

Filippos Fotiadis

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RESEARCH INTERESTS

My primary research interests lie in the intersection of control theory, optimization, and machine learning, with applications to security, autonomy, and verification of cyber-physical systems. I specifically focus on two research directions: creating game- and optimization-based decision-making tools to render cyber-physical systems secure against adversaries; and developing learning-based as well as approximation-free control methods to increase their resilience under environmental and model uncertainty.

EDUCATION

Ph.D. in Aerospace Engineering, Georgia Institute of Technology (GPA 4.0/4.0) Thesis title: “Game-Theoretic Learning and Control for Resilience of Complex Adaptive Systems” Advisor: Prof. Kyriakos G. Vamvoudakis	2019-2024 (expected)
M.S. in Mathematics, Georgia Institute of Technology (GPA 4.0/4.0)	2019-2023
M.S. in Aerospace Engineering, Georgia Institute of Technology (GPA 4.0/4.0)	2019-2022
Diploma (B.S. & M.S.) in Electrical & Computer Engineering, Aristotle University of Thessaloniki (GPA 9.59/10) Thesis title: “Improving Robustness of Adaptive Dynamic Programming Controllers using Prescribed Performance Control” Advisor: Prof. George A. Rovithakis	2013-2018

PROFESSIONAL & RESEARCH EXPERIENCE

Graduate Research Assistant, Georgia Institute of Technology Intelligent Cyber-Physical Systems Lab (PI: Prof. Kyriakos G. Vamvoudakis)	Aug 2019-present
Undergraduate Researcher, Aristotle University of Thessaloniki Automation and Robotics Lab (PI: Prof. George A. Rovithakis)	Feb 2018-Nov 2018
Intern on Physical Human-Robot Interaction, The Centre for Research and Technology Hellas Automation and Robotics Lab (PI: Prof. Zoe Doulgeri)	Jul 2017-Sep 2017

TEACHING EXPERIENCE

Instructor, AE8750/8751 Robotics Research Fundamentals Department of Aerospace Engineering, Georgia Institute of Technology	Spring 2023
Assistant in Teaching, AE8803 Optimization-Based Learning Control and Games Department of Aerospace Engineering, Georgia Institute of Technology	Fall 2022, Fall 2023

SCHOLARSHIPS

Georgia Tech Aerospace Engineering Fellowship (based on exemplary performance)	Aug 2023-May 2024
Alexander S. Onassis Foundation Scholarship	Sep 2020-May 2024
Gerondelis Foundation Graduate Study Scholarship	2021

AWARDS

Outstanding Service as Reviewer of the IEEE Control Systems Letters	2023
Excellent Reviewer for the Journal of Guidance, Control, and Dynamics	2022

PUBLICATIONS

Books

1. A. Kanellopoulos, L. Zhai, **F. Fotiadis**, K. G. Vamvoudakis, “Control and Game Theoretic Methods for Cyber-Physical Security,” to appear in *Elsevier*, 2024.

Book Chapters

1. **F. Fotiadis**, L. Zhai, K. G. Vamvoudakis, J. Hugues, “On the Impact of Sensor-Actuator Clock Offsets on Off-Policy Reinforcement Learning,” to appear in *Smarter Cyber-Physical Systems: Enabling Methodologies and Applications*, eds. Y. Wan, K. G. Vamvoudakis, Y. Chen, F. L. Lewis, CRC Press, 2024.

Journal Publications

1. **F. Fotiadis**, A. Kanellopoulos, K. G. Vamvoudakis, J. Hugues, “Impact of Clock Offsets and Quantization on Learning-based Games,” submitted.
2. **F. Fotiadis**, K. G. Vamvoudakis, Z.-P. Jiang, “[Data-Driven Actuator Allocation for Actuator Redundant Systems](#),” to appear in *IEEE Transactions on Automatic Control*, 2024.
3. **F. Fotiadis**, G. A. Rovithakis, “[Input-Constrained Prescribed Performance Control for High-order MIMO Uncertain Nonlinear Systems via Reference Modification](#),” to appear in *IEEE Transactions on Automatic Control*, 2024.
4. **F. Fotiadis**, K. G. Vamvoudakis, “[Learning-based Actuator Selection for Increased Attack Resilience of Uncertain Systems](#),” *Automatica*, vol. 159, paper 111332, 2024.
5. **F. Fotiadis**, K. G. Vamvoudakis, “[Recursive Reasoning with Reduced Complexity and Intermittency for Non-Equilibrium Learning in Stochastic Games](#),” *IEEE Transactions on Neural Networks and Learning Systems*, vol. 34, no. 11, pp. 8467-8481, 2023.
6. **F. Fotiadis**, K. G. Vamvoudakis, “[Concurrent Receding Horizon Control and Estimation against Stealthy Attacks](#),” *IEEE Transactions on Automatic Control*, vol. 68, no. 6, pp. 3712-3719, 2023.
7. K. G. Vamvoudakis, **F. Fotiadis**, A. Kanellopoulos, N.-M. T. Kokolakis, “[Nonequilibrium Dynamical Games: A Control Systems Perspective](#),” *Annual Reviews in Control*, vol. 53, pp. 6-18, 2022.
8. **F. Fotiadis**, G. A. Rovithakis, “[Prescribed Performance Control for Discontinuous Output Reference Tracking](#),” *IEEE Transactions on Automatic Control*, vol. 66, no. 9, pp. 4409-4416, 2021.
9. **F. Fotiadis**, K. G. Vamvoudakis, “[Detection of Actuator Faults for Continuous-Time Systems with Intermittent State Feedback](#),” *Systems and Control Letters*, vol. 152, pp. 104938, 2021.

Conference Publications

1. **F. Fotiadis**, A. Kanellopoulos, K. G. Vamvoudakis, J. Hugues, “Poisoning Actuation Attacks Against the Learning of an Optimal Controller,” to appear in *American Control Conference*, Toronto, Canada, 2024.
2. S. Athalye, **F. Fotiadis**, K. G. Vamvoudakis, J. Hugues, “An Output Feedback Game-Theoretic Approach for Defense against Stealthy GNSS Spoofing Attacks,” to appear in *American Control Conference*, Toronto, Canada, 2024.
3. J. M. Magalhães Júnior, L. Zhai, **F. Fotiadis**, A. Kanellopoulos, K. G. Vamvoudakis, J. Hugues, “[Real-Time and Experimental Reactive and Proactive Defense in a Multi-Agent Scenario](#),” *Proc. AIAA SciTech Forum*, Orlando, Florida, 2024.
4. **F. Fotiadis**, K. G. Vamvoudakis, “[A Physics-Informed Neural Networks Framework to Solve the Infinite-Horizon Optimal Control Problem](#),” *Proc. IEEE Conference on Decision and Control*, pp. 6008-6013, Marina Bay Sands, Singapore, 2023.
5. **F. Fotiadis**, K. G. Vamvoudakis, “[Game-Theoretic Deception Methods for Perfectly and Bounded Rational Stealthy Attackers](#),” *Proc. IEEE Conference on Decision and Control*, pp. 7956-7963, Marina Bay Sands, Singapore, 2023.
6. **F. Fotiadis**, G. A. Rovithakis, “[Input-Constrained Prescribed Performance Control for SISO Nonlinear Systems via Reference Relaxation](#),” *Proc. Mediterranean Conference on Control and Automation*, pp. 777-782, Limassol, Cyprus, 2023.
7. K. G. Vamvoudakis, **F. Fotiadis**, J. P. Hespanha, R. Chinchilla, G. Yang, M. Liu, J. S. Shamma, L. Pavel, “[Game Theory for Autonomy: From Min-Max Optimization to Equilibrium and Bounded Rationality Learning](#),” *Proc. American Control Conference*, pp. 4363-4380, San Diego, CA, 2023.
8. L. Zhai, **F. Fotiadis**, K. G. Vamvoudakis, J. Hugues, “[Timing-Aware Resilience of Data-driven Off-policy Reinforcement Learning for Discrete-Time Systems](#),” *Proc. American Control Conference*, pp. 2782-2787, San Diego, CA, 2023.
9. L. Zhai, A. Kanellopoulos, **F. Fotiadis**, K. G. Vamvoudakis, J. Hugues, “[A Modular Approach to Verification of Learning Components in Cyber-Physical Systems](#),” *Proc. AIAA SciTech, National Harbor*, MD, 2023.
10. **F. Fotiadis**, K. G. Vamvoudakis, Z.-P. Jiang, “[Data-Based Actuator Selection for Optimal Control Allocation](#),” *Proc. IEEE Conference on Decision and Control*, pp. 4674-4679, Cancun, Mexico, 2022.
11. **F. Fotiadis**, A. Kanellopoulos, K. G. Vamvoudakis, J. Hugues, “[Impact of Sensor and Actuator Clock Offsets on Reinforcement Learning](#),” *Proc. American Control Conference*, pp. 2669-2674, Atlanta, GA, 2022.
12. L. Zhai, A. Kanellopoulos, **F. Fotiadis**, K. G. Vamvoudakis, J. Hugues, “[Towards Intelligent Security for Unmanned Aerial Vehicles: A Taxonomy of Attacks, Faults, and Detection Mechanisms](#),” *Proc. AIAA SciTech Forum*, 2022.

13. **F. Fotiadis**, K. G. Vamvoudakis, “[Learning-based Actuator Placement for Uncertain Systems](#),” *Proc. IEEE Conference on Decision and Control*, pp. 90-95, Austin, TX, 2021.
14. **F. Fotiadis**, C. Verginis, K. G. Vamvoudakis, U. Topcu, “[Assured Learning-based Optimal Control subject to Timed Temporal Logic Constraints](#),” *Proc. IEEE Conference on Decision and Control*, pp. 750-756, Austin, TX, 2021.
15. A. Kanellopoulos, **F. Fotiadis**, C. Sun, Z. Xu, K. G. Vamvoudakis, U. Topcu, W. E. Dixon, “[Temporal Logic-based Intermittent, Optimal, and Safe Continuous-Time Learning for Trajectory Tracking](#),” *Proc. IEEE Conference on Decision and Control*, pp. 1263-1268, Austin, TX, 2021.
16. **F. Fotiadis**, K. G. Vamvoudakis, “[Recursive Reasoning for Bounded Rationality in Multi-Agent Non-Equilibrium Play Learning Systems](#),” *Proc. IEEE Conference on Control Technology and Applications*, pp. 741-746, San Diego, CA, 2021.
17. A. Kanellopoulos, **F. Fotiadis**, K. G. Vamvoudakis, V. Gupta, “[A Meta-Learning and Bounded Rationality Framework for Repeated Games in Adversarial Environments](#),” *Proc. IEEE Conference on Decision and Control*, pp. 1640-1645, Jeju Island, Republic of Korea, 2020.
18. **F. Fotiadis**, A. Kanellopoulos, K. G. Vamvoudakis, “[Constrained Differential Games for Secure Decision-Making against Stealthy Attacks](#),” *Proc. American Control Conference*, pp. 4658-4663, Denver, CO, 2020.
19. F. Dimeas, **F. Fotiadis**, D. Papageorgiou, A. Sidiropoulos, Z. Doulgeri, “[Towards Progressive Automation of Repetitive Tasks Through Physical Human-Robot Interaction](#),” *Human Friendly Robotics: 10th International Workshop*, pp. 151-163, 2018.

SERVICE ACTIVITIES

Reviewer, Journals

Automatica (>40)	2019-2024
IEEE Transactions on Automatic Control (>20)	2020-2021, 2023-2024
IEEE Transactions on Systems, Man and Cybernetics: Systems (>20)	2020-2024
IEEE Control Systems Letters (>10)	2020-2021, 2023
IEEE Transactions on Neural Networks and Learning Systems	2021-2024
IEEE Transactions on Cybernetics	2023
IEEE Transactions on Control of Network Systems	2021
IEEE Transactions on Industrial Electronics	2023
IEEE Transactions on Artificial Intelligence	2021
IEEE Transactions on Control Systems Technology	2020
International Journal of Robust and Nonlinear Control	2022-2023
Systems & Control Letters	2023
European Journal of Control	2024
AIAA Journal of Guidance, Control, and Dynamics	2022
Neurocomputing	2023
Journal of Optimization Theory and Applications	2020-2021
Expert Systems with Applications	2020
Optimal Control, Applications and Methods	2021-2022
Applied Mathematics and Computation	2023
The Aeronautical Journal	2023

Reviewer, Conferences

IEEE Conference on Decision and Control (CDC) (>20)	2020-2023
American Control Conference (ACC) (>10)	2020-2024
European Control Conference (ECC)	2023
IFAC World Congress	2021, 2023
Mediterranean Conference on Control and Automation (MED)	2023
IEEE Conference on Control Technology and Applications (CCTA)	2020, 2022
IFAC Conference on Modelling, Identification and Control of Nonlinear Systems	2021

TALKS & PRESENTATIONS

- “A Physics-Informed Neural Networks Framework to Solve the Infinite-Horizon Optimal Control Problem” IEEE Conference on Decision and Control (CDC), Marina Bay Sands, Singapore, 2023 [**Oral Presentation**]
- “Game-Theoretic Deception Methods for Perfectly and Bounded Rational Stealthy Attackers” IEEE Conference on Decision and Control (CDC), Marina Bay Sands, Singapore, 2023 [**Oral Presentation**]

- “Game-Theoretic Learning and Control for Resilience of Complex Adaptive Systems” Georgia Institute of Technology, Atlanta, USA, 2023 [**PhD Proposal**]
- “Input-Constrained Prescribed Performance Control for SISO Nonlinear Systems via Reference Relaxation” Mediterranean Conference on Control and Automation (MED), Limassol, Cyprus, 2023 [**Oral Presentation**]
- “Timing-Aware Resilience of Data-driven Off-policy Reinforcement Learning for Discrete-Time Systems” American Control Conference (ACC), San Diego, USA, 2023 [**Oral Presentation**]
- “Data-Based Actuator Selection for Optimal Control Allocation” IEEE Conference on Decision and Control (CDC), Cancun, Mexico, 2022 [**Oral Presentation**]
- “On Non-Equilibrium Learning in Stochastic Games” Combining Learning and Control in Cyber-Physical Systems Workshop, IEEE Conference on Decision and Control (CDC), Cancun, Mexico, 2022 [**Poster Presentation**]
- “Learning-Based Actuator Placement and Allocation for Resilience against Attacks” N.C. A&T State University, Greensboro, USA, 2022 [**Oral Presentation – Invited Talk**]
- “Impact of Sensor and Actuator Clock Offsets on Reinforcement Learning” American Control Conference (ACC), Atlanta, USA, 2022 [**Rapid Interactive Presentation**]
- “Learning-based Actuator Placement for Uncertain Systems” IEEE Conference on Decision and Control (CDC), Austin, USA, 2021 [**Oral Presentation (Virtual)**]
- “Assured Learning-based Optimal Control subject to Timed Temporal Logic Constraints” IEEE Conference on Decision and Control (CDC), Austin, USA, 2021 [**Oral Presentation (Virtual)**]
- “Recursive Reasoning for Bounded Rationality in Multi-Agent Non-Equilibrium Play Learning Systems” IEEE Conference on Control Technology and Applications (CCTA), San Diego, USA, 2021 [**Oral Presentation (Virtual)**]
- “Constrained Differential Games for Secure Decision-Making against Stealthy Attacks”, American Control Conference (ACC), Denver, USA, 2020 [**Oral Presentation (Virtual)**]