CURRICULUM VITAE

Part A. PERSONAL INFORMATION

CV date	18-July-2025

First name	María Jesús		
Family name	Ledesma-Carbayo		
Gender (*)	Female	Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail		URL Web: https://www.die.upm.es/im/	
Open Researcher and Contributor ID (ORCID)		0000-0001-6846-3923	

A.1. Current position

Position	Full professor (Catedrática de universidad)		
Initial date	07/09/2021		
Institution	Universidad Politécnica de Madrid (UPM)		
Department/Center	Electronic Engineering Dept. / ETSI Telecomunicación		
Country	Spain	Telephone number	
Key words	Biomedical engineering, medical image analysis, artificial intelligence, information and communications technologies		

A.2. Previous positions

Period	Position/Institution/Country/Interruption cause
2016- present	Researcher Information Processing and Telecommunications Center, IPTC, UPM
2008 – present	Co-PI & researcher / CIBER-BBN (the Biomedical Research Networking Center). Ministry of Science & Innovation. Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD Telecom. Eng.	Universidad Politécnica de Madrid / Spain	2003
Master Telecom. Eng.	Universidad Politécnica de Madrid / Spain	1998
Master Biomedical Tech.	UNED (Spanish Open Univ.) / Spain	2004
Master Biomedical Eng.	Univ. Patras / Greece (Eur postgrad program)	2010

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

Maria J. Ledesma-Carbayo defended her PhD Thesis in 2003 with pioneering contributions to spatio-temporal non-rigid registration to estimate myocardial movement from echocardiography, later developed for tagged and CINE cardiac MR with significant results. Since 2010 she has a permanent position in Universidad Politécnica de Madrid (UPM), in the Biomedical Image Technologies group where she is leading the research on cardiac, pulmonary and cancer imaging. The main motivation of her research is **improving health care delivery through advances in biomedical imaging technologies, providing technological solutions to actual clinical or biological problems**. Her main contributions have dealt with motion estimation and motion compensation techniques for US, MR and PET dynamic acquisitions, deep learning and statistical methods techniques for tissue subtyping and CT signal harmonization techniques in pulmonary CT, rhythm abnormalities substrate detection on cardiac MR for ablation studies and spatio-temporal artificial intelligence technologies for cancer therapy prediction,

These works have led to scientific publications (more than 180), leading roles in national and international projects (>3,7K€ for research grants and contracts, >1M€ in PhD and postdoctoral scholarships), 3 international patents, **technology transfers** to several companies (e.g. Siemens-Acuson, Imbio LLC, LeukoLabs Inc, GMV, Sedecal, QuBioTech) and software packages made **openly available** to the scientific and medical communities (e.g. DCE@urLAB for the analysis of MRI, AtlasIT and MatchIT for creation of atlas of embryo development, RegSeg for the segmentation of diffusion MRI, analysis tools for pulmonary vasculature and interstitial lesion subtyping of the lung parenchyma as part of Chest Imaging Platform).

She has a relevant international **network of collaborators** that has clearly enriched her scientific perspective. Some of them began during her visiting experiences to Oxford Univ. (1999), École Polytechnique Fédéral de Lausanne (2000, 2001, 2012), National Institutes of

Health (USA, 2006, 2007), Johns Hopkins Univ. (2013, 2014, 2015) and University California San Diego (2017, 10 months in 2020-21, 2022, 2024).
She has supervised **16 PhD Thesis** already defended and has an important **tutoring** activity of young researchers through her participation as faculty member (2013-2016) in the **MVision Consortium** created by Comunidad de Madrid and Massachusetts Institute of Technology (MIT), since 2016 in the **MIT-IinQ program** and from 2020 in the **Catalyst Europe** program (Spanish hub coordinator). In these activities, young researchers are guided to innovation to address unmet health care needs, and has resulted in several successful technology-based SME companies. She is also **founder** and member of the **Scientific Advisory** board of Spotlab SL, that develops and translate AI technologies through mobile digital microscopy promoting digital transformation of health care and technology access to low resource settings. She has been elected to the IEEE Bio Imaging and Signal Processing Technical Committee and has been regularly **expert evaluator** for the 6th, 7th, H2020 and HEurope **European Framework programs** and for the **European Research Council**. Additionally, she has been involved in different initiatives dealing with international cooperation for development, promoting **innovation and research for underserved populations**, through her participation in NGO and foundations like Ongawa, MVision and EHAS.

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

C.1. Publications. Scientific papers: H-Index 25 and 3025 times cited - Web of Science
H-Index 34 and 6519 times cited - Google Scholar

Recent papers with relevant indicators:

1. Alfano, F., Navas, P., Lamata, P., Ferreres García, K., Ortuño, J.E., Bueno Zamora, O., Lizarraga, S., Santos, A., Pascau, J., Goicolea, J.M., **Ledesma-Carbayo, M.J.** "Patient-specific visco-hyperelastic mechanical model for breast tumor localization in surgical planning". Bioeng. Transl. Med., e70044. 2025 (doi: 10.1002/btm2.70044). *Led the methodology conception and the technical and experimental designs.*
2. Pastor-Escuredo, D., Lombardot, B., Savy, T., Boyreau, et al.(10/11) last authors equally contributed: **Ledesma-Carbayo, M.J.***, Peyriéras, N.* (2025) "Unsupervised spatio-temporal classification of deformation patterns of embryonic tissues matches their fate map". iScience, 2025 10.1016/j.isci.2025.111753. *Led the technical design and experiments of the cell tracking methods and dynamic analysis.*
3. Ramos-Guerra, A.D., Farina, B., Rubio Pérez, J. et al. (11/11) last author: **Ledesma-Carbayo, M.J.** (2025) "Monitoring peripheral blood data supports the prediction of immunotherapy response in advanced non-small cell lung cancer based on real-world data". Cancer Immunol. Immunother., 74:120. 10.1007/s00262-025-03966-9. *Led the research, technical design and experiments of the temporal AI proposed models.*
4. Lin, L., Dacal, E., Díez, N., et al. (13/15) last authors equally contributed **Ledesma-Carbayo, M.J.***, Rubio, J.M.*, Luengo-Oroz, M.* (2024) "Edge Artificial intelligence (AI) for real-time automatic quantification of filariasis in mobile microscopy". Plos Neglect. Trop. Dis., 18(4):e0012117. doi: 10.1371/journal.pntd.0012117. *Co-led the research, design and experiments of the proposed AI models.*
5. Farina, B., Ramos Guerra, A.D., Bermejo-Peláez, D., (15/15), last author: M., **Ledesma-Carbayo, M.J**. (2023) "Integration of longitudinal deep-radiomics and clinical data improves the prediction of durable benefits to anti-PD-1/PD-L1 immunotherapy in advanced NSCLC patients". J. Transl. Med., 21:174. doi: 10.1186/s12967-023-04004-x *Led the research, design and experiments of the proposed spatio-temporal AI models.*
6. Cordero-Grande, L., Ortuño-Fisac, J.E., del Hoyo, A.A., Uus, A., Deprez, M., Santos, A., Hajnal, J.V., **Ledesma-Carbayo, M.J.** (8/8) (2023) "Fetal MRI by Robust Deep Generative Prior Reconstruction and Diffeomorphic Registration". *IEEE Trans. Med. Imaging*, 42(3):810-822. 10.1109/TMI.2022.3217725. *Co-led the research, design and experiments of the motion compensation and reconstruction methodology.*
7. Bermejo-Peláez, D., Ash, S.Y., Washko, G.R., San José Estépar, R., **Ledesma-Carbayo, M.J.** (5/5) (2020). "Classification of Interstitial Lung Abnormality Patterns with an Ensemble of Deep Convolutional Neural Networks". *Sci Rep*, 10: 338. 10.1038/s41598-019-56989-5. *Led the research, design and experiments of the proposed deep learning models*.
8. Gómez-Valverde, J.J., Antón, A., Fatti, G., Liefers, B., Herranz, A., Santos, A., Sánchez,

C.I., **Ledesma-Carbayo, M.J.** (8/8) (2019) "Automatic glaucoma classification using color fundus images based on convolutional neural networks and transfer learning". Biomed. Opt. Express, 10(2):892-913. 10.1364/BOE.10.000892. *Led the research, design and experiments of the proposed convolutional neural network models.*

Pioneering and highly influencial papers till today:

9. **Ledesma-Carbayo, M.J.**, Kellman, P., Arai, A.E., McVeigh, E.R. (4/4) (2007)"Motion corrected free-breathing delayed enhancement imaging of myocardial infarction using non-rigid registration". J. Magn. Reson. Imaging, 26:184-190. 10.1002/jmri.20957. . *Design, implementation and evaluation of the motion correction methods for DEMRI*.
10. Lamare, F., **Ledesma Carbayo, M.J.**, Cresson, T., Kontaxakis, G., Santos, A., Cheze Le Rest, C., Reader, A.J., Visvikis, D. (2/9) (2007)"List-mode-based Reconstruction for Respiratory Motion Correction in PET using Non-rigid Body Transformations". Phys. Med. Biol., 52:5187-5204. 2007.10.1088/0031-9155/52/17/006. *Design, implementation and integration of the deformation field in the reconstruction framework*.
11. **Ledesma-Carbayo, M.J.**, Kybic, J., Desco, M., Santos, A., Sühling, M., Hunziker, P., Unser, M. (1/7) (2005) "Spatio-Temporal Nonrigid Registration for Ultrasound Cardiac Motion Estimation". *IEEE Trans. Med. Imaging*, 24(9):1113-1126.10.1109/TMI.2005.852050 *Design, implementation and experiments of new cardiac motion analysis methods based on spatio-temporal non-rigid registration*.

C.2. Congress

Invited Lectures:

1. Challenges in spatio-temporal medical image processing, Keynote speaker SIPAIM 2022, 7-9 Nov. 2022, Viña del Mar, Chile.
2. Artificial intelligence in TB diagnostics and therapy monitoring. Open challenges and first results in a pediatric TB cohort from Mozambique and Spain INNOVA4TB project funded by EU Horizon 2020 under Marie Skłodowska-Curie grant #823854. 26/10/ 2021
3. Cuantificación y caracterización de lesiones pulmonares debidas al COVID a partir de Tomografía computarizada y la predicción de gravedad junto con datos clínicos y biológicos utilizando algoritmos de aprendizaje automático. Smart Health y COVID19. Federación Española de Empresas de Tecnología Sanitaria (FENIN), Plataforma Española de Innovación en Tecnología Sanitaria, Nanomed-Spain 16 Sep. 2020
4. Roundtable: Creating a pan-European, Transatlantic Collaboration. Researching Impact: Needs-based Healthcare Innovation. Health Venture Lab, Univ. Debrecen, GE Healthcare, EIT Health Catalyst Europe, MIT-LinQ 8 Dec. 2020
5. Artificial intelligence in TB diagnostics 3rd International Meeting on Childhood Tuberculosis. Paediatric Tuberculosis Network European Trials group – ptbnet. Virtual meeting hosted from Sofia (Bulgaria) 24 Sep. 2021

Recent conferences participation and Prices

6. Capellán-Martín, D. et al. (2024). Model Ensemble for Brain Tumor Segmentation in Magnetic Resonance Imaging. In: Baid, U., et al. crossMoDA BraTS 2023 MICCAI Conference Vancuver, Canada Lecture Notes in Computer Science, vol 14669. Springer, Cham. doi.org/10.1007/978-3-031-76163-8_20 Oral presentation First price for pediatric tumor segmentation and Third price for meningioma tumor segmentation
7. Parida, A., Capellán-Martín, D., Jiang, Z., Tapp, A. Et al (6/7) Adult Glioma Segmentation in Sub-Saharan Africa using Transfer Learning on Stratified Finetuning Data. MICCAI 2024, Marrakech, First Price in the Brain Tumor Segmentation Africa (BraTS-Africa) challenge .

Leading positions at international conferences: Sponsorship Chair. 2023 IEEE ISBI, Cartagena de Indias, Colombia; Awards Chair, 2021 IEEE ISBI, Nice, France; Program Chair. 2019 IEEE ISBI, Venice, Italy; Co-chair of the Challenge “Computer Aided Detection of Pulmonary Embolism”. IEEE ISBI 2013, San Francisco, CA USA; Publications & Publicity Chair. 2012 IEEE ISBI, Barcelona, Spain

C.3. Awarded Grants and Research projects

1. TEC-2024/COM-44 **MAGERIT-CM: Medical Augmented Reality and Digital Twins** &D Projects carried out in collaboration between research groups belonging to the universities and research bodies of the Community of Madrid in the Modality of R&D Activities Programs in Technologies. **Principal Investigator- PI** UPM- 225 562 € 2024 – 2027

2. PID2022-141493OB-I00: **IMAGINA: Multimodal integration of clinical data, medical imaging and histopathology for the prediction of cancer immunotherapy response**. National Program for Research Aimed at Knowledge Generation. Ministry of Science and Innovation. **PI** (CO-PI: Andrés Santos) 195 375 €. 2023 – 2026
3. PMP22/00054**:Immune4ALL: Exploring the feasibility of predictive and pharmacodynamic biomarkers of immunotherapy in solid tumours.** Precision Personalised Medicine Research Projects. RTRP (NextGenerationEU). **Principal investigator of participant group**. 135.000 € 2023-2025.
4. PMPTA22/00169: **ALMA: Artificial Intelligence for diagnosis, treatment and prognosis of haematological diseases.** R&D&I projects linked to Personalised Medicine and Advanced Therapies within the ISCIII-CDTI coordinated action of the RTRP (NextGenerationEU). **PI UPM**. 81.917 € 2023-2024.
5. PDC2022-133865-I00: **Response-PoC: Development of two pre-competitive prototypes for monitoring and prediction of treatment response in lung cancer and glioblastoma**. "Prueba de Concepto" projects. RTRP (NextGenerationEU). **PI** (CO-PI: Andrés Santos). 126 500 €. 2022 – 2024.
6. PMP21/00107: **INGENIO: INtegrative GENomic, digital Imaging and clinical information towards Precision Oncology Optimization**. Precision Personalized Medicine within National Strategic Action on Health. RTRP (NextGenerationEU). **PI of participant group and Steering Committee** 120 000 €. 2022-2025.
7. **Predictive models of response to lung cancer immunotherapy based on the integration of biomedical imaging data and molecular biomarkers** 2019. Leonardo Grant for Researchers and Cultural Creators. BBVA Foundation.40 000 € 2019-2021
8. RTI2018-098682-B-I00: **ST-IMMUNO: Spatio-temporal deep-learning for prediction of immunotherapy response**. National Program for Research Challenges of Society. Ministry of Science, Innovation and Universities. **PI (**CO-PI: Andrés Santos) 139 755 €. 2019 – 2021
9. Project #611132. **BIOPSYPEN: Optical Biopsy Pen – A Compact and Low-Cost Diagnostic Tool for Dermatology based on High-performing Integrated OCT**. Call FP7-ICT-2013-10. Small or medium-scale focused research project (STREP). 7th FP (European Commission). **Principal investigator**. 298 824€. 1-10-2013 – 31-3-2017
10. Project #269300. **TAHITI: Improving THerapy And Intervention Through Imaging.** Marie Curie Actions. 7th FP (European Commission). **PI and coordinator** 50 400 €. 2012 –2016.

C.4. Knowledge transfer and exploitation of research results

1. **Catalyst Europe - PhD Fellowship program. Grant #20380 EIT Health (EU)** Coordinator in UPM. 2020. 176 750 €.
2. **Clinical testing and refinement of a non-invasive white cell count prototype for bone marrow transplant patients. MIT Subaward Agreement no. 5710004204**. MIT Deshpande Center for Technological Innovation. **PI**. 2016-2018. 130 250 USD
3. **The Clinical Impact of Pulmonary Vascular Remodeling in Smokers. Brigham and Women's Hospital Fund #113439**. Prime Award No. 4R01HL116473-04 financed by the NIH, Bethesda MD USA. **PI**. 2016-2017. 42 793 USD
4. **Team Leuko: A non-invasive neutrophil test for lymphoma patients. MIT Subaward Agreement no. 5710003870.** Madrid-MIT M+Visión Consortium. **PI**. 2015-16. 63 926 USD
5. **neuroQWERTY: Typing pattern analysis in Parkinson's disease. MIT Subaward Agreement # 5710003835**. Madrid-MIT M+Visión Consortium. **PI**. 2015-2016. 75 207 USD
6. C. Castro-González, I. Butterwoth, A. Bourquard, A. Sánchez-Ferro, A. Pablo-Trinidad, **M.J. Ledesma-Carbayo,** J. Tucker-Schwartz**.** Systems, Devices and Methods for Non-invasive hematological measurements. **U.S. Patent #11,244,452B2** (priority date 16 Oct 2017) PCT/US18/56100. Extended to EPO, Australia, China, Japan, Canada. Owned by MIT and UPM. Licensed to LeukoLabs Inc. (Boston MA USA)
7. G. González Serrano, D. Jiménez Carretero, F.J. Rybicki, **M.J. Ledesma Carbayo**, S. Rodríguez López, R. San José Estepar. Method and system for determining the prognosis of a patient suffering from pulmonary embolism. **US Patent # 9,905,002B2 (priority date 27 Nov. 2013). European patent extension PCT/EP2014/075840**. Owned by MIT, UPM and Brigham and Women's Hospital. Licensed to Imbio LLC (Minneapolis MN USA)
8. A. Santos LLeó, **M.J. Ledesma Carbayo**, P. Guerra Gutiérrez. Fast Computation of Dose Distributions. Registered software (16/2013/5869) 4 Sep 2013, licensed to GMV Soluciones Globales Internet, S.A.U.