# 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.
- **Applications:** mobile robotics, autonomous driving, high-precision motion control.

## Education

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| 01/03/2018 – 28/06/2022 | **PhD in Control Theory**<br>• **TU Delft** (Delft Center for Systems and Control), Netherlands<br>• **Cum Laude** (top 5% in the Netherlands).<br>• Supervisor: prof. Manuel Mazo Jr.<br>• Coursework grade: 9.5/10. |
| 03/10/2011 – 08/11/2017 | **Diploma in Electrical and Computer Engineering** (5-year joint BSc. and MSc. degree)<br>• **National Technical University of Athens** (NTUA), Greece<br>• Grade: 8.26/10 (top 10%).<br>• Concentration: Control Systems, Robotics, Signals, Computer Systems, Electronics.<br>• Thesis: *"Decentralized Control with Obstacle Avoidance for Platoons of Car-Like Vehicles with Limited Sensing"*.<br>    o Supervisor: prof. Kostas J. Kyriakopoulos.<br>    o Grade: 10/10. |

## Professional Experience

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|---|---|
| 01/02/2026 – Present | **Senior Research Scientist at AI4I Institute, Turin, Italy**<br>• Robust and Intelligent Autonomous Systems lab (director: prof. Luca Laurenti).<br>• Research on stochastic and hybrid systems, Markov decision processes (MDPs), formal methods, and information theory.<br>• Research on safety-critical control and optimization. |

| 01/11/2022 – 31/10/2025 | **Postdoctoral Researcher at TU Eindhoven, Netherlands** |
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- Supervisor: prof. Maurice Heemels.
- Research on safety-critical control, optimization and nonsmooth dynamics.
  - Bridged nonsmooth dynamics and Control Barrier Functions, for safety-critical control and feedback-based optimization of dynamical systems.
  - Applications on high-precision motion control.
- Research on formal methods for stochastic and hybrid systems, MDPs and Reinforcement Learning (RL).
  - Developed efficient finite-state models of continuous stochastic processes, for verification/control with formal guarantees, under uncertainty.
  - Developed information-theoretic RL algorithms for improved agent predictability, with applications on robotics and autonomous driving in uncertain environments.

| 01/06/2022 – 31/10/2022 | **Postdoctoral Researcher at TU Delft, 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 at TU Delft, Netherlands** |
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- 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

| 2018 - 2019, 2019 - 2020, 2020 - 2021 | Teaching Assistant, Control Theory course (1st Quarter MSc. Systems and Control program). |
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- 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 | Entropy regularization in formal verification, control and estimation of stochastic systems. |
| 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

- Invited talk at the 19th Panhellenic Conference on Mathematical Analysis (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 (posters and demos) for ACM Hybrid Systems Computation and Control (2025, 2026).
- Associate Editor for the European Control Conference (2025, 2026).

## Prizes, Awards and Distinctions

- Marie Skłodowska-Curie Actions Seal of Excellence (proposal score 94.4%; not funded), 2025.
- 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.

## Participation in funded research projects

| Research Project | Function | Time period |
| --- | --- | --- |
| ERC Starting Grant SENTIENT | PhD Candidate (research) | 01/03/2018 – 28/02/2022 |
| ERC Advanced Grant PROACTHIS | Postdoc researcher (research) | 01/11/2022 – 31/10/2025 |

# 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: **8 journal articles, 8 conference papers, 3 preprints (submitted, under review)**.

## Journal articles (8)

[OJCSYS'26]  M. van Zutphen, D. Herceg, **G. Delimpaltadakis**, D. Antunes, "Tempering the Bayes Filter towards Improved Model-Based Estimation", accepted at the IEEE Open Journal of Control Systems, 2026. https://arxiv.org/abs/2512.02823

[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 (8)**

[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 (3)**

[arxiv'26b] M. van Zutphen, **G. Delimpaltadakis**, and D. Antunes, "Formal Entropy-Regularized Control of Stochastic Systems", under review, arXiv preprint arXiv:2603.05021, 2026. https://doi.org/10.48550/arXiv.2603.05021

[arXiv'26a] **G. Delimpaltadakis\***, P. Mestres\*, J. Cortés, and W.P.M.H. Heemels, "Safe Feedback Optimization through Control Barrier Functions", *arXiv preprint, arXiv:2602.09928*, 2026. https://arxiv.org/abs/2602.09928

[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