Gianluca Bianchin

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Academic Positions

Sep 22 - Present **Assistant Professor (Chargé de Cours)**
Department of Mathematical Engineering (INMA), ICTEAM Institute
University of Louvain, Belgium

Apr 20 - Aug 22 **Postdoctoral Researcher**
Department of Electrical, Computer & Energy Engineering
University of Colorado Boulder, CO, USA
Advisor: Prof. Emiliano Dall'Anese

Research Interests

My research interests are centered around system theory, control, and optimization in complex, cyber-physical, and network systems, primarily with applications to transportation systems. Topics of current interest are:

- data-driven control
- use of optimization methods for feedback control
- control and optimization in electrified transportation and mobility on demand
- resiliency and security of cyber-physical systems

Education

Sep 15 - Mar 20 **Ph.D. in Mechanical Engineering**
University of California Riverside, CA, USA
Advisor: Prof. Fabio Pasqualetti

Oct 12 - Oct 14 **M.Sc. in Controls Engineering** (awarded summa cum laude)
University of Padova, Italy
Advisor: Prof. Angelo Cenedese

Oct 09 - Jul 12 **B.Sc. in Information Engineering**
University of Padova, Italy
Advisor: Prof. Luca Schenato

Research Experience

Jun 19 - Sep 19 **Research Intern**
Robert Bosch LLC, Sunnyvale, CA, USA
Topic: Development and implementation of dynamical models for PEM fuel cells
Supervisor: Dr. Maksim Subbotin

Jun 18 - Sep 18 **Graduate Intern**
Pacific Northwest National Laboratory, Richland, WA, USA
Topic: Study and characterization of resilience in traffic networks
Supervisor: Dr. Soumya Kundu

Jan 15 - Sep 15 **Visiting Scholar**
University of California Riverside, CA, USA
Group: Cyber-Physical Systems and Distributed Computing Laboratory
Supervisor: Prof. Fabio Pasqualetti

Honors & Awards

2023 **IEEE Transactions on Control of Network Systems Best Paper Award**
(awarding best paper published in the transactions)

2019 **Dissertation Year Program Award**, University of California Riverside, USA
(awarding most-promising dissertation in the department, single award department-wide)

2017 **UC Riverside Green Grant Award**, University of California Riverside, USA
(awarding a research proposal on energy sustainability, one of three campus-wide awards)

2015 **Dean's Distinguished Fellowship Award**, University of California Riverside, USA
(awarding top Ph.D. applicants in the College, one of five department-wide awards)

2014 M.Sc. Degree awarded 'Summa cum Laude' from the University of Padova

Funded Projects and Proposal Writing Activities

2024 Data-driven feedback optimization control of complex network systems in the data-limited environment
Funding Instrument: FRS-FNRS Aspirant ASP (in the role of advisor)
Status: **funded, approx. €200K**

2024 Sustainability in Data-Driven Control: A Resource-Centric Approach
Funding Agency: UCLouvain Special Research Funds (FSR)
Status: **funded, €800K**
PIs: Gianluca Bianchin, R. Jungers, J. Hendrickx, J.-C. Delvenne

2022 Control-Informed Learning of Physical Systems with Humans in the Loop
Funding Agency: UCLouvain Special Research Funds (FSR)
Status: **funded, €80K**
PI: Gianluca Bianchin

I contributed to the writing of the following proposals:

2020 Closed-loop Optimization and Control of Physical Networks Subject to Dynamic Costs, Constraints, and Disturbances
Funding Agency: National Science Foundation (NSF), division CMMI
Status: **funded, $300K**
PI: Emiliano Dall'Anese, co-PI: Jorge Cortés

2020 Control-Theoretic Design of Data-Driven Policies for Containing Transmission of Infectious Diseases
Funding Agency: University of Colorado, AB Nexus
Status: **funded, $50K**
PI: Emiliano Dall'Anese, co-PIs: Andrea G. Buchwald, Jorge I. Poveda

2019 Leveraging Connected Automated Vehicles to Guide Humans in Traffic Congestion
Funding Agency: United States Department of Energy (DOE)
Status: not funded
PI: Fabio Pasqualetti, co-PIs: Guoyuan Wu, Soumya Kundu

Teaching Activities

At the University of Louvain, I am the instructor for the following courses:

2022 - Present LINMA 1510 – Linear control (Bachelor and Master)
2024 - Present LINMA 1731 – Stochastic processes: Estimation and Prediction (Bachelor)
2024 - Present LINMA 2725 – Stochastic optimal control and Reinforcement Learning (Master)
2022 - Present LINMA 2875 – System identification (Master)

As a postdoc at the University of Colorado Boulder, I served as a lecturer for the following course:

2020 ECEN 5008 – Coordinated Control of Multi-Agent Systems (graduate)

As a graduate student at UC Riverside, I was a Teaching Assistant for the following courses:

2019	ME 223 – Secure and Reliable Control Systems (graduate)
2018	ME 133 – Mechatronics (undergraduate)
2017 & 2019	ME 223 – Secure and Reliable Control Systems (graduate)

As a graduate student at UC Riverside, I was the main instructor for the following workshop courses:

2018	Data Processing in Matlab (graduate)
2017	Course: Introduction to LaTeX(graduate)

Advising and Student Mentoring Experience

2021-2022	Liliaokeawawa Cothren (graduate student), University of Colorado Boulder, USA Project: Perception-based gradient flow for feedback control
2021	Molly Alvine (undergraduate student), University of Colorado Boulder, USA Project: Control of mobility on demand systems with EVs
2021	Killian Wood (graduate student), University of Colorado Boulder, USA Project: Stochastic optimization with decision-dependent distributions
2020	Felipe Galarza-Jimenez (graduate student), University of Colorado Boulder, USA Project: Hybrid methods in online optimization
2017	Yin-Cen Liu (graduate student), University of California Riverside, USA Project: RSSI-Aided Trajectory Planning Against GPS Spoofing
2016	Tommaso Menara (graduate student), University of California Riverside, USA Project: Strong Structural Controllability of networks

Membership of Scientific Societies

2015 - Present	IEEE Control Systems Society (IEEE CSS)
	Institute for Electrical and Electronics Engineers (IEEE)
	International Federation of Automatic Control (IFAC)
	Society for Industrial and Applied Mathematics (SIAM)

Reviewing Activities

2015 - Present	**Journal papers reviewer** • IEEE Transactions on Automatic Control • Automatica • IEEE Transactions on Control of Network Systems • IEEE Control Systems Letters • IEEE Transactions on Control Systems Technology • Systems & Control Letters • SIAM Journal on Control and Optimization • IEEE Transactions on Intelligent Transportation Systems • Journal of Urban Technology • IEEE Robotics and Automation Letters • Journal of Selected Topics in Signal Processing • IEEE Transactions on Smart Grid
2015 - Present	**Conference papers reviewer** • IEEE Conference on Decision and Control • American Control Conference • European Control Conference • IFAC World Congress • IFAC Workshop on Distrib. Estimation and Control in Netw. Systems • Conference on Automation Science and Engineering

Institutional Responsibilities

2022	**Co-organizer of internal seminar series on Mathematical Engineering** Department of Mathematical Engineering, University of Louvain
2017 - 2018	**Vice President of Graduate Student Association** Department of Mechanical Engineering, University of California Riverside

Organisation of Scientific Meetings

2024	**Co-organizer of workshop for the UCLouvain Graduate School on Systems and Control** Title: *"Structure Learning in Critical Infrastructure Networks"* About 15 participants
2023	**Co-organizer of workshop at the American Control Conference** Title: *"Online Optimization Methods for Data-driven Feedback Control"* About 25 participants
2018	**Co-organizer of mechanical engineering symposium at UC Riverside** Title: *"Annual MEGSA Symposium"* About 40 participants

Invited Talks, Seminars, and Presentations

Jul 2024	2023 American Control Conference, Toronto, ON, Canada Title: *"Cycle Families and Resilience of Dynamical Networks"*
Dec 2023	2023 IEEE Conference on Decision and Control, Singapore Title: *"Data-Driven Exact Pole Placement for Linear Systems"*
Nov 2023	Department seminar at Leibniz Universität Hannover, Hanover, Germany Title: *"Time-varying Optimization of Dynamical Systems for Smart Societies"*
May 2023	Online Optimization for Data-Driven Control Workshop at the 2023 American Control Conference, San Diego, CA, USA Title: *"Online Feedback Optimization with Applications to Traffic Control"*
Jan 2023	KTH Royal Institute of Technology, Stockholm, Sweden Title: *"Data-driven Online Optimization of Physical Systems"*
Jun 2022	2022 American Control Conference, Atlanta, GA, USA Title: *"Online Stochastic Optimization with Decision-Dependent Distributions"*
Mar 2022	University of Michigan, Ann Arbor, MI, USA Title: *"Learning to Optimize Network Systems with Applications to Traffic Control"*
Feb 2022	Washington State University, Pullman, WA, USA Title: *"Data-driven online optimization for network control"*
Jan 2022	University of Louvain, Louvain-la-Neuve, Belgium Title: *"Learning to Optimize Network Systems via Online Optimization and Control"*
Dec 2021	2021 IEEE Conference on Decision and Control, Austin, TX, USA Title: *"Data-Driven Synthesis of Optimization-Based Controllers for Regulation of Unknown Systems"*
Sep 2021	2021 Automatica.it Workshop, Catania, Italy Title: *"Time-Varying Optimization of LTI Systems via Projected Primal-Dual Flows"*
Apr 2021	Meeting of the Colorado COVID-19 modeling group, Boulder, CO, USA Title: *"When can we safely return to normal? A novel method for identifying safe levels of NPIs in the context of COVID-19 vaccinations"*
Apr 2021	GIPSA-lab, Grenoble, France Title: *"Analysis and Design of Robust Traffic Networks: from Static to Dynamic Schemes"*
Dec 2020	2020 IEEE Conference on Decision and Control, Jeju Island, Republic of Korea Title: *"Routing Apps May Cause Oscillatory Congestion in Traffic Networks"*
May 2020	National Renewable Energy Laboratory (NREL), Golden, CO, USA Title: *"Stability and Robustness of Traffic Networks with App-Informed Vehicle Routing"*
Dec 2019	2019 IEEE Conference on Decision and Control, Nice, France Title: *"Secure Navigation of Robots in Adversarial Environments"*
Sep 2019	GE Global Research, Niskayuna, NY, USA Title: *"Towards Dependable CPS: Network-Wide Optimization and Secure Control"*
Sep 2019	Robert Bosch LLC, Sunnyvale, CA, USA Title: *"PEM Fuel Cell Modeling and State Observers: A Control-Systems Perspective"*

Jul 2019	2019 American Control Conference, Philadelphia, PA, USA Title: *"Resilience of Traffic Networks With Partially Controlled Routing"*
Dec 2018	2018 IEEE Conference on Decision and Control, Miami Beach, FL, USA Title: *"A Network Optimization Framework for the Control of Traffic Dynamics"*
Sep 2018	Pacific Northwest National Laboratory (PNNL), Richland, WA, USA Title: *"The Role of Partially Controlling Routing in Traffic Networks"*
May 2018	35$^{\text{th}}$ Southern California Control Workshop, Riverside, CA, USA Title: *"A Network Optimization Approach for the Optimization of Intersection Signaling"*
Jul 2016	2016 American Control Conference, Boston, MA, USA Title: *"The Observability Radius of Networks"*
May 2015	28$^{\text{th}}$ Southern California Control Workshop, Los Angeles, CA, USA Title: *"The Role of the Diameter in the Controllability of Complex Networks"*

Publications

Articles under review

[R1] **G. Bianchin** and B. V. Scoy, "The internal model principle of time-varying optimization," *IEEE Transactions on Automatic Control*, Aug. 2024, (Under review) arXiv:2407.08037 [link]

[R2] A. Mehrnoosh and **G. Bianchin**, "Distributed optimization of linear multi-agent systems via feedback-dgd," *arXiv preprint*, Jul. 2025, arXiv:2403.18386 (submitted) [link]

[R3] **G. Bianchin** and B. V. Scoy, "The discrete-time internal model principle of time-varying optimization: Limitations and algorithm design," in *American Control Conference*, Jul. 2025, (Submitted) [link]

[R4] R. Anguluri and **G. Bianchin**, "Data-driven control of second-order models," *IEEE Control Systems Letters*, Jun. 2023, (submitted)

[R5] **G. Bianchin** and E. Dall'Anese, "Event-triggered feedback optimization of LTI systems with applications to pandemic control," *IEEE Control Systems Letters*, Aug. 2022, (submitted), [link]

Journal papers

[J1] **G. Bianchin**, M. Vaquero, J. Cortés, and E. Dall'Anese, "k-dimensional agreement in multiagent systems for distributed coordination," *IEEE Transactions on Automatic Control*, Jan. 2025, (early access) [link]

[J2] **G. Bianchin** and F. Pasqualetti, "Navigation systems may deteriorate stability in traffic networks," *IEEE Open Journal of Control Systems*, vol. 3, pp. 239–252, 2024, (Early access) [link]

[J3] **G. Bianchin**, M. Vaquero, J. Cortés, and E. Dall'Anese, "Online stochastic optimization for unknown linear systems: Data-driven synthesis and controller analysis," *IEEE Transactions on Automatic Control*, vol. 69, no. 7, pp. 4411–4426, Jul. 2024, early Access

[J4] E. Perotti, A. M. Ospina, **G. Bianchin**, A. Simonetto, and E. Dall'Anese, "Renewable-based charging in green ride-sharing," *Scientific Reports*, vol. 15425, no. 13, Sep. 2023, arXiv:2305.02419, [link]

[J5] F. Avram, R. Adenane, L. Basnarkov, **G. Bianchin**, D. Goreac, and A. Halanay, "An age of infection kernel, an R formula, and further results for arino–brauer A, B matrix epidemic models with varying populations, waning immunity, and disease and vaccination fatalities," *Mathematics*, vol. 11, no. 6, Dec. 2021, [link]

[J6] L. Cothren, **G. Bianchin**, and E. Dall'Anese, "Online optimization of dynamical systems with deep learning perception," *IEEE Open Journal of Control Systems*, vol. 1, pp. 306–321, Oct. 2022, arXiv:2205.09574, [link]

[J7] **G. Bianchin**, E. Dall'Anese, J. I. Poveda, D. Jacobson, E. J. Carlton, and A. Buchwald, "Novel use of online optimization in a mathematical model of COVID-19 to guide the relaxation of pandemic mitigation measures," *Scientific Reports*, vol. 4731, no. 12, Jun. 2022, [link]

[J8] F. Avram, R. Adenane, **G. Bianchin**, and A. Halanay, "Stability analysis of an eight parameter SIR-type model including loss of immunity, and disease and vaccination fatalities," *Mathematics*, vol. 10, no. 3, p. 402, 2022, [link]

[J9] **G. Bianchin**, J. I. Poveda, and E. Dall'Anese, "Online optimization of switched LTI systems using continuous-time and hybrid accelerated gradient flows," *Automatica*, vol. 146, p. 110579, 2022, [link]

[J10] K. Wood, **G. Bianchin**, and E. Dall'Anese, "Online projected gradient descent for stochastic optimization with decision-dependent distributions," *IEEE Control Systems Letters*, vol. 6, pp. 1646–1651, 2022, [link]

[J11] **G. Bianchin**, J. Cortés, J. I. Poveda, and E. Dall'Anese, "Time-varying optimization of LTI systems via projected primal-dual gradient flows," *IEEE Transactions on Control of Network Systems*, vol. 9, no. 1, pp. 474–486, Mar. 2022, [link] **Award: IEEE Transactions on Control of Network Systems Best Paper Award**

[J12] F. Galarza-Jimenez, **G. Bianchin**, J. I. Poveda, and E. Dall'Anese, "Online optimization of LTI systems under persistent attacks: Stability, tracking, and robustness," *Nonlinear Analysis: Hybrid Systems*, vol. 44, p. 101152, May 2022, [link]

[J13] F. Galarza-Jimenez, J. Poveda, **G. Bianchin**, and E. Dall'Anese, "Extremum seeking under persistent gradient deception: A switching systems approach," *IEEE Control Systems Letters*, vol. 6, no. 1, pp. 133–138, 2021, [link]

[J14] Y.-C. Liu, **G. Bianchin**, and F. Pasqualetti, "Secure trajectory planning against undetectable spoofing attacks," *Automatica*, vol. 112, p. 108655, 2020, [link] **Award: February 2020 Automatica Editor's choice**

[J15] **G. Bianchin**, Y.-C. Liu, and F. Pasqualetti, "Secure navigation of robots in adversarial environments," *IEEE Control Systems Letters*, vol. 4, no. 1, pp. 1–6, 2020, [link]

[J16] **G. Bianchin** and F. Pasqualetti, "Gramian-based optimization for the analysis and control of traffic networks," *IEEE Transactions on Intelligent Transportation Systems*, vol. 21, no. 7, pp. 3013–3024, 2020, [link]

[J17] **G. Bianchin**, P. Frasca, A. Gasparri, and F. Pasqualetti, "The observability radius of networks," *IEEE Transactions on Automatic Control*, vol. 62, no. 6, pp. 3006–3013, 2017, [link]

Peer-reviewed conference proceedings

[C1] **G. Bianchin** and J.-C. Delvenne, "Cycle families and resilience of dynamical networks," in *American Control Conference*, Jul. 2024, (To appear) [link]

[C2] **G. Bianchin**, "Data-driven exact pole placement for linear systems," in *IEEE Conf. on Decision and Control*, Singapore, Dec. 2023, pp. 685–690, arXiv:2303.11469, [link]

[C3] L. Cothren, **G. Bianchin**, and E. Dall'Anese, "Data-enabled gradient flow as feedback controller: Regulation of linear dynamical systems to minimizers of unknown functions," in *Learning for Dynamics & Control*, Stanford, CA, Jun. 2022, pp. 234–247, [link]

[C4] **G. Bianchin**, M. Vaquero, J. Cortés, and E. Dall'Anese, "Data-driven synthesis of optimization-based controllers for regulation of unknown linear systems," in *IEEE Conf. on Decision and Control*, Austin, TX, Dec. 2021, pp. 5783–5788, [link]

[C5] **G. Bianchin** and F. Pasqualetti, "Routing apps may cause oscillatory congestions in traffic networks," in *IEEE Conf. on Decision and Control*, Jeju Island, Republic of Korea, Dec. 2020, pp. 253–260, [link]

[C6] **G. Bianchin**, F. Pasqualetti, and S. Kundu, "Resilience of traffic networks with partially controlled routing," in *American Control Conference*, Philadelphia, PA, USA, Jul. 2019, pp. 2670–2675, [link]

[C7] **G. Bianchin** and F. Pasqualetti, "A network optimization framework for the analysis and control of traffic dynamics and intersection signaling," in *IEEE Conf. on Decision and Control*, Miami, FL, USA, Dec. 2018, pp. 1017–1022, [link]

[C8] T. Menara, **G. Bianchin**, M. Innocenti, and F. Pasqualetti, "On the number of strongly structurally controllable networks," in *American Control Conference*, Seattle, WA, USA, May 2017, pp. 340–345, [link]

[C9] **G. Bianchin**, P. Frasca, A. Gasparri, and F. Pasqualetti, "The observability radius of network systems," in *American Control Conference*, Boston, MA, USA, Jul. 2016, pp. 185–190, [link]

[C10] **G. Bianchin**, F. Pasqualetti, and S. Zampieri, "The role of diameter in the controllability of complex networks," in *IEEE Conf. on Decision and Control*, Osaka, Japan, Dec. 2015, pp. 980–985, [link]

[C11] **G. Bianchin**, A. Cenedese, M. Luvisotto, and G. Michieletto, "Distributed fault detection in sensor networks via clustering and consensus," in *IEEE Conf. on Decision and Control*, Osaka, Japan, Dec. 2015, pp. 3828–3833, [link]

Book Chapters and Code Releases

[M1] **G. Bianchin**, "Online primal-dual controller for the control of epidemic outbreaks," https://github.com/gianlucaBi/safe_levels_NPIs, 2021, [Online; accessed 20-Sep-2021]

[M2] **G. Bianchin**, "Online primal-dual controller for ramp metering in transportation systems," https://github.com/gianlucaBi/onlinePrimalDual_rampMetering, 2020, [Online; accessed 20-Sep-2021]

[M3] **G. Bianchin** and F. Pasqualetti, "Time-delay attacks in network systems," in *Cyber-Physical Systems Security*. Springer International Publishing, 2018, pp. 157–174, [link]

[M4] **G. Bianchin** and F. Pasqualetti, "SUMO toolbox for Gramian-based optimization," https://github.com/gianlucaBi/Gramian-Based-Traffic-Optimization, 2018, [Online; accessed 23-Oct-2020]

Theses

[T1] **G. Bianchin**, "Control-theoretic methods for the robustness of network systems: Application to traffic control and cyber-physical security," Ph.D. dissertation, University of California Riverside, 2020

[T2] **G. Bianchin**, "Coordinated control of mixed robot and sensor networks in distributed area exploration," Master's thesis, University of Padova, 2014