

CURRICULUM VITAE (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

CV date	23/09/2025
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First name	Urbano
Family name	Lugrís Armesto

(*) Mandatory

A.1. Current position

Position	Associate Professor (Profesor Titular)
Initial date	16/10/2020
Institution	University of La Coruña
Department/Center	Naval and Industrial Engineering / Esc. Pol. de Ingeniería de Ferrol
Country	Spain
Key words	Biomechanics, dynamics, simulation, mechatronics

A.2. Previous positions (research activity interruptions, art. 45.2.b))

Period	Position/Institution/Country/Interruption cause
08/2003 – 09/2003	Becario FEUGA / Norcontrol S.A. / Spain
10/2003 – 04/2004	Inspector técnico / Norcontrol S.A. / Spain
05/2004 – 05/2008	Becario FPI / University of La Coruña / Spain
06/2008 – 12/2008	Investigador contratado / University of La Coruña / Spain
01/2009 – 06/2009	Profesor ayudante / University of La Coruña / Spain
06/2009 – 01/2011	Profesor ayudante doctor / University of La Coruña / Spain
01/2011 – 10/2020	Profesor contratado doctor / University of La Coruña / Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Industrial Engineer	University of La Coruña	2003
PhD Industrial Engineering	University of La Coruña	2008

Part B. CV SUMMARY (max. 5000 characters, including spaces)

After graduating in Industrial Engineering at the University of La Coruña (2003), I worked for nine months at Norcontrol S.A. (later absorbed by Applus), dedicated to technical assistance in construction of steel structures and wind power plants. Among other things, I was in charge of developing a novel process for ultrasonic testing of welded joints in tubular bridge structures.

In 2004, I abandoned the company to join, by means of a PhD scholarship (FPI), the Laboratory of Mechanical Engineering (LIM in Spanish) of the University of La Coruña (UDC), where I already had carried out my Master's Thesis. During the grant, I worked on my PhD in dynamics of multibody systems with flexible bodies, under the supervision of Profs. Javier Cuadrado (head of LIM) and Juana Mayo (University of Sevilla). I had two predoctoral stays, both of them three months long: one at the University of Sevilla, Spain in 2005, directed by Prof. Juana Mayo, and another one at the University of Stuttgart, Germany in 2006, with Prof. Peter Eberhard. I got my PhD in November 2008, obtaining the PhD Extraordinary Award. In 2014, I had a three-month postdoc stay at the University of Duisburg-Essen, working in collaboration with Prof. Andrés Kecskeméthy. After holding several different positions at UDC, in October 2020 I reached my current associate professor position, while still working at the Laboratory of Mechanical Engineering.

In 2009, due to having established contact with doctors Manuel Giráldez, professor at the School of Sports and Physical Education of the UDC, and Antonio Rodríguez Sotillo, head of the Spinal Cord Injury unit of the Hospital of La Coruña (CHUAC), a branch devoted to research

in biomechanics of human movement started at LIM, which has been the focus of my work until the present day. This branch has been financed to date by means of five consecutive projects of the Spanish National R+D+i Plan. The first three projects (2010-2018) were dedicated to the development of active orthoses for assisting the gait of spinal-cord-injured patients. These three projects were coordinated with a group from the University of Extremadura (Prof. Javier Alonso) and another one from the Polytechnic University of Cataluña (Prof. Josep Maria Font-Llagunes). After that third coordinated project, we got the fourth and fifth, now for the UDC only (2019-2021 and 2023-2026), focused on studying efficiency vs. model complexity in human motion simulation.

Within the biomechanics branch, I was responsible for setting up a full motion capture laboratory from scratch, including the integration of IR cameras, force plates, EMG sensors and inertial measurement units, into a real-time motion capture software application. In addition, I developed a multibody model for solving the forward and inverse dynamics of human movement. This motion capture system, along with the multibody model, have been the basis for most of our publications in biomechanics.

I am the first author of a patent for the active knee-ankle-foot orthosis described above. This patent is currently licensed to ABLE Human Motion S.L., a startup company devoted to bringing the product to the market. Moreover, I have collaborated in several projects for the naval, automotive and military industries, as shown in Section C.4.1.

I have supervised four PhD theses, all of them about biomechanics of human motion. One of the former PhD students won the Best PhD Thesis Award from the HM Chair of Sports Traumatology in 2021, and is currently working as post-doc researcher at our laboratory.

At this time, I have 31 papers published in JCR-indexed journals, 6 of them in Q1 journals. According to the Web of Science, I have a total of 457 citations (h-index 14). According to Scopus, the number of citations is 614 (h-index 17).

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Most important publications in books and journals with "peer review" and in conferences (*see instructions*).

1. U. Lugris, M. Perez-Soto, F. Michaud, J. Cuadrado, Human Motion Capture, Reconstruction, and Musculoskeletal Analysis in Real Time, *Multibody System Dynamics*, vol. 60(2), 3-25, 2024.
2. J. Cuadrado, F. Michaud, U. Lugris, M. Perez Soto, Using Accelerometer Data to Tune the Parameters of an Extended Kalman Filter for Optical Motion Capture: Preliminary Application to Gait Analysis, *Sensors*, vol. 21, art. 427, 22 pages, 2021.
3. F. Michaud, U. Lugris, J. Cuadrado, A. Kecskemethy, Y. Ou, A Procedure to Define Customized Musculoskeletal Models for the Analysis of the Crutch-Orthosis-Assisted Gait of Spinal Cord Injured Subjects, *Journal of Biomechanical Engineering*, vol. 142(12), 121013 (8 pages), 2021.
4. F. Mouzo, F. Michaud, U. Lugris, J. Cuadrado, Leg-Orthosis Contact Force Estimation from Gait Analysis, *Mechanism and Machine Theory*, vol. 148, 103800 (13 pages), 2020.
5. J.M. Font-Llagunes, U. Lugris, D. Clos, F.J. Alonso, J. Cuadrado, Design, Control, and Pilot Study of a Lightweight and Modular Exoskeleton for Walking Assistance After Spinal Cord Injury, *Journal of Mechanisms and Robotics*, vol. 12(3), 031008 (8 pages), 2020.
6. F. Michaud, F. Mouzo, U. Lugris, J. Cuadrado, Energy Expenditure Estimation During Crutch-Orthosis-Assisted Gait of a Spinal-Cord-Injured Subject, *Frontiers in Neurorobotics*, vol. 13(55), 1-11, 2019.

7. F. Mouzo, U. Lugris, R. Pamies-Vila, J. Cuadrado, Skeletal-Level Control-Based Forward Dynamic Analysis of Acquired Healthy and Assisted Gait Motion, *Multibody System Dynamics*, vol. 44(1), 1-29, 2018.
8. R. Pamies-Vila, J.M. Font-Llagunes, U. Lugris, J. Cuadrado, Parameter Identification Method for a Three-Dimensional Foot-Ground Contact Model, *Mechanism and Machine Theory*, vol. 75, 107-116, 2014.
9. U. Lugris, J. Carlin, R. Pamies-Vila, J.M. Font-Llagunes, J. Cuadrado, Solution Methods for the Double-Support Indeterminacy in Human Gait, *Multibody System Dynamics*, vol. 30(3), 247-263, 2013.
10. J. Alonso, F. Romero, R. Pamies-Vila, U. Lugris, J.M. Font-Llagunes, A Simple Approach To Estimate Muscle Forces and Orthosis Actuation in Powered Assisted Walking of Spinal Cord-Injured Subjects, *Multibody System Dynamics*, vol. 28(1-2), 109-124, 2012.

C.2. Congress.

1. F. Mouzo, F. Michaud, U. Luguís, J. Masood and J. Cuadrado, Evaluation of Two Upper-Limb Exoskeletons for Ceiling Welding in the Naval Industry, *4th Int. Symposium on Wearable Robotics, WeRob 2020*. Online conference, 2020-10.
2. F. Mouzo, F. Michaud, M. Lamas, U. Luguís and J. Cuadrado, Effect of Muscle Modeling in the Efficiency and Accuracy of the Forward-Dynamics Simulation of Human Gait, *5th Int. Conf. on Neurorehabilitation, ICNR 2020*. Online conference, 2020-10.
3. F. Mouzo, U. Luguís, J. Cuadrado, J.M. Font-Llagunes and F.J. Alonso, Calibration and Validation of a Skeletal Multibody Model for Leg-Orthosis Contact Force Estimation, *4th Int. Symposium on Wearable Robotics, WeRob 2018*. Pisa, Italy, 2018-10.
4. U. Luguís, R. Vilela, E. Sanjurjo, F. Mouzo and F. Michaud, Implementation of an Extended Kalman Filter for Optical Motion Capture with Real-Time 3D Visualization, *5th Joint Int. Conf. on Multibody System Dynamics (IMSD 2018)*. Lisbon, Portugal, 2018-06.
5. M.O. Nunes, U. Luguís, J. Cuadrado, M.N. Souza, A. Pino and L.L. Menegaldo, Kinematic Consistency of Position Analysis in the Push-Up Exercise from Experimental 3D Markers Data, *IUTAM Symposium on Intelligent Multibody Systems: Dynamics, Control, Simulation*. Sozopol, Bulgaria, 2017-09.
6. F. Mouzo, U. Luguís, D. Dopico, B.J. Fregly and J. Cuadrado, Use of Analytical Derivatives in an Optimal Control Algorithm for the Residual Elimination Problem of Gait, *8th ECCOMAS Thematic Conf. on Multibody Dynamics*. Prague, Czech Republic, 2017-06.
7. L. Caspers, U. Luguís and A. Kecskemethy, Foot-Ground Sagittal Rolling Behaviour During Heel Contact and its Approximation by an Exponential-Curvature Disk, *4th Joint Int. Conf. on Multibody System Dynamics (IMSD 2016)*. Montreal, Canada, 2016-05.
8. F. Michaud, U. Luguís, Y. Ou, J. Cuadrado and A. Kecskemethy, Comparison of Forward-dynamics Approaches to Estimate Muscular Forces in Human Gait, *4th Joint Int. Conf. on Multibody System Dynamics (IMSD 2016)*. Montreal, Canada, 2016-05.

C.3. Projects or research lines in which you have participated.

1. 2nd principal investigator in project PID2022-140062OB-I00, *Captura, reconstrucción y análisis neuro-musculo-esquelético del movimiento humano en tiempo real, con consideración de la fatiga muscular*, MICIU (30/12/2022, BOE 03/01/2023), Javier Cuadrado, University of La Coruña, 01/09/2023-31/08/2026, 79.375 EUR.

2. Principal investigator in project PGC2018-095145-B-I00, *Estudio de la relación entre eficiencia y nivel de detalle en modelos biomecánicos del cuerpo humano*, MICIU (13/08/2018, BOE 20/08/2018), Urbano LUGRÍS, University of La Coruña, 01/01/2019-31/12/2021, 101.640 EUR.
3. 2nd principal investigator in project DPI2015-65959-C3-1-R, *Ortesis híbrida motor-FES de bajo coste para la marcha de lesionados medulares y métodos de simulación para ayuda al diseño y la adaptación*, MINECO (17/06/2015, BOE 23/06/2015), Javier Cuadrado, University of La Coruña, 01/01/2016-31/12/2018, 66.913 EUR.
4. Researcher in project DPI2012-38331-C03-01, *Diseño de una órtesis activa innovadora para la marcha de lesionados medulares incompletos mediante métodos de análisis y predicción de movimiento y modelos músculo-esqueléticos complejos*, MINECO (30/12/2011, BOE 31/12/2011), Javier Cuadrado, University of La Coruña, 01/01/2013-31/12/2015, 164.970 EUR.
5. Researcher in project DPI2009-13438-C03-01, *Aplicación de técnicas de dinámica multicuerpo al diseño de órtesis activas para ayuda a la marcha*, MICINN (26/12/2008, BOE 31/12/2008), Javier Cuadrado, University of La Coruña, 01/01/2010-31/12/2012, 171.457 EUR.

C.4. Participation in technology/knowledge transfer activities and exploitation of results.

C.4.1 Contracts

1. *Industry 5.0: Digitization of the impact testing process on Light Weight Shock Machine*, Navantia, S.A., Urbano LUGRÍS, University of La Coruña, 11/07/2023-31/12/2024, 49.000 EUR.
2. *Efficient electric motor thermal model II*, GKN Driveline Zumaia, S.A., Javier Cuadrado, University of La Coruña, 01/01/2021-31/12/2021, 37.000 EUR.
3. *Efficient electric motor thermal model*, GKN Driveline Zumaia, S.A., Javier Cuadrado, University of La Coruña, 01/01/2019-31/12/2019, 36.000 EUR.
4. *Development of a head and neck multibody model with bullet and shrapnel protection*, Carlos III University of Madrid, Javier Cuadrado, University of La Coruña, 01/06/2016-31/08/2017, 26.000 EUR.
5. *Validation of multibody model for real-time platform and implementation of macro-joints*, Tecnia Research & Innovation, Javier Cuadrado, University of La Coruña, 06/03/2013-05/03/2014, 35.000 EUR.

C.4.2. Patents

1. U. LUGRÍS, J. Cuadrado, J.M. Font-Llagunes, D. Clos, F.J. Alonso, F. Romero. *Walking-Assistance System*, ES 2663899 B2. University of La Coruña, Polytechnic University of Cataluña, University of Extremadura, 2018 (subject to preliminary examination). Licensed to ABLE Human Motion S.L.
2. U. LUGRÍS, F. Michaud, J. Cuadrado, *Method and System for Estimating the Posture and Motion of the Spine*, ES 2943269 B2. University of La Coruña, 2023. Licensed to Motion and Force Engineering Solutions, S.L.