

# Giannis (Ioannis) Delimpaltadakis

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**Personal website:** <https://gdelimpa.github.io>

## Research Interests

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- **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

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| 01/03/2018 – 28/06/2022 | <b>PhD in Control Theory</b> <ul style="list-style-type: none"><li>• <b>TU Delft</b> (Delft Center for Systems and Control), Netherlands</li><li>• <b>Cum Laude</b> (top 5% in the Netherlands).</li><li>• Supervisor: prof. Manuel Mazo Jr.</li><li>• Coursework grade: 9.5/10.</li></ul>   |
| 03/10/2011 – 08/11/2017 | <b>Diploma in Electrical and Computer Engineering</b> (5-year joint BSc. and MSc. degree) <ul style="list-style-type: none"><li>• <b>National Technical University of Athens (NTUA)</b>, Greece</li><li>• Grade: 8.26/10 (top 10%).</li><li>• Concentration: Control Systems, Robotics, Signals, Computer Systems, Electronics.</li><li>• Thesis: <i>"Decentralized Control with Obstacle Avoidance for Platoons of Car-Like Vehicles with Limited Sensing"</i>.<ul style="list-style-type: none"><li>○ Supervisor: prof. Kostas J. Kyriakopoulos.</li><li>○ Grade: 10/10.</li></ul></li></ul> |

## Professional Experience

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| 01/11/2022 – Present | <b>Postdoctoral Researcher</b> <ul style="list-style-type: none"><li>• <b>TU Eindhoven</b> (Control Systems Technology), Netherlands</li><li>• Supervisor: prof. Maurice Heemels.</li><li>• Research on safety-critical control, optimization and nonsmooth dynamics.<ul style="list-style-type: none"><li>○ Bridging nonsmooth dynamics and Control Barrier Functions, for safety-critical control and feedback-based optimization of dynamical systems.</li><li>○ Applications on high-precision motion control.</li></ul></li></ul> |
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- Research on formal methods for stochastic and hybrid systems, Markov decision processes (MDPs) and Reinforcement Learning (RL).
  - Developing efficient finite-state models of continuous stochastic processes, for verification/control with formal guarantees, under uncertainty.
  - Developing information-theoretic RL algorithms for improved agent predictability, with applications on robotics and autonomous driving in uncertain environments.
  - 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.
  - 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.
  - Worked with stochastic, hybrid, uncertain, nonlinear systems and formal methods for control.
  - Constructed finite-state models of ETC systems' communication, enabling scheduling in shared networks and assessing ETC's performance.
  - Applications on automotive systems.

## **Teaching**

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2018 - 2019, 2019 - 2020,  
2020 - 2021

Teaching Assistant, Control Theory course (1<sup>st</sup> 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**

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

<b>MSc. Student</b>	<b>Period</b>	<b>MSc. Thesis</b>
Menno van Zutphen (PhD student)	10/2023 – Present	Formal control synthesis for stochastic systems employing information-theoretic tools.

Stijn Hanegraaf (MSc. student)	01/2025 – 08/2025	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

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- Invited talk at the 19<sup>th</sup> 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

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

### Editorial Work

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

### Prizes, Awards and Distinctions

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- 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

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- 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

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

## PUBLICATIONS

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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, 8 conference papers, 2 preprints (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=DDUsc1ID27>
- [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", *Proceedings of the 28th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, 2025. <https://doi.org/10.1145/3716863.3718039>
- [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/10.1109/CDC56724.2024.10886853>
- [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

- [arXiv'25] **G. Delimpaltadakis** and G. Gleizer, "An Information Theory of Finite Abstractions and their Fundamental Scalability Limits", *arXiv preprint*, *arXiv:2512.03977*, 2025.  
<https://arxiv.org/abs/2512.03977>

[CDC'20] M. van Zutphen, D. Herceg, **G. Delimpaltadakis**, and D. Antunes, "Tempering the Bayes Filter towards Improved Model-Based Estimation", *arXiv preprint*, *arXiv:2512.02823*, 2025. <https://arxiv.org/abs/2512.02823>