Giannis (Ioannis) Delimpaltadakis

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Research Interests

- **Hybrid systems and safety-critical control**, including formal methods for dynamical systems and control, discrete finite-state models (abstractions) of dynamical systems, formal languages, automata, and networked cyberphysical systems (event-triggered control).
- **Stochastic dynamics and control**, including Markov Decision Processes, Reinforcement Learning, and Information Theory in control.
- **The interface of optimization and control**, including optimization-based control (control-barrier functions, projection-based control), optimization of dynamical systems through feedback (feedback optimization), and nonsmooth dynamics.

Education

01/03/2018 – 28/06/2022	**PhD in Control Theory** - **TU Delft** (Delft Center for Systems and Control), Netherlands - **Cum Laude** (top 5% in the Netherlands). - Supervisor: prof. Manuel Mazo Jr. - Coursework grade: 9.5/10.

03/10/2011 – 08/11/2017	**Diploma in Electrical and Computer Engineering** (5-year joint BSc. and MSc. degree)
	- **National Technical University of Athens** (NTUA), Greece
	- Grade: 8.26/10 (top 10%).
	- Concentration: Control Systems, Robotics, Signals, Computer Systems, Electronics.
	- Thesis: *"Decentralized Control with Obstacle Avoidance for Platoons of Car-Like Vehicles with Limited Sensing"*.
	    o Supervisor: prof. Kostas J. Kyriakopoulos.
	    o Grade: 10/10.

Professional Experience

01/11/2022 – Present	**Postdoctoral Researcher**
	- **TU Eindhoven** (Control Systems Technology), Netherlands
	- Supervisor: prof. Maurice Heemels.
	- Research on safety-critical control, optimization and nonsmooth dynamics.
	    o Bridging nonsmooth dynamics and Control Barrier Functions, for safety-critical control and feedback-based optimization of dynamical systems.
	    o Applications on high-precision motion control.
	- Research on formal methods for stochastic and hybrid systems, Markov decision processes (MDPs) and Reinforcement Learning (RL).

- o Developing efficient finite-state models of continuous stochastic processes, for verification/control with formal guarantees, under uncertainty.
- o Developing information-theoretic RL algorithms for improved agent predictability, with applications on robotics and autonomous driving in uncertain environments.
- o Co-supervising a PhD student on formal control synthesis for stochastic systems, using information-theoretic tools.

01/06/2022 – 31/10/2022 **Postdoctoral Researcher**
- **TU Delft** (Delft Center for Systems and Control), Netherlands
- Supervisors: prof. Manuel Mazo Jr., prof. Luca Laurenti.
- Research on formal methods for stochastic systems and MDPs.
  - o Devised algorithms for robust MDPs.

01/03/2018 – 28/06/2022 **PhD Candidate**
- **TU Delft** (Delft Center for Systems and Control), Netherlands
- Supervisor: prof. Manuel Mazo Jr.
- Research on networked control systems, event-triggered control (ETC) and formal methods.
  - o Worked with stochastic, hybrid, uncertain, nonlinear systems and formal methods for control.
  - o Constructed finite-state models of ETC systems' communication, enabling scheduling in shared networks and assessing ETC's performance.
  - o Applications on automotive systems.

Teaching

2018 - 2019, 2019 - 2020, 2020 - 2021

Teaching Assistant, Control Theory course (1st Quarter MSc. Systems and Control program).
- Delivered exercise lectures, designed and corrected exams, held office hours.
- Students graded the course with 8.2/10.

Supervision

Supervision of PhD and MSc. students (as co-supervisor)

MSc. Student	Period	MSc. Thesis
Menno van Zutphen (PhD student)	10/2023 – Present	Formal control synthesis for stochastic systems employing information-theoretic tools.
Stijn Hanegraaf (MSc. student)	01/2025 – Present	Control-Barrier-Function-based Nonlinear Integrators for high-precision motion control

Stijn Römer (MSc. student)	01/2021 – 04/2022	An Artificial Neural Network Approach to Within-Game Predictions in Football using Spatiotemporal Data
Tim Sweering (MSc. student)	09/2020 – 09/2021	Applying Koopman Methods for Nonlinear Reachability Analysis
Indeevar Shyam Lanka (MSc. student)	05/2020 – 05/2021	Event-triggered control for automotive systems

Invited talks

- Invited talk at the 19th Panhellenic conference on Mathematical Analysis (to be given, Dec 2025, National Technical University of Athens).
- Invited talk at the 2025 OBI2 workshop on Dynamics, Optimization and Control, organized by the Bernoulli Institute and the International Federation for Information Processing (Jun. 2025, University of Groningen).
  - Talk: "*Feedback Optimization with State Constraints*"
- Invited talk at the 11th Symposium of the European Network for Nonsmooth Dynamics (Oct 2024, TU Eindhoven).
  - Talk: "*Continuous Approximations of Projected Dynamical Systems via Control Barrier Functions*"

Organization of international conferences

- Co-organizer of the 11th Symposium of the European Network for Nonsmooth Dynamics (ENNSD), 9-11 October, 2024.

Editorial Work

- Program Committee member for ACM Hybrid Systems Computation and Control 2025 (posters and demos).
- Associate Editor for the 23rd European Control Conference, 2025.

Prizes, Awards and Distinctions

- PhD thesis awarded the Cum Laude distinction, placing it among the top 5% in the Netherlands.
- D. Thomaidi Award for publishing a journal article during the undergraduate studies, NTUA, 2017.
- Nikolaos Kritikos Award for excellence in Mathematics, NTUA, 2011-2012.
- Eurobank's award for performance in the Greek Nationwide University Entrance Examination, 2011.

Certificates

- Dutch Institute of Systems and Control (DISC) certificate for graduate studies.
  - Grade: 9.5/10
- DELF B2 Diplôme d'études en langue Française, 2009.
- Michigan ECPE C2 certificate for proficiency in English, 2008.

Software

- Co-developer of ETCetera https://gitlab.tudelft.nl/sync-lab/ETCetera.
  - Python toolbox that computes finite models of ETC systems.

PUBLICATIONS

Below, the mark '*' signifies equal contribution. My publications can be viewed on my Google Scholar profile (note: Google scholar has some latency on updating the publication list. The list below is fully up to date). Overall: **7 journal articles, 7 conference papers, 1 preprint (submitted, under review)**.

Journal articles

[TMLR'25] D. Jarne Ornia*, **G. Delimpaltadakis***, J. Kober, and J. Alonso-Mora, "Predictable Reinforcement Learning Dynamics through Entropy Rate Minimization", *Transactions on Machine Learning Research,* 2025. https://openreview.net/forum?id=DDUsc1lD27

[TAC'24] **G. Delimpaltadakis**, J. Cortés, and W.P.M.H. Heemels, "Continuous Approximations of Projected Dynamical Systems via Control Barrier Functions", *IEEE Transactions on Automatic Control*, 2024. https://doi.org/10.1109/TAC.2024.3449151

[TAC'23] **G. Delimpaltadakis**, L. Laurenti and M. Mazo Jr. , "Formal Analysis of the Sampling Behaviour of Stochastic Event-Triggered Control", *IEEE Transactions on Automatic Control*, 2023. https://doi.org/10.1109/TAC.2023.3333748

[TAC'22] **G. Delimpaltadakis** and M. Mazo Jr., "Abstracting the Traffic of Nonlinear Event-Triggered Control Systems", *IEEE Transactions on Automatic Control*, 2022. https://doi.org/10.1109/TAC.2022.3195128

[TCNS'21] **G. Delimpaltadakis** and M. Mazo Jr., "Region-Based Self-Triggered Control for Perturbed and Uncertain Nonlinear Systems", *IEEE Transactions on Control of Network Systems*, 2021. https://doi.org/10.1109/TCNS.2021.3050121

[TAC'20] **G. Delimpaltadakis** and M. Mazo Jr., "Isochronous Partitions for Region-Based Self Triggered Control", *IEEE Transactions on Automatic Control*, 2020. https://doi.org/10.1109/TAC.2020.2994020

[RAL'18] **I. M. Delimpaltadakis**, C. P. Bechlioulis, and K. J. Kyriakopoulos, "Decentralized Platooning With Obstacle Avoidance for Car-Like Vehicles With Limited Sensing", *IEEE Robotics and Automation Letters*, 2018. https://doi.org/10.1109/LRA.2018.2793340

Conference papers

[CDC'25] **G. Delimpaltadakis***, P. Mestres*, J. Cortés, and W.P.M.H. Heemels, "Feedback Optimization with State Constraints through Control Barrier Functions", *accepted at the 64th IEEE Conference on Decision and Control (CDC),* 2025.
https://doi.org/10.48550/arXiv.2504.00813

[HSCC'25] A. Banse, **G. Delimpaltadakis**, L. Laurenti, M. Mazo Jr., and R. Jungers, "Memory-dependent abstractions of stochastic systems through the lens of transfer operators", to appear in the *Proceedings of the 28th ACM International Conference on Hybrid Systems: Computation and Control (HSCC),* 2025.
https://doi.org/10.48550/arXiv.2502.04240

[CDC'24] M. van Zutphen, **G. Delimpaltadakis,** W.P.M.H. Heemels, and Duarte Antunes, "Predictable Interval MDPs through Entropy Regularization", *Proceedings of the 63rd IEEE Conference on Decision and Control (CDC)*, 2024.
https://doi.org/10.48550/arXiv.2403.16711

[CDC'23] **G. Delimpaltadakis** and W.P.M.H. Heemels, "On the relationship between Control Barrier Functions and Projected Dynamical Systems", *Proceedings of the 62nd IEEE Conference on Decision and Control (CDC)*, 2023.
https://doi.org/10.1109/CDC49753.2023.10383260

[HSCC'23] **G. Delimpaltadakis**, M. Lahijanian, M. Mazo Jr., and L. Laurenti, "Interval Markov Decision Processes with Continuous Action-Spaces", *Proceedings of the 26th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, 2023.
https://doi.org/10.1145/3575870.3587117

[HSCC'22] **G. Delimpaltadakis***, G. de A. Gleizer*, I. van Straalen* and M. Mazo Jr., "ETCetera: Beyond Event-Triggered Control", *Proceedings of the 25th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, pp. 1-11, 2022.
https://doi.org/10.1145/3501710.3519523

[CDC'21] **G. Delimpaltadakis**, L. Laurenti, and M. Mazo Jr., "Abstracting the Sampling Behaviour of Stochastic Linear Periodic Event-Triggered Control Systems", *Proceedings of the 60th IEEE Conference on Decision and Control (CDC)*, pp. 1287-1294, 2021.
https://doi.org/10.1109/CDC45484.2021.9683751

[CDC'20] **G. Delimpaltadakis** and M. Mazo Jr., "Traffic Abstractions of Nonlinear Homogeneous Event-Triggered Control Systems", *Proceedings of the 59th IEEE Conference on Decision and Control (CDC)*, pp. 4991-4998, 2020.
https://doi.org/10.1109/CDC42340.2020.9303968

Preprints