

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
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

Postdoctoral Researcher, University of Texas at Austin Autonomous Systems Group (PI: Prof. Ufuk Topcu)	Aug 2024-present
Graduate Research Assistant, Georgia Institute of Technology Intelligent Cyber-Physical Systems Lab (PI: Prof. Kyriakos G. Vamvoudakis)	Aug 2019-Aug 2024
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-Aug 2024
Alexander S. Onassis Foundation Scholarship	Sep 2020-May 2024
Gerondelis Foundation Graduate Study Scholarship	2021

AWARDS & HONORS

Outstanding 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**, K. G. Vamvoudakis, “Input-Output Data-Driven Sensor Selection for Cyber-Physical Systems,” submitted.
2. **F. Fotiadis**, K. G. Vamvoudakis, “A Physics-Informed Learning Framework to Solve the Infinite-Horizon Optimal Control Problem,” submitted.
3. S. Niu, A. Bouland, H. Wang, **F. Fotiadis**, A. Kurdila, A. L’Afflitto, S. T. Paruchuri, K. G. Vamvoudakis, “[Convergence Rates of Online Critic Value Function Approximation in Native Spaces](#),” to appear in *IEEE Control Systems Letters*, 2024.
4. **F. Fotiadis**, A. Kanellopoulos, K. G. Vamvoudakis, J. Hugues, “[On the Effect of Clock Offsets and Quantization on Learning-based Adversarial Games](#),” *Automatica*, vol. 167, paper 111762, 2024.
5. **F. Fotiadis**, G. A. Rovithakis, “[Input-Constrained Prescribed Performance Control for High-order MIMO Uncertain Nonlinear Systems via Reference Modification](#),” *IEEE Transactions on Automatic Control*, vol. 69, no. 5, pp. 3301-3308, 2024.
6. **F. Fotiadis**, K. G. Vamvoudakis, Z.-P. Jiang, “[Data-Driven Actuator Allocation for Actuator Redundant Systems](#),” *IEEE Transactions on Automatic Control*, vol. 69, no. 4, pp. 2249-2264, 2024.
7. **F. Fotiadis**, K. G. Vamvoudakis, “[Learning-based Actuator Selection for Increased Attack Resilience of Uncertain Systems](#),” *Automatica*, vol. 159, paper 111332, 2024.
8. **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.
9. **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.
10. 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.
11. **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.
12. **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. N. Tukenmez, **F. Fotiadis**, J. M. Magalhães Júnior, K. G. Vamvoudakis, S. Bogosyan, “Intermittent Learning for Trajectory Tracking Control with an Experimental Validation on Microdrones,” submitted.
2. **F. Fotiadis**, K. G. Vamvoudakis, “Input-Output Data-Driven Sensor Selection,” to appear in *IEEE Conference on Decision and Control*, Milan, Italy, 2024.
3. **F. Fotiadis**, G. A. Rovithakis, K. G. Vamvoudakis, “Embedding Learning-based Optimal Controllers with Assured Safety,” to appear in *IEEE Conference on Decision and Control*, Milan, Italy, 2024.
4. A. Kanellopoulos, **F. Fotiadis**, K. G. Vamvoudakis, H. Sandberg, “Unpredictable Switching for Cyber-Physical Security Against Worst-case Attackers,” to appear in *IEEE Conference on Decision and Control*, Milan, Italy, 2024.
5. N. Tukenmez, **F. Fotiadis**, J. M. Magalhães Júnior, K. G. Vamvoudakis, S. Bogosyan, “Reward Drops in Learning-based Control with an Experimental Validation on Microdrones,” to appear in *IEEE Conference on Decision and Control*, Milan, Italy, 2024.
6. **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.
7. 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.

8. 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
9. **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.
10. **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.
11. **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.
12. 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.
13. 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.
14. 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.
15. **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.
16. **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.
17. 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.
18. **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.
19. **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.
20. 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.
21. **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.
22. 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.
23. **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.
24. 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 (>40)	2020-2021, 2023-2024
IEEE Transactions on Systems, Man and Cybernetics: Systems (>20)	2020-2024
IEEE Control Systems Letters (>20)	2020-2021, 2023-2024
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	2023-2024
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)	2020-2024
American Control Conference (ACC) (>10)	2020-2024
European Control Conference (ECC)	2023
IFAC World Congress	2021, 2023
Mediterranean Conference on Control and Automation (MED)	2023-2024
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)]**