Yuriy Zacchia Lun, Ph.D.

Curriculum Vitae et Studiorum

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Education

2017 **Ph.D. Comput. sci., Gran Sasso Science Institute (GSSI) / IMT Lucca (joint program)**.
Diss. title: *Stability and optimal control of polytopic time-inhomogeneous Markov jump linear systems.*
Advisors: Prof. Maria Domenica Di Benedetto and Prof. Alessandro D'Innocenzo.

2012 **M.Sc. Telecom. Eng., University of L'Aquila**. Final score: 110/110.
Diss. title: *Algorithm for refinement of telecommunication network infrastructure localization*.

2008 **B.Sc. Telecom. Eng., University of L'Aquila**. Final score: 110/110.

Employment History

Since 2022 **Assistant professor (non-tenure track: RTDa)**, Department of Information Engineering, Computer Science and Mathematics (DISIM), University of L'Aquila.

2018–2022 **Research collaborator**, SysMA research unit, IMT School for Advanced Studies Lucca.
Projects: Industrial cybersecurity—SINCERA; Cyber range scenario design and management; Methodologies and tools for data network security.

2017–2018 **Research collaborator**, University of L'Aquila and Center of Excellence DEWS.
Project: Formal verification for security in cyber-physical systems.

2013 Industrial R&D **Assistant Researcher**, WEST Aquila S.r.l.

2012–2013 ICT Training **Analyst**, CONSEL—ELIS Consortium.
Activities: Design of the vocational master on "Development of applications and services in the cloud" and teaching of the "Administration of salesforce.com" course.

Visiting Positions

2017/02–2017/07 **Visiting Ph.D. student** within ERASMUS+ for Traineeship programme, OXCAV group, Department of Computer Science, University of Oxford.

Awards

2019 **Best work in progress paper award**, 15th **IEEE** International Workshop on Factory Communication Systems (**WFCS**).

Skills

Languages Strong reading, writing and speaking competencies for English, Italian, and Russian.

Coding Strong proficiency with MATLAB and LaTeX.

Professional Associations

IEEE **Member** since 2016.

ACM **Member** since 2024.

Teaching at the University of L'Aquila (UnivAQ)

Since 2023
- ICT Security—F4Z, I4W, and I3N—6 ECTS credits. Principal lecturer: Dr. Walter Tiberti. Activities: 32 hours of lessons (4 ECTS credits).

Since 2022
- *Complementi di analisi dei segnali e campi elettromagnetici* (Complements of signal analysis and electromagnetic fields, conducted in Italian)—I3D—3 ECTS credits. Activities: 15 hours of lessons and exercises (3 ECTS credits).
- Industrial communications—I4S—9 ECTS credits. Principal lecturer: Prof. Piergiuseppe Di Marco. Activities: 30 hours of lessons (3 ECTS credits).

2023–2024
- *Metodologie e strumenti per l'insegnamento di tecnologie e sistemi di telecomunicazioni* (Methodologies and tools for teaching telecommunications technology and systems, conducted in Italian)—University pathways for initial training of secondary school teachers: the A-40 Class—Electrical and electronic science and technology—1 ECTS credit. Activities: 6 hours of lessons (1 ECTS credit).
- *Laboratorio di didattica di segnali, trasmissioni e reti* (Signals, transmission, and networks teaching laboratory, conducted in Italian)—University pathways for initial training of secondary school teachers: the A-40 Class—Electrical and electronic science and technology—1 ECTS credit. Activities: 12 hours of laboratory experiences (1 ECTS credit).

2021–2022
- *Analisi dei segnali e campi elettromagnetici* (Signals analysis and electromagnetic fields, conducted in Italian)—I3D—9 ECTS credits. Principal lecturer: Prof. Fortunato Santucci. Activities: 20 hours of lessons (2 ECTS credits) within the Signals analysis course unit.

Research Interests

- Automatic control of wireless networked control systems; communication, computation, and control co-design; stochastic hybrid systems, formal methods, and security in cyber-physical domains.

Research Publications

Journal Articles

8 **Zacchia Lun**, Y., Santucci, F., & D'Innocenzo, A. (2025). Wireless control with channel state detection and message dropout compensation. *IEEE Control Systems Letters*, *9*, 1399–1404. doi:10.1109/LCSYS.2025.3580048

7 **Zacchia Lun**, Y., Smarra, F., & D'Innocenzo, A. (2025). Optimal control over Markovian wireless communication channels under generalized packet dropout compensation. *Automatica*, *176*, 112240. doi:10.1016/j.automatica.2025.112240

6 **Zacchia Lun**, Y., Santucci, F., & D'Innocenzo, A. (2024). Robust linear quadratic regulation over polytopic time-inhomogeneous Markovian channels under generalized packet dropout compensation. *IEEE Control Systems Letters*, *8*, 3315–3320. doi:10.1109/LCSYS.2024.3521656

5 **Zacchia Lun**, Y., Rinaldi, C., D'Innocenzo, A., & Santucci, F. (2024). Co-designing wireless networked control systems on IEEE 802.15.4-based links under Wi-Fi interference. *IEEE Access*, *12*, 71157–71183. doi:10.1109/ACCESS.2024.3402082

4 Impicciatore, A., **Zacchia Lun**, Y., Pepe, P., & D'Innocenzo, A. (2024). Optimal output-feedback control over Markov wireless communication channels. *IEEE Transactions on Automatic Control*, *69*(3), 1643–1658. doi:10.1109/TAC.2023.3328268

3 Soderi, S., Masti, D., & **Zacchia Lun**, Y. (2023). Railway cyber-security in the era of interconnected systems: A survey. *IEEE Transactions on Intelligent Transportation Systems*, *24*(7), 6764–6779. doi:10.1109/TITS.2023.3254442

2. **Zacchia Lun**, Y., D'Innocenzo, A., & Di Benedetto, M. D. (2019). Robust stability of polytopic time-inhomogeneous Markov jump linear systems. *Automatica, 105*, 286–297. doi:10.1016/j.automatica.2019.03.031

1. **Zacchia Lun**, Y., D'Innocenzo, A., Smarra, F., Malavolta, I., & Di Benedetto, M. D. (2019). State of the art of cyber-physical systems security: An automatic control perspective. *Journal of Systems and Software, 149*, 174–216. doi:10.1016/j.jss.2018.12.006

Conference Proceedings

18. D'Innocenzo, A., Rehman, K. U., & **Zacchia Lun**, Y. (2025, December). Data driven finite abstractions by simulation relations with probabilistic guarantees using regression trees. In *Proceedings of the 64th IEEE Conference on Decision and Control (CDC)*. Accepted. IEEE.

17. Fasciani, A., **Zacchia Lun**, Y., Smarra, F., & D'Innocenzo, A. (2025, August). Model predictive control for speed regulation of autonomous vehicles at road intersections and performance evaluation in a V2X communication scenario. In *Proceedings of the 21st IEEE International Conference on Automation Science and Engineering (CASE)*. Accepted. IEEE.

16. Khan, M. A., **Zacchia Lun**, Y., Di Marco, P., Mahmood, A., Santucci, F., & Gidlund, M. (2025, June). Analysis of communication and control performance of multi-hop IEEE 802.15.4-based WNCSs under Wi-Fi interference. In *Proceedings of the 21st IEEE International Conference on Factory Communication Systems (WFCS)* (pp. 1–8). IEEE. doi:10.1109/WFCS63373.2025.11077614

15. **Zacchia Lun**, Y., Rinaldi, C., Santucci, F., & D'Innocenzo, A. (2023, July). Wireless networked control over lossy uplinks abstracted by finite-state Markov channels. In *Proceedings of the 22nd IFAC World Congress: IFAC-PapersOnLine (56) 2* (pp. 3041–3047). Elsevier. doi:10.1016/j.ifacol.2023.10.1432

14. Impicciatore, A., Tsiamis, A., **Zacchia Lun**, Y., D'Innocenzo, A., & Pappas, G. J. (2022, December). Secure state estimation over Markov wireless communication channels. In *Proceedings of the 61st IEEE Conference on Decision and Control (CDC)* (pp. 2935–2940). IEEE. doi:10.1109/CDC51059.2022.9992668

13. Florenzan Reyes, L. F., Smarra, F., **Zacchia Lun**, Y., & D'Innocenzo, A. (2021, June). Learning Markov models of fading channels in wireless control networks: a regression trees based approach. In *Proceedings of the 29th Mediterranean Conference on Control and Automation (MED)* (pp. 232–237). IEEE. doi:10.1109/MED51440.2021.9480310

12. Impicciatore, A., **Zacchia Lun**, Y., Pepe, P., & D'Innocenzo, A. (2021, May). Optimal output-feedback control and separation principle for Markov jump linear systems modeling wireless networked control scenarios. In *Proceedings of the 2021 American Control Conference (ACC)* (pp. 2700–2706). IEEE. doi:10.23919/ACC50511.2021.9482674

11. **Zacchia Lun**, Y., Rinaldi, C., Alrish, A., D'Innocenzo, A., & Santucci, F. (2020, July). On the impact of accurate radio link modeling on the performance of WirelessHART control networks. In *Proceedings of the 2020 IEEE Conference on Computer Communications (INFOCOM)* (pp. 2430–2439). IEEE. doi:10.1109/INFOCOM41043.2020.9155285

10. **Zacchia Lun**, Y., & D'Innocenzo, A. (2019, December). Stabilizability of Markov jump linear systems modeling wireless networked control scenarios. In *Proceedings of the 58th IEEE Conference on Decision and Control (CDC)* (pp. 5766–5772). IEEE. doi:10.1109/CDC40024.2019.9029202

9. **Zacchia Lun**, Y., Abate, A., & D'Innocenzo, A. (2019, June). Linear quadratic regulation of polytopic time-inhomogeneous Markov jump linear systems. In *Proceedings of the 17th European Control Conference (ECC)* (pp. 4094–4099). IEEE. doi:10.23919/ECC.2019.8796279

8. Alrish, A., **Zacchia Lun**, Y., D'Innocenzo, A., & Santucci, F. (2019, May). Work in Progress: Systematic Derivation of Accurate Analytic Markov Channel Models for Industrial Control. In *Proceedings of the*

15th IEEE International Workshop on Factory Communication Systems (WFCS) (pp. 1–4). IEEE. doi:10.1109/WFCS.2019.8757917

7 **Zacchia Lun**, Y., Wheatley, J., D'Innocenzo, A., & Abate, A. (2018, July). Approximate abstractions of Markov chains with interval decision processes. In *Proceedings of the 6th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS): IFAC-PapersOnLine (51) 16* (pp. 91–96). Elsevier. doi:10.1016/j.ifacol.2018.08.016

6 **Zacchia Lun**, Y., D'Innocenzo, A., Abate, A., & Di Benedetto, M. D. (2017, December). Optimal robust control and a separation principle for polytopic time-inhomogeneous Markov jump linear systems. In *Proceedings of the 56th IEEE Conference on Decision and Control (CDC)* (pp. 6525–6530). IEEE. doi:10.1109/CDC.2017.8264642

5 **Zacchia Lun**, Y., D'Innocenzo, A., & Di Benedetto, M. D. (2017a, July). Robust LQR for time-inhomogeneous Markov jump switched linear systems. In *Proceedings of the 20th IFAC World Congress: IFAC-PapersOnLine (50) 1* (pp. 2199–2204). Elsevier. doi:10.1016/j.ifacol.2017.08.281

4 **Zacchia Lun**, Y., D'Innocenzo, A., & Di Benedetto, M. D. (2017b, July). Robust stability of time-inhomogeneous Markov jump linear systems. In *Proceedings of the 20th IFAC World Congress: IFAC-PapersOnLine (50) 1* (pp. 3418–3423). Elsevier. doi:10.1016/j.ifacol.2017.08.838

3 **Zacchia Lun**, Y., D'Innocenzo, A., & Di Benedetto, M. D. (2016, December). On stability of time-inhomogeneous Markov jump linear systems. In *Proceedings of the 55th IEEE Conference on Decision and Control (CDC)* (pp. 5527–5532). IEEE. doi:10.1109/CDC.2016.7799118

2 **Zacchia Lun**, Y., Tennina, S., Di Renzo, M., Graziosi, F., & Verikoukist, C. (2013, November). WSN-Aided People Localization: A Ray Tracing Network Planning and Performance Analysis Tool. In *Proceedings of the 11th ACM Conference on Embedded Networked Sensor Systems (SenSys)* (Article 36). ACM. doi:10.1145/2517351.2517406

1 Tennina, S., Kartsakli, E., Lalos, A., Antonopoulos, A., Mekikis, P.-V., Di Renzo, M., … Verikoukis, C. (2013, October). WSN4QoL: Wireless Sensor Networks for quality of life. In *Proceedings of the 15th IEEE International Conference on e-Health Networking, Applications and Services (HealthCom)* (pp. 277–279). IEEE. doi:10.1109/HealthCom.2013.6720683

Selected Talks at Conferences and Seminars

2025/07/09 Speaker at the 2025 American Control Conference (ACC)—Denver, CO, USA—presenting the journal paper [J6] above

2025/06/04 Speaker at the 10th IFAC Conference on Networked Systems (NecSys 25)—Hong Kong, China—presenting the poster of the journal paper [J7] above

2023/07/11 Speaker at the 22nd IFAC World Congress—Yokohama, Japan—presenting the conference paper [C15] above

2020/07/09 Speaker at the 2020 IEEE Conference on Computer Communications (INFOCOM)—Virtual due to the COVID-19 pandemic—presenting the conference paper [C11] above

2019/12/13 Speaker at the 58th IEEE Conference on Decision and Control (CDC)—Nice, France—presenting the conference paper [C10] above

2019/06/28 Speaker at the 17th European Control Conference (ECC)—Naples, Italy—presenting the conference paper [C9] above

2019/04/17 Speaker at the Cyberspace and cybersecurity seminar (organized by the Chamber of Commerce of Lucca, conducted in Italian under the title *Cyber spazio e Cyber security*)—Lucca, Italy—giving a talk on cloud platforms for ICT security monitoring with an Italian title *"Le piattaforme CLOUD per il monitoraggio della sicurezza ICT"*

2018/07/11 Speaker at the 6th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS)—Oxford, OX, UK—presenting the conference paper [C7] above

Selected Talks at Conferences and Seminars (continued)

2017/12/15 — Speaker at the 56th IEEE Conference on Decision and Control (CDC)—Melbourne, VIC, Australia—presenting the conference paper [C6] above

2017/09/12 — Speaker at the 2017 Automatica.it Conference—Milan, Italy—presenting the research outcomes under the title "Stability and optimal control of polytopic time-inhomogeneous Markov jump linear systems"

2017/07/10 — Speaker at the 20th IFAC World Congress—Toulouse, France—presenting the conference papers [C4] and [C5] above

2016/12/14 — Speaker at the 55th IEEE Conference on Decision and Control (CDC)—Las Vegas, NV, USA—presenting the conference paper [C3] above

2013/11/11 — Speaker at the 11th ACM Conference on Embedded Networked Sensor Systems (SenSys)—Rome, Italy—presenting the poster [C2] above

Editorial and Reviewing Activities

2024–present — **Associate editor** for the European Control Conference (ECC'25 and ECC'26).

2015–present — Technical **reviewer** for several international journals and conferences, including ACM TCPS, Elsevier Automatica, Nonlinear Analysis: Hybrid Syst., and Eur. J. Control, IEEE TAC, L-CSS, T-ITS, TVT, JSAC, COMML, ICC, GLOBECOM, ICMLCN, and CDC.

2025 — Co-chair of a regular session at the 2025 American Control Conference (WeC06: Stochastic Control).

2019 — Co-chair of a regular session at the 18th European Control Conference (FrC5: Sliding and Switched Control).

2017 — Co-chair of a regular session at the 56th IEEE Conference on Decision and Control (FrC11: Switched Systems III; in lieu of Prof. Patrizio Colaneri).

Co-chair of a regular session at the 20th IFAC World Congress (MoP24: Stability and Stabilization of Hybrid Systems).

2016 — Co-chair of a regular session at the 55th IEEE Conference on Decision and Control (WeA12: Stability of Hybrid Systems; in lieu of Prof. Alessandro D'Innocenzo).

Projects

2024–present — **HD-MOTION**—Hub for the Digital MObility TransformatION—European Digital Innovation Hubs Network project https://hdmotion.eu
Position: **Scientific committee member** and **coordinator** for the UnivAQ

2023–present — **Resilient Trust**—Trusted SMEs for Sustainable Growth of Europeans Economical Backbone to Strengthen the Digital Sovereignty—Horizon Europe Grant 101112282
Position: **Researcher** and **task leader** coordinating the development of machine-learning-based radio frequency anomaly and malicious attack detection mechanisms

DigInTraCE—A Digital value chain Integration Traceability framework for process industries for Circularity and low Emissions by waste reduction and use of secondary raw materials—Horizon Europe Grant 101091801 https://www.digintrace.eu
Position: **Researcher**