, and George J. Pappas, "Gradual release of sensitive data under differential privacy," *Journal of Privacy and Confidentiality*, vol. 7, no. 2, pp. 23–52, 2017.

[8] Shuo Han, Ufuk Topcu, and George J. Pappas, "Differentially private distributed constrained optimization," *IEEE Transactions on Automatic Control*, vol. 62, no. 1, pp. 50–64, 2017.

[9] Fei Miao, Shuo Han, Shan Lin, John A. Stankovic, Desheng Zhang, Sirajum Munir, Hua Huang, Tian He, and George J. Pappas, "Taxi dispatch with real-time sensing data in metropolitan areas: A receding horizon control approach," *IEEE Transactions on Automation Science and Engineering*, vol. 13, no. 2, pp. 463–478, 2016.

[10] Shuo Han, Victor M. Preciado, Cameron Nowzari, and George J. Pappas, "Data-driven network resource allocation for controlling spreading processes," *IEEE Transactions on Network Science and Engineering*, vol. 2, no. 4, pp. 127–138, 2015.

[11] Shuo Han, Molei Tao, Ufuk Topcu, Houman Owhadi, and Richard M. Murray, "Convex optimal uncertainty quantification," *SIAM Journal on Optimization*, vol. 25, no. 3, pp. 1368–1387, 2015.

Peer-Reviewed Conference Publications

[1] Yansong Li and Shuo Han, "Accelerating Model-Free Policy Optimization Using Model-Based Gradient: A Composite Optimization Perspective," in *Proceedings of The 4th Annual Learning for Dynamics and Control Conference*, PMLR, 2022, pp. 304–315.

[2] Abhishek Kulkarni, Shuo Han, Nandi Leslie, Charles Kamhoua, and Jie Fu, "Qualitative planning in imperfect information games with active sensing and reactive sensor attacks: Cost of unawareness," in *IEEE Conference on Decision and Control*, 2021.

[3] Jieren Deng, Chenghong Wang, Xianrui Meng, Yijue Wang, Ji Li, Sheng Lin, Shuo Han, Fei Miao, Sanguthevar Rajasekaran, and Caiwen Ding, "A secure and efficient federated learning framework for NLP," in *Conference on Empirical Methods in Natural Language Processing*, 2021.

[4] Shuo Han, "Computational convergence analysis of distributed gradient tracking for smooth convex optimization using dissipativity theory," in *American Control Conference*, 2019.

[5] Shuo Han, Ufuk Topcu, and George J. Pappas, "Quantification on the efficiency gain of automated ridesharing services," in *American Control Conference*, 2017.

[6] Fei Miao, Shuo Han, Abdeltawab Hendawi, Mohamed E. Khalefa, John A. Stankovic, and George J. Pappas, "Data-driven distributionally robust vehicle balancing with dynamic region partition," in *ACM/IEEE International Conference on Cyber-Physical Systems*, 2017.

[7] Jorge Cortés, Geir E. Dullerud, Shuo Han, Jerome Le Ny, Sayan Mitra, and George J. Pappas, "Differential privacy in control and network systems," in *IEEE Conference on Decision and Control*, 2016, (tutorial paper).

[8] Shuo Han, Ufuk Topcu, and George J. Pappas, "Event-based information-theoretic privacy: A case study of smart meters," in *American Control Conference*, 2016.

[9] Jie Fu, Shuo Han, and Ufuk Topcu, "Optimal control in Markov decision processes via distributed optimization," in *IEEE Conference on Decision and Control*, 2015.

[10] Fei Miao, Shuo Han, Shan Lin, and George J. Pappas, "Taxi dispatch under model uncertainties," in *IEEE Conference on Decision and Control*, 2015.

[11] Shuo Han, Ufuk Topcu, and George J. Pappas, "A sublinear algorithm for barrier-certificate-based data-driven model validation of dynamical systems," in *IEEE Conference on Decision and Control*, 2015.

[12] Shuo Han, Ufuk Topcu, and George J. Pappas, "An approximately truthful mechanism for electric vehicle charging via joint differential privacy," in *American Control Conference*, 2015.

[13] Shuo Han, Ufuk Topcu, and George J. Pappas, "Differentially private distributed protocol for electric vehicle charging," in *Annual Allerton Conference on Communication, Control, and Computing*, 2014.

[14] Shuo Han, Ufuk Topcu, and George J. Pappas, "Differentially private convex optimization with piecewise affine objectives," in *IEEE Conference on Decision and Control*, 2014.

[15] Fragkiskos Koufogiannis, Shuo Han, and George J. Pappas, "Computation of privacy-preserving prices in smart grids," in *IEEE Conference on Decision and Control*, 2014.

[16] Shuo Han, Ufuk Topcu, Molei Tao, Houman Owhadi, and Richard M. Murray, "Convex optimal uncertainty quantification: Algorithms and a case study in energy storage placement for power grids," in *American Control Conference*, 2013, **Best Student Paper Finalist**.

[17] Shuo Han and Richard M. Murray, "Containment indicator function construction via numerical conformal mapping," in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2011.

[18] Shuo Han, Andrea Censi, Andrew D. Straw, and Richard M. Murray, "A bio-plausible design for visual pose stabilization," in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2010.

[19] Andrea Censi, Shuo Han, Sawyer B. Fuller, and Richard M. Murray, "A bio-plausible design for visual attitude stabilization," in *IEEE Conference on Decision and Control*, 2009.

[20] Shuo Han, Andrew D. Straw, Michael H. Dickinson, and Richard M. Murray, "A real-time helicopter testbed for insect-inspired visual flight control," in *IEEE International Conference on Robotics and Automation*, 2009.

INVITED TALKS

1. "Systematic Design of Decentralized Algorithms for Consensus Optimization," Aerospace Engineering and Engineering Mechanics, UT Austin, 08/2019.

2. "Systematic Design of Decentralized Algorithms for Consensus Optimization," Mechanical, Materials, and Aerospace Engineering, Illinois Institute of Technology, 05/2019.

3. "Data-Driven Control and Optimization for Urban Infrastructures," Electrical and Computer Engineering, University of Connecticut, 04/2017.

4. "Data-Driven Control and Optimization for Urban Infrastructures," Industrial and Systems Engineering, University of Florida, 04/2017.

5. "Data-Driven Control and Optimization for Urban Infrastructures," Aerospace Engineering, Iowa State University, 03/2017.

6. "Data-Driven Control and Optimization for Urban Infrastructures," Electrical & Computer Engineering, University of Rochester, 03/2017.

7. "Data-Driven Control and Optimization for Urban Infrastructures," Electrical & Computer Engineering, University of Illinois at Chicago, 02/2017.

8. "Data-Driven Control and Optimization for Urban Infrastructures," Mechanical Engineering, University of Kentucky, 02/2017.

9. "Distributional Uncertainty: From Quantification to Decision Making," Applied Mathematics & Statistics, UC Santa Cruz, 01/2017.

10. "Enabling Data-Rich Autonomous Urban Infrastructures," Electrical & Computer Engineering, Temple University, 11/2016.

11. "A Theory of Privacy for Cyber-Physical Systems," Electrical & Computer Engineering, Worcester Polytechnic Institute, 10/2016.

12. "Data-Driven and Privacy-Aware Optimization for Smart Cities," Electrical & Systems Engineering, Washington University in St. Louis, 03/2016.

13. "Data-Driven and Privacy-Aware Optimization for Smart Cities," Systems Engineering, Boston University, 02/2016.

14. "A Theory of Privacy for Cyber-Physical Systems," Rigorous Systems Research Group, Caltech, 10/2015.

15. "A Theory of Privacy for Cyber-Physical Systems," Center for Control, Dynamical Systems, and Computation (CCDC), UC Santa Barbara, 10/2015.

16. "A Theory of Privacy for Cyber-Physical Systems," DREAM Seminar, UC Berkeley, 10/2015.

17. "A Theory of Privacy for Cyber-Physical Systems," Coordinated Science Laboratory, UIUC, 10/2015.

18. "A Theory of Privacy for Cyber-Physical Systems," Electrical & Computer Engineering, Purdue University, 10/2015.

19. "A Theory of Privacy for Cyber-Physical Systems," Electrical & Computer Engineering, University of Notre Dame, 10/2015.

20. "A Theory of Privacy for Cyber-Physical Systems," Michigan Power and Energy Lab, University of Michigan, 10/2015.

21. "Convex Optimal Uncertainty Quantification: Algorithms and A Case Study in Energy Storage Placement for Power Grids," MIT, 10/2012.

22. "Convex Optimal Uncertainty Quantification: Algorithms and A Case Study in Energy Storage Placement for Power Grids," PRECISE Center, University of Pennsylvania, 10/2012.