Gianluca Bianchin

Postdoctoral Scholar
Dept. of Electrical, Computer, and Energy Engineering
University of Colorado Boulder

gianluca.bianchin@colorado.edu

https://gianlucabi.github.io
Google Scholar profile

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Current Position

Apr 20 - Present **Postdoctoral Scholar**, University of Colorado, Boulder
Working on online optimization with applications to traffic control
Mentor: Prof. Emiliano Dall'Anese

Education

Sep 15 - Mar 20 **Ph.D. in Mechanical Engineering**, University of California, Riverside
Dissertation: Control-Theoretic Methods for the Robustness of Network Systems: Application to Traffic Control and Cyber-Physical Security
Advisor: Prof. Fabio Pasqualetti

Oct 12 - Oct 14 **M.Sc. in Controls Engineering (Summa Cum Laude)**, University of Padova, Italy
Thesis: Coordinated Control of Mixed Robot and Sensor Networks for Distributed Area Exploration
Advisor: Prof. Angelo Cenedese

Oct 09 - Jul 12 **B.Sc. in Information Engineering**, University of Padova, Italy
Thesis: Modeling and Optimization of Hybrid Vehicles Powertrains
Advisor: Prof. Luca Schenato

Research Interests

My main research interests are in the modeling, analysis, and control of large-scale interconnected systems, with a focus on transportation networks. I work primarily on problems related to network design, vehicle routing, and distributed optimization and control. A second research direction is in security, robustness, and reliability of cyber-physical systems, with an emphasis on attack modeling and countermeasure design.

Research Experience

Sep 15 - Mar 20 **Graduate Student Researcher**, University of California, Riverside
at Cyber-Physical Systems and Distributed Computing Laboratory
Advised by Prof. Fabio Pasqualetti

Jun 19 - Sep 19 **Research Intern**, Robert Bosch LLC, Sunnyvale, CA
Working on the development and implementation of dynamical models for PEM fuel cells
Advised by Dr. Maksim Subbotin

Jun 18 - Sep 18 **Graduate Student Intern**, Pacific Northwest National Laboratory, Richland, WA
at Optimization and Control Group
Funding: Control of Complex Systems Initiative (CCSI)
Advised by Dr. Soumya Kundu

Jan 15 - Sep 15 **Visiting Scholar**, University of California, Riverside
at Department of Mechanical Engineering

Jan 14 - Oct 14 **Graduate Student Researcher**, University of Padova, Italy
at NAVLAB - Laboratory for Autonomous Navigation
Advised by Prof. Angelo Cenedese

Honors & Awards

2019 **Dissertation Year Program Award**, University of California, Riverside
(for outstanding research accomplishments in the area of mechanical engineering)

2017 **UC Riverside Green Grant** (G^3), University of California, Riverside
(one of three campus-wide awards)

2015 **Dean's Distinguished Fellowship Award**, University of California, Riverside

2014 M.Sc. degree awarded with honor from the University of Padova

Publications

Journal Articles

[J1] G. Bianchin and F. Pasqualetti, "Routing apps may deteriorate stability in traffic networks: Oscillating congestions and robust information design," *arXiv:2003.10018*, 2020

[J2] Y.-C. Liu, G. Bianchin, and F. Pasqualetti, "Secure trajectory planning against undetectable spoofing attacks," *Automatica*, vol. 112, p. 108655, 2020

[J3] 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

[J4] G. Bianchin and F. Pasqualetti, "Gramian-based optimization for the analysis and control of traffic networks," *IEEE Transactions on Intelligent Transportation Systems*, pp. 1–12, 2019

[J5] 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

Peer-reviewed Conference Articles

[C1] 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. submitted

[C2] G. Bianchin, F. Pasqualetti, and S. Kundu, "Resilience of traffic networks with partially controlled routing," in *American Control Conference*, (Philadelphia, PA, USA), pp. 2670–2675, July 2019

[C3] 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), pp. 1017–1022, Dec. 2018

[C4] T. Menara, G. Bianchin, M. Innocenti, and F. Pasqualetti, "On the number of strongly structurally controllable networks," in *American Control Conference*, (Seattle, WA, USA), pp. 340–345, May 2017

[C5] G. Bianchin, P. Frasca, A. Gasparri, and F. Pasqualetti, "The observability radius of network systems," in *American Control Conference*, (Boston, MA, USA), pp. 185–190, July 2016

[C6] 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), pp. 980–985, Dec. 2015

[C7] 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), pp. 3828–3833, Dec. 2015

Miscellaneous

[M1] G. Bianchin and F. Pasqualetti, "Time-delay attacks in network systems," in *Cyber-Physical Systems Security*, pp. 157–174, Springer International Publishing, 2018

[M2] G. Bianchin and F. Pasqualetti, "SUMO toolbox for Gramian-based optimization." `https://github.com/gianlucaBianchin/Gramian-Based-Traffic-Optimization`, 2018. [Online; accessed 20-February-2020]

Theses

[T1] G. Bianchin, *Control-Theoretic Methods for the Robustness of Network Systems: Application to Traffic Control and Cyber-Physical Security.* PhD thesis, University of California Riverside, Riverside, CA, 2020

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

Teaching Experience

2017 - 2018	**Lecturer and Consultant**, GradQuant Center, University of California, Riverside Courses: Data Processing in Matlab, Introduction to LaTeX
	Teaching Assistant, University of California, Riverside
Spring 17, 19	ME 223 - Secure and Reliable Control Systems (graduate class)
Winter 18	ME 133 - Mechatronics (undergraduate class)

Advising Experience

2017 - 2018	Yin-Cen Liu, University of California, Riverside Master's Thesis: RSSI-aided Trajectory Planning Against GNSS Spoofing Current Placement: Software Engineer, Toyota InfoTechnology Center
2016	Tommaso Menara, University of California, Riverside Master's Thesis: A Novel Characterization of Strong Structural Controllability: Sparsity Conditions and Control Paths Current Placement: Ph.D. Student, UC Riverside

Talks, Seminars, and Presentations

Dec 2019	2019 IEEE Conference on Decision and Control, Nice, France Talk: "Secure Navigation of Robots in Adversarial Environments"
Sep 2019	GE Global Research, Niskayuna, NY, USA Talk: "Towards Dependable Cyber-Physical Systems: Network-Wide Optimization and Secure Control"
Sep 2019	Battery Systems Group, Robert Bosch LLC, Sunnyvale, CA, USA Talk: "PEM Fuel Cell Modeling and State Observers: A Control-Systems Perspective"
Jul 2019	2019 IEEE American Control Conference, Philadelphia, PA, USA Talk: "Resilience of Traffic Networks With Partially Controlled Routing"
Dec 2018	2018 IEEE Conference on Decision and Control, Miami Beach, FL, USA Talk: "A Network Optimization Framework for the Control of Traffic Dynamics and Intersection Signaling"
Oct 2018	2018 Autonomous Systems Workshop, University of California, Riverside Poster: "Secure Trajectory Planning Against Spoofing Attacks"
Sep 2018	Optimization and Control Group, Pacific Northwest National Laboratory
May 2018	35th Southern California Control Workshop, University of California, Riverside Talk: "A Network Optimization Approach for the Optimization of Intersection Signaling"
Jul 2016	2016 IEEE American Control Conference, Boston, MA, USA Talk: "The Observability Radius of Networks"
May 2016	7th MEGSA Graduate Symposium, University of California, Riverside, USA Poster: "On Control and Security of Complex Networks"
May 2015	28th Southern California Control Workshop, University of California, Los Angeles Talk: "The Role of the Diameter in the Controllability of Complex Networks"

Professional Affiliations

2015 - Present	Institute for Electrical and Electronics Engineers (IEEE), student member
2015 - Present	IEEE Control Systems Society (IEEE CSS)
2015 - Present	Society for Industrial and Applied Mathematics (SIAM)

Professional Service

Technical reviewer

Journals	IEEE Transactions on Automatic Control
	Automatica
	IEEE Transactions on Control of Network Systems
	IEEE Control Systems Letters
	IEEE Transactions on Control Systems Technology
	IEEE Control Systems Letters
	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
Conferences	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

Volunteering Activities

2018	Co-organizer of the Mechanical Engineering Graduate Symposium
2017 - 2018	Vice President of the Mechanical Eng. Graduate Student Association, UC Riverside
2016	Volunteer, IEEE Conf. on Decision and Control, Las Vegas, NV, USA

Workshops and Summer Schools Participation

Jan 2020	37^{th} Southern California Control Workshop, UC San Diego
May 2019	36^{th} Southern California Control Workshop, University of Southern California
May 2018	35^{th} Southern California Control Workshop, UC Riverside
Oct 2017	33^{rd} Southern California Control Workshop, UC Santa Barbara
Oct 2016	31^{st} Southern California Control Workshop, UC Irvine
Jul 2015	Games and Contracts for Cyber-Physical Security, IPAM, UC Los Angeles
Jun 2015	Trustworthy Cyber Infrastructure for the Power Grid, UIUC