

Konstantinos Gatsis

CONTACT

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ACADEMIC APPOINTMENTS

Departmental Lecturer Department of Engineering Science Control Engineering Group University of Oxford, Oxford, UK	Dec.2019 - present
Postdoctoral Researcher Dept. of Electrical & Systems Engineering GRASP (General Robotics, Automation, Sensing and Perception) Laboratory PRECISE (Penn Research In Embedded Computing and Integrated Systems Engineering) Center University of Pennsylvania, Philadelphia, PA	Oct.2016 - Oct.2019

EDUCATION

PhD in Electrical & Systems Engineering University of Pennsylvania Thesis: Resource-aware Design of Wireless Control Systems Advisor: Prof. George J. Pappas	Sept.2010 - Dec. 2016 Philadelphia, PA
Diploma in Electrical & Computer Engineering University of Patras Thesis: Robotic Vehicle Navigation Advisor: Prof. Anthony Tzes	Sept. 2004 - May 2010 Patras, Greece

RESEARCH INTERESTS

Cyber-Physical Systems; Internet-of-Things (IoT); Learning for Autonomous Systems; Autonomous 5G Wireless Applications; IoT Security and Privacy; Control and Optimization

TEACHING EXPERIENCE

Instructor University of Oxford, UK Robust Control (C20)	Hillary Term 2020
Instructor University of Pennsylvania, Philadelphia, PA Special topics in ESE: Safe Learning for Control (ESE 680) with Professors Manfred Morari, George J. Pappas	Spring 2019
Special topics in ESE: Learning for Control (ESE 680) with Professors Manfred Morari, George J. Pappas	Spring 2018
Special topics in ESE: Dynamic Programming and Optimal Control (ESE 680)	Fall 2017

Teaching Assistant

University of Pennsylvania, Philadelphia, PA

Control of Systems (ESE 406), Instructor: Prof. Bruce Kothmann

Spring 2013

Introduction to Optimization Theory (ESE 504), Instructor: Prof. Ali Jadbabaie

Fall 2011

HONORS & AWARDS**Best Student Paper Finalist (as co-author)**

2017

56th IEEE Conference on Decision and Control, Melbourne, Australia. Awarded to V. Tzoumas for the paper "Resilient Monotone Submodular Function Maximization".

Young Author Prize Finalist (as co-author)

2017

2017 IFAC World Congress, Toulouse, France. Awarded to A. Tsiamis for the paper "State Estimation with Secrecy against Eavesdroppers".

Best Poster Award

2017

IoTDI Conference in CPSWeek 2017, Pittsburgh, PA, for the poster "Wireless Control for the IoT: Power, Spectrum, and Security Challenges".

Joseph, D'16, and Rosaline Wolf Award for Best Doctoral Dissertation (co-recipient)

2016

Awarded annually for the best dissertation from a male Electrical and Systems Engineering Ph.D. Candidate of the University of Pennsylvania.

O. Hugo Schuck Best Paper Award (Theory)

2014

Awarded by the American Automatic Control Council to the two best papers (theory and application) presented at the 2013 American Control Conference. For the paper "Optimal Power Management in Wireless Control Systems".

Best Paper Award Finalist

2014

ACM/IEEE 5th International Conference on Cyber-Physical Systems (ICCPs 2014), Berlin, Germany, for the paper "Opportunistic Scheduling of Control Tasks Over Shared Wireless Channels".

Student Best Paper Award

2013

2013 American Control Conference (ACC 2013) for the paper "Optimal Power Management in Wireless Control Systems".

Student Travel Support

54th IEEE Conference on Decision and Control (CDC 2015), Osaka, Japan

ACM/IEEE 5th International Conference on Cyber-Physical Systems (ICCPs 2014), Berlin, Germany

SUPERVISION**Undergraduate**

Shenqi Ye (with Prof. Noa Zilberman), July - Aug. 2020

PUBLICATIONS**Book Chapters**

[B-1] K. Gatsis and G. J. Pappas. Reinforcement learning for control using value function approximation. In J. Baillieul and T. Samad, editors, *Encyclopedia of Systems and Control*. Springer, London, 2020

Journal Papers

[J-1] V. L. Silva, M. Eisen, K. Gatsis, and A. Ribeiro. Model-free design of control systems over wireless fading channels. *IEEE Transactions on Signal Processing*, 2020. Submitted. Available on Arxiv

[J-2] X. Chen, K. Gatsis, H. Hassani, and S. S. Bidokhti. Age of information in random access channels. *IEEE Transactions on Information Theory*, 2020. Submitted. Available on Arxiv

- [J-3] A. B. Alexandru, K. Gatsis, Y. Shoukry, S. A. Seshia, P. Tabuada, and G. J. Pappas. Cloud-based quadratic optimization with partially homomorphic encryption. *IEEE Transactions on Automatic Control*, 2020. To appear
- [J-4] K. Gatsis, H. Hassani, and G. J. Pappas. Latency-reliability tradeoffs for state estimation. *IEEE Transactions on Automatic Control*, 2020. To appear
- [J-5] A. Tsiamis, K. Gatsis, and G. J. Pappas. State-secrecy codes for networked linear systems. *IEEE Transactions on Automatic Control*, 65(5):2001–2015, 2020
- [J-6] K. Gatsis and G. J. Pappas. Statistical learning for analysis of networked control systems over unknown channels. *Automatica*, 2019. Submitted. Available on Arxiv
- [J-7] M. Eisen, M. M. Rashid, K. Gatsis, D. Cavalcanti, N. Himayat, and A. Ribeiro. Control aware radio resource allocation in low latency wireless control systems. *IEEE Internet of Things Journal*, 6(5):7878–7890, 2019
- [J-8] M. Eisen, K. Gatsis, G. J. Pappas, and A. Ribeiro. Learning in wireless control systems over non-stationary channels. *IEEE Transactions on Signal Processing*, 67(5):1123–1137, 2019
- [J-9] K. Gatsis, A. Ribeiro, and G. J. Pappas. Random access design for wireless control systems. *Automatica*, 91:1 – 9, May 2018
- [J-10] K. Gatsis, M. Pajic, A. Ribeiro, and G. J. Pappas. Opportunistic control over shared wireless channels. *IEEE Transactions on Automatic Control*, 60(12):3140–3155, December 2015
- [J-11] K. Gatsis, A. Ribeiro, and G. J. Pappas. Optimal power management in wireless control systems. *IEEE Transactions on Automatic Control*, 59(6):1495–1510, June 2014

Conference Papers

- [C-1] X. Chen, K. Gatsis, H. Hassani, and S. S. Bidokhti. Age of information in random access channels. In *IEEE International Symposium on Information Theory (ISIT)*, 2020
- [C-2] V. L. Silva, M. Eisen, K. Gatsis, and A. Ribeiro. Resource allocation in large-scale wireless control systems with graph neural networks. In *IFAC World Congress*, 2020
- [C-3] H. Hu, K. Gatsis, M. Morari, and G. J. Pappas. Non-cooperative distributed MPC with iterative learning. In *IFAC World Congress*, 2020
- [C-4] K. Gatsis and G. J. Pappas. Learning to control over unknown wireless channels. In *IFAC World Congress*, 2020
- [C-5] V. L. Silva, M. Eisen, K. Gatsis, and A. Ribeiro. Resource allocation in wireless control systems via deep policy gradient. In *2020 IEEE 21st International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, 2020
- [C-6] H. Hu, K. Gatsis, M. Morari, and G. J. Pappas. Tuning communication latency for distributed model predictive control. In *8th IFAC Workshop on Distributed Estimation and Control in Networked Systems (NecSys)*, 2019
- [C-7] M. Eisen, M. M. Rashid, K. Gatsis, D. Cavalcanti, N. Himayat, and A. Ribeiro. Control aware communication design for time sensitive wireless systems. In *2019 IEEE International Conference on Acoustics, Speech and Signal Processing*, 2019
- [C-8] A. Tsiamis, K. Gatsis, and G. J. Pappas. An information matrix approach for state secrecy. In *57th IEEE Conference on Decision and Control (CDC 2018)*, Miami Beach, FL, 2018
- [C-9] K. Gatsis and G. J. Pappas. Sample complexity of networked control systems over unknown channels. In *57th IEEE Conference on Decision and Control (CDC 2018)*, Miami Beach, FL, 2018
- [C-10] M. Eisen, K. Gatsis, G. J. Pappas, and A. Ribeiro. Learning in non-stationary wireless control systems via newton’s method. In *American Control Conference 2018 (ACC 2018)*, Milwaukee, WI, 2018
- [C-11] A. Tsiamis, K. Gatsis, and G. J. Pappas. State-secrecy codes for stable systems. In *American Control Conference 2018 (ACC 2018)*, Milwaukee, WI, 2018

- [C-12] N. J. Watkins, K. Gatsis, M. Morari, and G. J. Pappas. Scenario-based model predictive control for energy harvesting actuators. In *American Control Conference 2018 (ACC 2018)*, Milwaukee, WI, 2018
- [C-13] M. Eisen, K. Gatsis, G. J. Pappas, and A. Ribeiro. Optimization of switched linear systems over non-stationary wireless channels. In *2018 IEEE 19th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, 2018
- [C-14] M. Eisen, K. Gatsis, G. J. Pappas, and A. Ribeiro. Learning statistically accurate resource allocations in non-stationary wireless systems. In *2018 IEEE International Conference on Acoustics, Speech and Signal Processing*, 2018
- [C-15] A. Alexadru, K. Gatsis, and G. J. Pappas. Privacy preserving cloud-based quadratic optimization. In *55th Annual Allerton Conference on Communication, Control, and Computing*, October 2017
- [C-16] V. Tzoumas, K. Gatsis, A. Jadbabaie, and G. J. Pappas. Resilient monotone submodular function maximization. In *56th IEEE Conference on Decision and Control (CDC 2017)*, Melbourne, Australia, December 2017 [**Best Student Paper Finalist for V. Tzoumas**]
- [C-17] A. Tsiamis, K. Gatsis, and G. J. Pappas. State estimation codes for perfect secrecy. In *56th IEEE Conference on Decision and Control (CDC 2017)*, Melbourne, Australia, December 2017
- [C-18] N. J. Watkins, K. Gatsis, C. Nowzari, and G. J. Pappas. Battery management for control systems with energy harvesting sensors. In *56th IEEE Conference on Decision and Control (CDC 2017)*, Melbourne, Australia, December 2017
- [C-19] A. Tsiamis, K. Gatsis, and G. J. Pappas. State estimation with secrecy against eavesdroppers. *IFAC-PapersOnLine*, 50(1):8385 – 8392, July 2017. 20th IFAC World Congress, Toulouse, France [**Young Author Prize Finalist for A. Tsiamis**]
- [C-20] Y. Shoukry, K. Gatsis, A. Alanwar, G. J. Pappas, S. A. Seshia, M. Srivastava, and P. Tabuada. Privacy-aware quadratic optimization using partially homomorphic encryption. In *55th IEEE Conference on Decision and Control (CDC 2016)*, Las Vegas, NV, December 2016
- [C-21] K. Gatsis, A. Ribeiro, and G. J. Pappas. State-based communication design for wireless control systems. In *55th IEEE Conference on Decision and Control (CDC 2016)*, Las Vegas, NV, December 2016
- [C-22] K. Gatsis, A. Ribeiro, and G. J. Pappas. Control-aware random access communication. In *Proc. of the ACM/IEEE 7th International Conference on Cyber-Physical Systems (ICCPS 2016)*, Vienna, Austria, April 2016
- [C-23] K. Gatsis, A. Ribeiro, and G. J. Pappas. Control with random access wireless sensors. In *Proc. of the 54th IEEE Conference on Decision and Control (CDC 2015)*, Osaka, Japan, December 2015
- [C-24] K. Gatsis, A. Ribeiro, and G. J. Pappas. Decentralized channel access for wireless control systems. In *Proc. of the 5th IFAC Workshop on Distributed Estimation and Control in Networked Systems (NecSys)*, Philadelphia, PA, September 2015
- [C-25] K. Gatsis, U. Topcu, and G. J. Pappas. Value of forecasts in planning under uncertainty. In *Proc. of the 2015 American Control Conference (ACC 2015)*, Chicago, IL, July 2015
- [C-26] K. Gatsis, M. Pajic, A. Ribeiro, and G. J. Pappas. Opportunistic sensor scheduling in wireless control systems. In *Proc. of the 53rd IEEE Conference on Decision and Control (CDC 2014)*, Los Angeles, CA, December 2014
- [C-27] K. Gatsis, M. Pajic, A. Ribeiro, and G. J. Pappas. Opportunistic scheduling of control tasks over shared wireless channels. In *Proc. of the ACM/IEEE 5th International Conference on Cyber-Physical Systems (ICCPS 2014)*, Berlin, Germany, April 2014 [**Best Paper Award Finalist**]
- [C-28] K. Gatsis, M. Pajic, A. Ribeiro, and G. J. Pappas. Power-aware communication for wireless sensor-actuator systems. In *Proc. of the 52nd IEEE Conference on Decision and Control (CDC 2013)*, Florence, Italy, December 2013
- [C-29] K. Gatsis, A. Ribeiro, and G. J. Pappas. Optimal power management in wireless control systems. In *Proc. of the 2013 American Control Conference (ACC 2013)*, Washington DC, June 2013 [**O. Hugo Schuck Best Paper Award, Student Best Paper Award**]

- [C-30] G. Siamantas, K. Gatsis, and A. Tzes. Mobile robot-assisted cellular environment coverage. In *Proc. of the 6th IFIP International Conference on Artificial Intelligence Applications and Innovations (AIAI 2010)*, Larnaca, Cyprus, October 2010

Other Publications

- [O-1] K. Gatsis and G. J. Pappas. Optimization, learning, and control for the internet-of-things. In *Princeton Day of Optimization*, Princeton, NJ, September 2018. Poster
- [O-2] K. Gatsis and G. J. Pappas. Secure and resource-efficient monitoring and control for the IoT. In *'Meet the Faculty Candidate' Poster Session, 56th IEEE Conference on Decision and Control (CDC 2017)*, Melbourne, Australia, December 2017. Poster
- [O-3] K. Gatsis, A. Ribeiro, and G. J. Pappas. Power and spectrum optimization for wireless autonomous systems. In *DIMACS Workshop on Distributed Optimization, Information Processing, and Learning*, Rutgers University, New Brunswick, NJ, August 2017. Poster
- [O-4] K. Gatsis and G. J. Pappas. Wireless control for the IoT: Power, spectrum, and security challenges. In *2nd IEEE International Conference on Internet-of-Things Design and Implementation (IoTDI), CPSWeek 2017*, Pittsburgh, PA, April 2017. Poster [**Best Poster Award**]
- [O-5] K. Gatsis, A. Ribeiro, and G. J. Pappas. Optimal design principles for wireless control systems. In *'Meet the Faculty Candidate' Poster Session, 55th IEEE Conference on Decision and Control (CDC 2016)*, Las Vegas, NV, December 2016. Poster
- [O-6] K. Gatsis, M. Pajic, A. Ribeiro, and G. J. Pappas. Optimal resource management in wireless control systems. In *2014 NSF Cyber-Physical Systems Principal Investigators' Meeting*, Arlington, VA, November 2014. Poster

SELECTED TALKS

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| Seminar, Department of Electrical & Systems Engineering,
Washington University in St. Louis, St. Louis, MO | Apr. 2019 |
| Seminar, Department of Electrical & Computer Engineering,
Northeastern University, Boston, MA | Mar. 2019 |
| Seminar, Department of Electrical, Computer & Energy Engineering,
University of Colorado Boulder, CO | Mar. 2019 |
| Seminar, Department of Electrical & Computer Engineering,
University of Toronto, Canada | Mar. 2019 |
| Seminar, Department of Electrical & Computer Engineering,
University of California Riverside, Riverside, CA | Mar. 2019 |
| Seminar, Polytechnic School, Arizona State University, Tempe, AZ | Feb. 2019 |
| Seminar, Department of Electrical & Computer Engineering,
University of Illinois at Chicago, Chicago, IL | Feb. 2019 |
| Invited talk at Information Theory and Applications (ITA) Workshop, San Diego, CA | Feb. 2019 |
| Seminar, Online, Intel Science and Technology Center for Wireless Autonomous Systems | Dec. 2018 |
| Seminar, Link Lab, University of Virginia, Charlottesville, VA | Apr. 2018 |
| Seminar, Department of Electrical Engineering,
Columbia University, New York, NY | Mar. 2018 |

Seminar, Department of Electrical & Computer Engineering, University of Michigan, Ann Arbor, MI	Jan. 2018
Invited talk at Modeling and Optimization: Theory and Applications (MOPTA) Conference, Lehigh University, Bethlehem, PA	Aug. 2016
CCSP Seminar, University of Maryland, College Park, MD	Mar. 2016
ISS Seminar, Harvard University, Cambridge, MA	Feb. 2016
Invited talk at Information Theory and Applications (ITA) Workshop, San Diego, CA	Feb. 2016
PhD Colloquium, Electrical & Systems Engineering, University of Pennsylvania	Aug. 2015

PROFESSIONAL & REVIEWING ACTIVITIES

Open Invited Session Organizer July 2020
"Control for Next Generation Wireless Networks", 2020 IFAC World Congress, Berlin, Germany
Co-organizers: D. Baumann, K. H. Johansson, S. Trimpe

Workshop Organizer Dec. 2018
Workshop on Learning for Control
During 57th IEEE Conference on Decision and Control, Miami Beach, Florida, December 16, 2018
Co-organizers: Pramod P. Khargonekar, Manfred Morari, George J. Pappas

Journal Reviewer
IEEE Transactions on Automatic Control, Automatica, IEEE Control Systems Magazine, IEEE Transactions on Signal Processing, IEEE Transactions on Power Systems, IEEE Transactions on Wireless Communications, IEEE Journal of Selected Topics in Signal Processing, ACM Transactions on Cyber-Physical Systems, IEEE Transactions on Control of Network Systems, IEEE Embedded Systems Letters, IEEE Control Systems Letters, IEEE Communications Letters

Conference Reviewer
Conference on Robot Learning 2020, On multiple occasions for IEEE Conference on Decision and Control, American Control Conference, Cyber-Physical Systems Week, European Control Conference, IFAC World Congress

Member,
Institute of Electrical and Electronics Engineers (IEEE)

Member,
Engineering and Physical Sciences Research Council (EPSRC) Associate Peer Review College

LANGUAGES

Greek: Native,
English: Fluent,
Spanish: Competent,
French: Basic