Leonardo J. Colombo

Personal Webpage: https://sites.google.com/view/leonardojcolombo/home
Google Scholar Page:
https://scholar.google.es/citations?user=wOhyXnMAAAAJ&hl=es

Complete CV open access available at:
https://netzerodronelab.github.io/misc/CV_Colombo%20Leonardo.pdf

Video presentation at YouTube Channel: https://youtu.be/9wx5g9REHR0

Part A. PERSONAL DATA

Complete name:	Leonardo Jesús Colombo	
Nationality : Argentinean (Spanish residence)	Marital Status: Married, 2 children. No paternal leave taken.	Date of birth: 21/10/1986 (35 years old)

Dpto./Center	Centre for Automation and Robotics (CSIC-UPM)	
Phone	+34 683472104	e-mail: leonardo.colombo@car.upm-csic.es
Current Position	Científico Titular at CSIC in the Centre for Automation and Robotics (CAR)	
Keywords	Control Theory, Machine Learning methods for Dynamics and Control, Multi-robot systems, Unmanned Aerial Vehicles, Applied Mathematics.	

A.2. General indicators
Google Scholar cites : 484, h-index: 12

Project Manager (Principal investigator of research project): **5 projects** - La Caixa Junior Leader Postdoctoral Fellowship, Leonardo Grant for Researchers and Cultural Creators from BBVA Foundation, Juan de la Cierva Incorporación Fellowship from Ministry of Science and Innovation, Santander Iberoamérica Fellowship by VRI-CSIC and Santander Bank, LINCGLOBAL 2022 by VRI-CSIC.

Ph.D thesis supervised last 5 years: **4 Phd students** (3 in progress, to finish in 2023, 2024, 2026 respect.).
Master thesis supervised last 5 years: **3 students** on Machine Learning, Optimal and Geometric Control.
Postdocs supervised on the last 5 years: **2 postdoc** (currently supervising until 08/2022 and 04/2023).
Technician hired under research projects: **1 tech** for simulation in drones coordination and cooperation.
Undergraduate students supervised last five years: **9 students.**

Parte B. RESUME (Short Presentation)
I graduated from the Department of Mathematics at the National University of La Plata in Argentina in 2009 and I was awarded a PhD in Mathematics at the Institute of Mathematical Sciences in 2014. I held postdoctoral positions at the University of Michigan and KTH Royal Institute of Technology between 2014 and 2018. From 2018 to 2019 I was a Juan de la Cierva Incorporación Researcher at ICMAT where I have been also a Postdoctoral Junior Leader Researcher between 2019-2021, coordinator of the La Caixa Foundation project *Descentralizad strategies for cooperative robotic swarms.* Currently, I hold a **tenured researcher position (Científico Titular)** at the Spanish National Research Council CSIC in the **Centre of Automation and Robotics (CAR) CSIC-UPM** and I am a recipient of a 2020 **Leonardo Fellowship from the BBVA Foundation to lead the project ``*Safety guarantees with data-driven controls for cooperative systems*''.** I got the *Vicent Caselles Award in Mathematics* from the Spanish Royal Mathematical Society and the BBVA Foundation, and the Outstanding Postdoctoral Assistant Professor Teaching Award from the University of Michigan, both in 2016. I was a Visiting Assistant Professor (competitive position) in the Department of Systems and Control at the Indian **Institute of Technology en Bombay,** India (2018-2020). I am Associated Editor for the Journal of Geometric Mechanics from 2020. My current research field spans Control Theory, Robotics and Bayesian Methods for Machine Learning. I am particularly interested in the development of efficient control algorithms behind practical issues in robotics implementations with complex multi-robot systems. My research can be divided mainly into two main lines: (1) **Multi-Robot Systems:** in particular, design and distributed implementations of controllers for coordination, tracking, collision avoidance of complex multi-robot systems, their applications in ***Unmanned Aerial Vehicles,*** and design of **Robust Control Algorithms** for fast and robust processing of data in **Robotic Swarms**. (2) **Control-oriented by machine learning:** through the application of techniques from System Identification, Bayesian Inference, and Convex Optimization, with an emphasis on their applications to ***Correct-by-design Modeling and Online Learning of Complex Control Systems***.

Parte C. RELEVANT ACHIEVEMENTS
C.1. Publications (last 5 years)
More than 40 Publications in high impact international journals and Proceedings of international conferences in Automation, Robotics and Applied Mathematics since 2018 - See personal webpage.
C.1.1 Some Q1 Journals articles (JCR) ***last 2 years*** *(2020-2021)*
1. J. Goodman, L. Colombo. *Variational collision avoidance on Riemannian Manifolds.* **SIAM Journal on Control and Optimization.** Vol 60, 168-188, 2022. [Q1 Applied Mathemathics, JCR 2020, position 55/265].
2. N. Raj, L. Colombo, A. Simha. Structure-Preserving Reduced Attitude Control of Gyroscopes. **Automatica**. Vol 125, 109471, 2021. [Q1 Automation and Control Systems, JCR 2020, position 10/63].
3. L. Colombo and D. Dimarogonas. *Symmetry reduction for optimal control of multi-agent systems.* **IEEE Transactions on Automatic Control.** Vol 6(5), 2021. [Q1 Automation and Control Systems, JCR 2020, position 11/63].

4. E. Aranda Escolastico, L. Colombo and M. Guinaldo. *Periodic event-triggered targeted shape control of Lagrangian systems with discrete-time delay.* **ISA Transactions**. Vol 117, 139-149 2021. [Q1 Automation and Control Systems, JCR 2020, position 13/63].
5. J. Giribet, L. Colombo, P. Moreno, I. Mas, D. Dimarogonas. Dual Quaternion Cluster Space Formation Control. **IEEE Robotics and Automation Letters**. Vol 6(4) 6789-6796, 2021. [Q1 Robotics, JCR 2020, position 8/28].
6. L. Colombo and E. Eyrea Irazu. *Symmetries and periodic orbits in simple hybrid Routhian systems.* **Nonlinear Analysis: Hybrid Systems**. Vol 36, 100857, 2020. [Q1 Automatic Control and Computer Sciences, JCR 2020 puesto 8/63, Q1 Matemática Aplicada, JCR 2020 position 2/254].
7. J. Goodman and L. Colombo. *On the existence and uniqueness of Poincaré maps for systems with impulse effects.* **IEEE Transactions on Automatic Control.** Vol 65 (4), 1815-1821, 2020. [Q1 Automation and Control Systems, JCR 2020, position 11/63].

C.2. Participation in International and National Sponsored Research Projects (last 5 years)
C2.1: Sponsored *Projects as Main Researcher*
1.``Safety Guarantees with data-driven controls for cooperative systems". 2020 Leonardo Grant for Researchers and Cultural Creators, BBVA Foundation. (Nov. 2020-May 2022). **Amount: 39.987,00 Euros**.
2.''Decentralized strategies for cooperative robotic swarms". **La Caixa Foundation Junior Leader research project** (June 2019-May 2022). **Amount 305.100,00 Euros**.
3.``Path planning via interpolation and localization of agents through distance sensors in the design of controllers for the formation of multiple rotorcrafts (Co4Drones)". **Santander Iberoamérica Grant 2019** (March 2019-May 2019). **Amount 5.000 Euros**.
4. Budget Associated with **Juan de la Cierva Incorporación Research Project**, Ministry of Science and Innovation, Spain (March 2018-May 2019). **Amount: 6.000 Euros.**
C.2.2: Participation in International Projects
5. The interplay between geometry, mechanics and control in multi-agent systems. **I-Link A Project.** Spanish Research Team: David Martin de Diego (IP) and Leonardo Colombo. **Spanish National Research Council (CSIC),** 2019-2021, (**24.000 Euros**).
C.2.3: Participation in National (Spanish) Projects
6. 2020-2023 Geometric structures in dynamical systems, mechanics and hydrodynamics. **PID2019-106715GB-C21**. Principal researchers: David Martín de Diego (ICMAT-CSIC), Daniel Peralta Salas (ICMAT-CSIC), MICINN Spain, (**76.287,00 Euros**).

C.3. Experience in organizing R&D activities
Member of scientific committee for International Young Researchers Workshop on Geometry, Mechanics and Control. May 2016- Feb2020. **Miember organizing committee (I)** 13th, **International Young Researchers Workshop on Geometry, Mechanics and Control**, Coimbra Portugal, Dec 2018.
(II) Special Session Geometric Structures applied to classical mechanics, control theory and engineering. **Bienal Congress of the Spanish Royal Mathematical Society**. Santander, Feb 2019. **(III)** XXVIII **International Fall Workshop on Geometry and Physics**, Madrid, Spain, Sep 2019.
(IV) Special session "The interplay of mathematical engineering and control of networked systems", **ICIAM Conference**, Valencia, July 2019. **(V) Temathic trimester** ``Current trends in geometric methods in natural sciences", ICMAT, Sept-Dec, 2019. **(VI)** Special session in the **V Congreso de Jóvenes Investigadores RSME**. Castellón, Jan 2020. **(VII)** 15th International Summer School on Geometry, Mechanics and Control. 2021, Madrid. **(VIII)** Local Organizer. EECI 2021, International Graduate School on Control. Course M09, Madrid. http://www.eeci-igsc.eu/igsc-program-2021/

C.4 Awards and competitive achievements.
1. Vicent Caselles Award 2016 (Vicent Caselles Award - 2016) Spanish Royal Mathematical Society **RSME** and **BBVA Foundation** (best 6 Spanish young researchers in mathematics under 30 years old).
2. Outstanding Postdoctoral Assistant Professor Teaching Award in Mathematics, University of Michigan, 2016.
3. ACCESS Linnaeus Center Scholarship, KTH Royal Institute of Technology, Stockholm, Sweden. Selected as **one of 2 winning candidates** from around 60 applicants in 2017.
4. Juan de la Cierva Incorporación. **Ranked 1st** of 4 winning candidates in mathematics (2017).
5. Santander Iberoamérica 2018 Fellowship: Fellow from Vice-presidency of International Relations at CSIC and Santander Bank to carry out research on geometric control of multi-agent systems with applications to cooperative drones in Coimbra, Portugal. Amount 5.000 Euros.
6. Selected by the **Vice-presidency of International Relations at CSIC** as the *unique candidate* from CSIC to apply in a competitive Postdoctoral Fellowship from AXA Research Found in 2018 on climate transition.

C.5 Outreach and Communication of Research
Collaboration in the dissemination programs of ICMAT 4th ESO School and Business; Graffiti and Maths. Articles published in Outreach Magazines (Matematicalia). Collaboration in blogs of science: La Caixa, Mathematics and its frontiers, Section Coffee and Theorems from El Pais Newspaper and ICMAT, etc. Participation and finalist in "We are Scientists - Get us out of here" - FECYT.

C.6 Some *Editorial and Reviewer activities*
Member of Program Committee SIAM Conference on Control and its Applications 2021**, Associated Editor Journal Geometric Mechanics** since March 2020**, Editor in the special issue for J. Geometric Mechanics** dedicated to the 65 years of Prof. A. Bloch, 2021-2022. Reviewer for **AMS Mathematical Reviewers** (from 2013). **Reviewer of several research papers in International high ranked Journals** including: IEEE Transactions on Automatic Control, IEEE Transactions on Control Systems Technology, Automatica, SIAM Journal of Control and Optimization, IEEE Transactions Control Network Systems, IEEE Control Systems Letters, IEEE-RAL. **Science mentor** of the section Mathematics for Frontiers for Young Minds http://home.frontiersin.org/, **Reviewer of several IEEE and IFAC International Conference Papers.**