CURRICULUM VITAE of Dario Corona

Updated in October 2021

ACTUAL POSITIONS

from 2020   **Post-Doc Researcher**, University of Camerino   (Assegnista di Ricerca)
Field of Research: Mathematical Analysis
Project Title: "Sistemi dinamici e applicazioni in ambito energetico"
Advisor: prof. Maria Letizia Corradini

from 2015   **Founding Partner** and **CEO** of **LiMiX Srl**,
Spin-off of University of Camerino (Italy)
website: www.limix.it

EDUCATION AND TRAINING

2019   **Research scholarship**, University of Camerino
Project: "Advanced control design for fatigue alleviation for wind turbine"
Advisor: prof. Maria Letizia Corradini

2019   **PhD in Mathematics and Applications**, University of Camerino and Picchio S.p.a.
Thesis: "Decomposition of Optimal Tracking Controllers for Weakly Dual Redundant Systems"
Advisors: prof. Maria Letizia Corradini and prof. Roberto Giambò
Company Advisor: Eng. Francesco di Pietrantonio

2018   **Master Degree in Mathematics and Applications**, University of Camerino
Final Grade: full marks (110/110) and *summa cum laude*
Thesis: "A Mathematical Model for the Development of a Lower Extremity Exoskeleton"
Advisors: prof. Fabio Giannoni and prof. Maria Letizia Corradini

2014   **Research scholarship**, University of Camerino and MES S.p.a.
Project: "Development of a lower limb exoskeleton for disabled people"

2012   **Bachelor Degree in Mathematics and Applications**, University of Camerino
Final Grade: full marks (110/110) and *summa cum laude*
Thesis: "GARCH Model and Volatility Analysis in Finance"
Advisor: prof. Carlo Lucheroni

2009   **INDAM scholarship** (Istituto Nazionale di Alta Matematica)

2009   **High School**, Scientific Lyceum, Liceo Costanza Varano, Camerino (Final Grade: 100/100)

WORK EXPERIENCE

from Sept 2021   **Teacher of Mathematics** (Temporary replacement as Post-Doc Researcher - Italian Law 240/2010)
at public secondary school "IPSIA Don Pocognoni", Matelica, Italy

Aug 2021   **Teacher Qualification at secondary level** (A026 - Mathematics)
First place in the open examination for Marche region

Feb-June 2019   **External Expert and Tutor** (I.S.I.S.S. Magarotto, Rome)
For the PON/FSE project "10.6.6 A-FSEPON-LA-2017-27"
Title "IPSIA: Immaginare per creare" - Module "Talking Hands: i segni prendono voce" - 108h

2015   **Project Leader**, University of Camerino and Belumbury S.p.a.
Creation and implementation of a 3D mounting and maintenance manual for electric cars

2012/13   **Stage**, Logistic Department of Colussi Group

RESEARCH EXPERIENCE

	Documents	Citations	H-index
Google Scholar	17	52	4
Scopus	14	29	3

In these first years of my research career, I have mainly worked on the following research fields.

Mathematical Analysis: Since 2019, I am working on existence and multiplicity results for periodic solutions of Hamiltonian systems. In particular, I devoted my attention to the brake orbits, which are, roughly speaking, pendulum-like solutions that oscillate back and forth between two endpoints. My contribute is generalizing the results obtained in the last years for natural Hamiltonian systems to Hamiltonian systems of classical type (see [1,3,5,6] below). Beside their own research appealing, these results have application in robotics, as proved by the recent collaboration with prof. Albu-Schaeffer (Institute of Robotics and Mechatronics, German Aerospace Center (DLR), Oberpfaffenhofen, Germany), that applies this kind of periodic solutions to bio-inspired robot design. Beside the direct applications, this research gains its value also by the great number of methodologies that involves (Riemannian and Finsler geometry; Hamiltonian systems; Calculus of Variations; Critical Point Theory; Ljusternik-Schnirelman category). **These techniques could be successfully applied on all nonlinear Hamiltonian systems**.

Moreover, I recently started a research on indefinite Lagrangians (with index 1 with respect to the velocities): generalizing the results obtained in Lorentzian geometry, this research could have applications in alternatives of general relativity.

Optimal Control Theory: During the PhD course, the main focus of my research was obtaining optimal controllers for under-actuated systems, namely systems with more outputs than inputs (see [8,9,11,13,14,15,17] below). Thanks to this experience, **I am able to design effective control strategies from the study of analytical and dimensional properties of dynamical systems.**

Green researches: During both my research scholarship "Advanced control design for fatigue alleviation for wind turbine" and my Post-doc research period, I could use my expertise on control design to study different strategies to reduce the extreme loads on support structure and blades of a wind turbine. This research could have a huge impact, since it allows to reduce the cost of energy for wind farms. Therefore, it could increase the share of renewable energy in the global energy mix, fitting with **point 7.2 of "2030 Agenda for Sustainable Development"**.

Gesture Recognition: Through the university spin-off Limix Srl, I actively work on the third mission, moving the results of academic research towards the benefit of the social development (see [4,7,10,12,16] below). This is mainly an applied research that gathers and merges different disciplines, such as electronic, engineering, design, computer science, artificial intelligence and mathematical analysis. With these works, **I gained the experience to realize a real product from the results of academic research**.

Journal papers

–	D. Corona, E. Caponio, "A variational setting for the action functional of an indefinite Lagrangian with Noether charges", (in preparation)
1	D. Corona, F. Giannoni, "Brake orbits for Hamiltonian systems of classical type via geodesics in singular Finsler metrics", Advances in Nonlinear Analysis, (Provisionally Accepted), **2021**
2	D. Corona, A. Della Corte, "The critical exponent functions", Comptes Rendus Mathématique, (Accepted), **2021**
3	D. Corona, "A multiplicity result for orthogonal geodesic chords in Finsler disks", Discrete and Continuous Dynamical Systems, vol. 41(11), **2021** doi: 10.3934/dcds.2021079
4	F. Pezzuoli, D. Corona, and M. L. Corradini, "Recognition and classification of dynamic hand gestures by a wearable data-glove", SN Computer Science, vol. 2, **2021** doi: 10.1007/s42979-020-00396-5
5	D. Corona, "A multiplicity result for Euler–Lagrange orbits satisfying the conormal boundary conditions", Journal of Fixed Point Theory and Applications, vol. 22, pag. 60, **2020** doi: 10.1007/s11784-020-00795-4
6	D. Corona and F. Giannoni, "A New Approach for Euler-Lagrange Orbits on Compact Manifolds with Boundary", Symmetry, vol. 12, n. 11, pag. 1917, **2020** doi: 10.3390/sym12111917
7	F. Pezzuoli, D. Tafaro, M. Pane, D. Corona, and M. L. Corradini, "Development of a new sign language translation system for people with autism spectrum disorder", Advances in Neurodevelopmental Disorders, **2020**, doi: 10.1007/s41252-020-00175-6
8	D. Corona, A. Cristofaro, and D. Rotondo, "Reachability and stabilization of scheduled steady-states for LPV single-input systems", Journal of the Franklin Institute, vol. 356, n. 8, pagg. 4478–4495, **2019** doi: 10.1016/j.jfranklin.2019.04.007
9	D. Corona and A. Cristofaro, "Optimality principles and decomposition of tracking controllers for weakly dual redundant systems", Optimal Control Applications and Methods,16, **2018** doi: 10.1002/oca.2420

Conference papers

10   F. Pezzuoli, D. Corona, and M. L. Corradini, "Dynamic gestures recognition through a low-cost data glove", in 2020 IEEE international conference on human-machine systems (ICHMS), pagg. 1–3, **2020**
doi: 10.1109/ICHMS49158.2020.9209424

11   D. Corona and A. Cristofaro, "Optimal controlled steady-states for multi-input underactuated systems", 18th European Control Conference (ECC), 3734-3739, **2019**
doi: [10.23919/ECC.2019.8795796](10.23919/ECC.2019.8795796)

12   F. Pezzuoli, D. Corona, and M. L. Corradini, "Improvements in a Wearable Device for Sign Language Translation", in Advances in Human Factors in Wearable Technologies and Game Design, AHFE, pagg. 70–81, **2019**
doi: [10.1007/978-3-030-20476-1_9](10.1007/978-3-030-20476-1_9)

13   D. Corona and A. Cristofaro, "Optimal closed-loop tracking controllers for weakly dual redundant systems with periodic references", IEEE CDC, **2018**
doi: [10.1109/CDC.2018.8619169](10.1109/CDC.2018.8619169)

14   D. Corona and A. Cristofaro, and D. Rotondo, "Optimizing output regulation for a class of underactuated LPV systems", in Mediterranean control conference, pagg. 135–140, **2017**
doi: [10.1109/MED.2017.7984107](10.1109/MED.2017.7984107)

15   D. Corona and A. Cristofaro, and M. L. Corradini, "Optimal output regulation for underactuated systems with quasiperiodic references", IFAC World Congress 2017, pagg. 3717–3722, **2017**
doi: 10.1016/j.ifacol.2017.08.712

16   F. Pezzuoli, D. Corona, M. L. Corradini, and A. Cristofaro, "Development of a wearable device for sign language translation", in Int. Workshop on human-friendly robotics (HFR2017), Cham, pagg. 115–126, **2017**
doi: [10.1007/978-3-319-89327-3_9](10.1007/978-3-319-89327-3_9)

17   D. Corona and A. Cristofaro, "Some remarks on optimal output regulation for weakly dual redundant plants", in Mediterranean control conference, pagg. 1205–1211, **2016**
doi: [10.1109/MED.2016.7536028](10.1109/MED.2016.7536028)

TEACHING EXPERIENCE

Courses

2021	Lecturer of "Critical Point Theory", PhD course at **Universidade de São Paulo, Brazil**, 20h
2021/22	Adjunct Professor of Analysis 3, Unicam, Bachelor course in Mathematics and Applications, 42h
	Adjunct Professor of Analysis 2, Unicam, Bachelor Course in Physics, 17h
	Introductory course in Mathematics for all entering students of Unicam, 15h
2020/21	Adjunct Professor of Analysis 3, Unicam, Bachelor course in Mathematics and Applications, 42h
	Adjunct Professor of Analysis 2, Unicam, Bachelor Course in Physics, 17h
	Introductory course in Mathematics for all entering students of Unicam, 9h
2019/20	Adjunct Professor of Analysis 3, Unicam, Bachelor course in Mathematics and Applications, 42h
	Exercise Lectures of Analysis 2, Unicam, Bachelor course in Mathematics and Applications, 14h
	Exercise Lectures of Analysis 1, Unicam, Bachelor course in Mathematics and Applications, 25h
	Exercise Lectures of Mathematical Methods for Physics, Unicam, Bachelor Course in Physics, 25h
2018/19	Adjunct Professor of System Analysis, Unicam, Mathematics and Applications, 42h
	Exercise Lectures of Mathematical Methods for Physics, Unicam, Bachelor Course in Physics, 25h
	Exercise Lectures of Analysis 2, Unicam, Bachelor Course in Physics, 25h
2017/18	Exercise Lectures of Analysis 2, Unicam, Bachelor Course in Physics, 25h
2016/17	Programming Class, Unicam, Bachelor Course in Mathematics and Applications, 30h
	Exercise Lectures of Analysis 2, Unicam, Bachelor course in Mathematics and Applications, 25h
	Exercise Lectures of Analysis 1, Unicam, Bachelor course in Mathematics and Applications, 25h

Thesis

I supervised the following theses for the Bachelor degree of Mathematics and Applications in Unicam.

2021	Gianluca Pacini, "Risoluzione di Equazioni Differenziali con il Metodo di Galerkin";
	Michelangelo Faleschini, "Serie di Fourier: dall'equazione del calore alle applicazioni informatiche";
	Matteo Carletti, "Introduzione all'Analisi non Standard";
2020	Davide Fioriti, "Reti Neurali e Teorema di Approssimazione Universale";
	Letizia Falzetti, "Fast Fourier Transform e Applicazioni";
	Gulsin Celik, "Introduzione al Calcolo delle Variazioni";
	Laura Carini, "Machine Learning e riconoscimento di sequenze introniche nel genoma di protozoi ciliati";
	Edoardo Langella, "Mountain Pass Theorem e risoluzione del problema di Dirichlet per equazioni ellittiche";
2019	Federica Volpi, "Teoria dei Punti Critici";
	Rudy Milani, "Studio Preliminare per il Riconoscimento di Gesti Dinamici basato su Guanti Sensorizzati";
2018	Giulia Sbrega, "Realizzazione di un sistema di Predictive Text".

THIRD MISSION

Through the spin-off **Limix**, I am translating the academic research into products with high social impact. The main project is Talking Hands, a wearable device for gesture recognition which aims to help people with severe speech or language problems.

Patents

- European patent EP3443553A1
  "Conversion system of the movements related to sign languages into voice and/or written text."

- Italian patent N. 102016000038807 granted by MISE (Ministero dello Sviluppo Economico);

Grants and Awards
The spin-off Limix, whose I am funding member and CEO, has obtained the following grants and awards

2020	**Smartees**	40.000€
	Horizon 2020 funds for supporting SMEs in integrating flexible and wearable electronics into novel products	
2020	**POR MARCHE FESR 2014/2020**	122.500€
	"Promozione della ricerca e dello sviluppo negli ambiti della specializzazione intelligente"	
2019	**Premio Nazionale ANGI**	
	Premio per le migliori iniziative degli innovatori italiani	
2019	**Seal of Excellence** (SME Instrument Phase 2)	
	Certificate delivered by the EU Commission for high-quality project proposal	
2018	**SME Instrument Phase 1**	50.000€
	EU Commision funds for feasibility study (project manager)	
2018	**Finalist of Chivas Venture**, international competiotion for start-up with high social impact	
2017	**POR MARCHE FESR 2014/2020**	100.000€
	"Sostegno allo Sviluppo ed al Consolidamento di Start-Up ad alta Intensità di Applicazione di Conoscenza"	
2016	**R.O.M.E. Prize**, European maker project with highest social impact	100.000€
2016	**E-Capital**, regional Business plan competition	20.000€
2015	**StartCup Marche**, regional Business plan competition	15.000€

Total grants:	**447.500€**

Talking Hands, the main project of Limix, has been publicly presented many times. The following list provides the main media appearances.

TV Appearances

2021	**Tg3 Pixel** (Rai - Rai 3)	https://www.youtube.com/watch?v=R8V2LW-aVOI&t=1m39s
2018	**Chi ha paura del buio** (Mediaset - Italia 1)	Short Link
	Tgr Talenti Digitali (Rai Marche)	https://www.youtube.com/watch?v=JhccG-VIy7Q
	Tgr Leonardo (Rai Marche)	Short Link

| | **Eta Beta** (Rai Radio 1) | |
| 2017 | **Il posto giusto** (Rai - Rai 3) | |

Press Appereances

2021	**La buona impresa**, Il Sole 24 Ore	
	QdS.it	
	Il Resto del Carlino	
2019	**PRISMA** - numero 6	
	Harvard Business Review Italia	
2018	**Wired Italia**	
	Affaritaliani.it	
	Tech Trends	

Public Speeches
During my work and academic careers, I had different public speeches. The main ones are listed below.

> **TEDxAscoliPiceno** with the speech "Il primo obiettivo della tecnologia"
> https://www.youtube.com/watch?v=kZKQHc-4EFA&t=1s

2021	**Sharper Night - La notte dei ricercatori** with the speech "Ricerca e Disabilità"
	Porte Aperte, Mathematics and Applications, Unicam
	Famelab - Talking Science https://www.youtube.com/watch?v=rOM9y_rpqYc and https://www.youtube.com/watch?v=pfoKYrhNK1U
2020	**Porte Aperte**, Mathematics and Applications, Unicam
2019	**Forum PA** (Italian National Forum of Public Administration) invited by Undersecretary for Family and Disability Vincenzo Zoccano, Rome
	Porte Aperte, Mathematics and Applications, Unicam
2018	**Makers Town**, showcasing the Town of the Future and what needs to be done in terms of policy, private investment and education, Bruxelles
	SUCCEED, Stimulate financial education to foster entrepreneurship and Development, Bruxelles
	Netval, Italian association for the valorisation of results from public research, Unicam
2017	**Global Teacher Prize**, invited by MIUR, Dubai
	Fosforo, la Festa della Scienza, Senigallia
2016	**Mind the Bridge**, start-up incubator, San Francisco

COMPUTER SKILLS

| **Programming** | MATLAB, Python, C and C++ (co-programmer of Talking Hands) |
| **Microsoft Office** | Excellent knowledge of Excel, Word, Access, Power Point and VBA language |

LANGUAGES

| **Italian** | Mother tongue |
| **English** | Cambridge First Certification ($B2$) |