

CV Date

07/02/2025

### Part A. PERSONAL INFORMATION

First Name	David		
Family Name	Rodríguez Martínez		
Sex	Male	Date of Birth	03/10/1990
ID number Social Security, Passport	50894501D		
URL Web	<a href="https://drodriguezsrl.github.io/">https://drodriguezsrl.github.io/</a>		
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Open Researcher and Contributor ID (ORCID)	0000-0003-4817-9225		

### A.1. Current position

Job Title	Beatriz Galindo Junior Professor		
Starting date	2024		
Institution	Universidad de Málaga		
Department / Centre	Departamento de Ingeniería de Sistemas y Automática / Escuela de Ingenierías Industriales		
Country	Spain	Phone Number	(0034) 951952332
Keywords	Robotics; Perception; Autonomous Navigation; Mobility; Terramechanics; Localization & Mapping; Space		

### A.2. Previous positions (Research Career breaks included)

Period	Job Title / Name of Employer / Country
2025	Paternity Leave
2023 - 2024	Research Scientist (postdoc) / École Polytechnique Fédérale de Lausanne (EPFL) / Switzerland
2020 - 2023	Systems Engineer / École Polytechnique Fédérale de Lausanne (EPFL) / Switzerland
2018 - 2020	NPI Researcher / European Space Agency (ESA) / Holland
2017 - 2020	PhD Candidate / Tohoku University / Japan
2018 - 2018	Visiting Scientist / German Aerospace Agency (DLR) / Germany
2016 - 2016	Mechanical Engineer Trainee / European Space Agency (ESA) / Holland
2014 - 2015	Research Scholar / West Virginia University / United States of America

### A.3. Education

Degree/Master/PhD	University / Country	Year
PhD in Engineering	Tohoku University / Japan	2020
MSc. in Space Studies	International Space University / France	2016
Ingeniero Industrial Especialidad Mecánica	Universidad Carlos III de Madrid / Spain	2015

## Part B. CV SUMMARY

Since December 2024, I have been appointed as a Beatriz Galindo Junior Professor at the University of Malaga's Department of Systems Engineering and Automation. My work intersects robotics, advanced mechanical design, quantum optics, computer vision, and space. My research has pioneered advancements in faster lunar locomotion and single-photon vision, with the goal of ultimately enabling planetary robots to autonomously explore some of the most extreme environments in our solar system. Over more than ten years, I founded initiatives and led research projects in academic institutions and public organizations based in Europe, USA, and Japan, raising over €1.1M in research grants (as PI) from international, national, and regional public and private institutions. I have been honored with prestigious personal grants and awards, including the ESA-ISU sponsorship, the Japanese MEXT fellowship, Tohoku University's GP Mech award, ESA's Networking Partnering Initiative, and, more recently, the Beatriz Galindo fellowship from the Spanish Ministry of Science, Innovation, & Universities. I have published 5 Q1 scientific journal papers and 12 conference papers in a number of international events. I have been involved in the organization of the International Conference on Space Robotics (iSpaRo) as co-chair in 2024 and member of the program committee in 2025. I have also organized multiple workshops at ICRA 2023, 2024, and 2026, and ERF 2024, as well as several smaller workshops at other venues. Throughout my career, I have been invited to present my work in embassies and universities and more than a dozen events, conferences, and symposiums. I have been Associate Editor in the last two editions of the iSpaRo conference, guest Editor for JINT in 2023, and I actively review papers for a number of journals and conferences including RA-L, Journal of Terramechanics, ICRA, and ISTVS, to name a few. Aside from academia, I served as a Systems Engineer, later Principal Scientist, at EPFL's Space Center from 2020-2022, as an Associate Researcher for ESA from 2018-2020 and as a Visiting Scientist for DLR in 2019. I have supervised (directed or co-directed) 30+ undergrad/grad student projects and coordinated initiatives involving more than 200 students. I am currently co-supervising 1 PhD thesis at the University of Malaga and have indirectly supported the work of 5 PhDs at Tohoku University and EPFL. I currently teach undergraduate courses on the Fundamentals of Control (GIERM209) and Product Automation (GIDIDP311) at UMA's School of Industrial Engineering, and I am recurrently invited to give a Lecture Series on Space Robotics at the International Space University since 2025. Previously, I taught and directed graduate courses at EPFL on Concurrent Engineering of Space Missions (ENG411) and Spacecraft Design and Systems Engineering (EE584), with around 60 students enrolled every year. Currently, I chair the HERMES committee, serve on euRobotics TGs on Space Robotics, Autonomous Navigation, and Perception, and on IEEE RAS TCs on Space Robotics, Multi-Robot Systems, and Computer & Robot Vision; and I participated as a member in NASA SSERVI's Swiss Affiliate Network. A few of the highlights of my career include the project "High-speed Lunar Locomotion," which I led during my PhD. This was a first-of-a-kind collaboration between ESA and Tohoku University and marked the beginning of a new line of research on fast-moving planetary rovers. Leading a team of 6 graduate students, we published the first comprehensive review devoted to high- speed mobility on planetary surfaces, conducted the most extensive wheel-soil interaction testing campaign to date in collaboration with DRL on the effects of speed over planetary soil simulants, and developed the Explorer-1 rover prototype with a novel suspension mechanism, which was later featured by NHK News. After my Ph.D. and while serving at EPFL's Space Center, I founded and directed the Lunar Hub to advance lunar R&D in Switzerland. During this period, I managed over €3M in funding, contributing to innovation/tech transfer projects including ESA-ADRIOS, CAPSYS, RELNAV, led by ClearSpace, and NESTS, led by Ariane Group. Internally, we launched the Lunar Reconnaissance Drone project to explore the feasibility of designing and deploying a compact, fully autonomous drone for high-resolution mapping of hardly accessible lunar regions. The results were presented at major forums and a paper was published in Acta Astronautica. In 2022, I founded HERMES, an international network of field scientists, roboticists, and industry experts on multi-robot cooperation in extreme environments, culminating in workshops at ICRA 2023 and ICRA 2024. In 2023, I joined EPFL's Advanced Quantum Architecture Laboratory (AQUA) as a postdoctoral researcher and PI of the DRAGONFLY project, funded by armasuisse S+T, to craft, for the first time ever, autonomous navigation methods for robots driven by single-photon cameras.

## Part C. RELEVANT ACCOMPLISHMENTS

### C.1. Most important publications in national or international peer-reviewed journals, books and conferences

- 1 **Scientific paper.** D. Rodríguez-Martínez (CA); Dave van der Meer; Junlin Song; Abishek Bera; C. J. Pérez-del-Pulgar; Miguel Angel Olivares-Mendez. 2026. SPICE-HL3: Single-Photon, Inertial, and Stereo Camera dataset for Exploration of High-Latitude Lunar Landscapes. *Scientific Data*. Springer Nature. DOI: 10.1038/s41597-026-06668-8
- 2 **Scientific paper.** R. Tonasso; D. Tataru; H. Rauch; V. Pozsgay; T. Pfeiffer; E. Uythoven; D. Rodríguez-Martínez (CA). 2024. A lunar reconnaissance drone for cooperative exploration and high-resolution mapping of extreme locations. *Acta Astronautica*. Elsevier. 218, pp.1-17. DOI: 10.1016/j.actaastro.2024.02.006
- 3 **Scientific paper.** D. Rodríguez-Martínez (CA); K. Uno; K. Sawa; G. Kudo; G. Hernan Diaz; A. Umemura; S. Santra; K. Yoshida. 2024. Enabling Faster Locomotion of Planetary Rovers with a Mechanically-Hybrid Suspension. *IEEE Robotics and Automation Letters (RA-L)*. IEEE. 9-1, pp.619-626. DOI: 10.1109/LRA.2023.3335769
- 4 **Scientific paper.** D. Rodríguez-Martínez (CA); K. Yoshida. 2017. High-speed lunar rovers. *ROOM: The Space Journal*. 2-12, pp.54-56.
- 5 **Review.** D. Rodríguez-Martínez (CA); M. Van Winnendael; K. Yoshida. 2019. High-speed mobility in planetary surfaces: a technical review. *Journal of Field Robotics*. Wiley. 36-8, pp.1436-1455. DOI: 10.1002/rob.21912

### C.2. Conferences and meetings

- 1 D. Rodríguez-Martínez; C. Pérez del Pulgar. Fast vision in the dark: A case for single-photon imaging in planetary navigation. 18th Symposium on Advanced Space Technologies in Robotics and Automation (ASTRA). European Space Agency. 2025
- 2 C. Pérez del Pulgar; D. Rodríguez-Martínez; L. Gerdes; A. J. García Cerezo. The role of robotics in planetary exploration, contributions from the University of Málaga. VIII Congreso de Ciencias Planetarias (CPESS-8). Universidad de Málaga. 2025
- 3 Pérez del Pulgar, C.; Rodríguez-Martínez, D., The role of robotics in planetary exploration, contributions from the University of Málaga, Europlanet Science Congress - Division for Planetary Sciences Joint Meeting (EPSC-DPS 2025), Helsinki, Finland. 2025
- 4 A. Guerrieri; D. Rodríguez-Martínez; E. Charbon. A Dynamically Reconfigurable Single Board Computer for High-Dynamic Range Space Cameras. *IEEE Space Mission Challenges for Information Technology / Space Computing Conference (SMC-IT/SCC)*. Institute of Electrical and Electronics Engineers. Mountain View, CA. 2024.
- 5 T. Manteaux; D. Rodríguez-Martínez; R. Thilak Rajan. RAPF: Efficient path planning for lunar microrovers. International Conference on Space Robotics (iSpaRo). Institute of Electrical and Electronics Engineers (IEEE). Luxembourg. 2024.
- 6 K. Sawa; K. Uno; G. Kudo; K. Yoshida; D. Rodríguez-Martínez. Development and experimental evaluation of a suspension mechanism for a high-speed lunar rover. *Robotics and Mechatronics Conference (ROBOMECH)*. Japan Society of Mechanical Engineers (JSME). Nagoya, Japan. 2023.
- 7 D. Rodríguez-Martínez; T. Pfeiffer; E. Uythoven; V. Pozsgay; R. Tonasso; E. David; J-P. Kneib. Design of a lunar reconnaissance drone for exploration and mapping of extreme, hardly accessible locations. *Space Resources Week*. European Space Resources Innovation Centre. Luxembourg. 2023.
- 8 V. Pozsgay; D. Rodríguez-Martínez; J-P. Kneib. A lunar reconnaissance drone mission concept for mapping and characterizing polar regions. *Lunar Polar Volatiles Conference (LPVC)*. Lunar and Planetary Institute (LPI). Boulder, CO. 2022.
- 9 T. Pfeiffer; E. Uythoven; D. Rodríguez-Martínez; H. Koizumi; J-P. Kneib. Feasibility study and preliminary design of a lunar reconnaissance drone. *Lunar Surface Innovation Consortium (LSIC) Spring Meeting*. The Johns Hopkins University Applied Physics Laboratory. Laurel, MD. 2022.
- 10 K. Nakagoshi; D. Rodríguez-Martínez; K. Yoshida. A new single-wheel test bed for

fast-moving planetary robots. Aerospace Europe Conference. French National Aeronautical and Astronautical Association (3AF). Bordeaux, France. 2020.

**11D. Rodríguez-Martínez;** F. Buse; M. Van Winnendael; K. Yoshida. The effects of increasing velocity on the tractive performance of planetary rovers. 15th ISTVS Conference. International Society for Terrain-Vehicle Systems (ISTVS). Prague, Czech Republic. 2019.

**12P.** Iliffe; S. Kaethler; E. Xu; **D. Rodríguez-Martínez;** et al. Planetary protection and the search for life on the icy moons of the Solar System: A technology roadmap. 67th International Astronautical Congress (IAC). International Astronautical Federation (IAF). Guadalajara, Mexico. 2016.

### C.3. Research projects and contracts

- 1 Project.** (INSIGHT) Hybrid Intelligence for Space Robotics: Merging Classical and Learned Methods for Robust and Interpretable GNC. Proyectos de Generación de Conocimiento (MICIU). PI: C.J. Pérez del Pulgar. (Universidad de Málaga). 01/09/2025-31/08/2028. 105.000 €. Role: Research Team Member.
- 2 Project.** (ECHO2) End-to-End Control for Handling Operations in Orbit. Discovery Co-Sponsored Research, European Space Agency (ESA). PI: David Rodríguez Martínez. (Universidad de Málaga). 01/10/2025- 30/09/2027. 140.000 €.
- 3 Project.** Single-photon imaging to Explore the Moon. European Space Agency. David Rodríguez-Martínez. (Universidad de Málaga). 01/02/2026-31/12/2026. 20.000 €
- 4 Project.** Monocular SPAD camera for enhanced vision in complex and uncertain environments. armassuisse Science & Technology (S+T) Program, Swiss Federal Department of Defense, Civil Protection and Sport (DDPS). PI: David Rodríguez Martínez. (École Polytechnique Fédérale de Lausanne (EPFL)). 01/04/2024-31/12/2024. 100.000 €.
- 5 Project.** Quantum LiDAR for NLOS applications. armassuisse Science & Technology (S+T) Program, Swiss Federal Department of Defense, Civil Protection and Sport (DDPS). PI: David Rodríguez Martínez. (École Polytechnique Fédérale de Lausanne (EPFL)). 01/03/2024-15/11/2024. 86.000 €.
- 6 Project.** Pre-study on SPAD-based LiDAR Direct Time-of-flight (DTOF) for occluded perception. Armasuisse Science & Technology (S+T) Program, Swiss Federal Department of Defense, Civil Protection and Sport (DDPS). PI: Edoardo Charbon. (École Polytechnique Fédérale de Lausanne (EPFL)). 01/04/2023-31/12/2023. 37.000 €. Role: Scientific Coordinator.
- 7 Project.** (DRAGONFLY) A 1 Mpx SPAD camera with real-time on-chip computation for space applications. armasuisse Science and Technology (S+T), Swiss Federal Department of Defense, Civil Protection and Sport (DDPS). PI: David Rodríguez Martínez. (EPFL). 10/11/2022-31/12/2023. 140.000 €.
- 8 Project.** (NESTS) New European Space Transportation Solutions. European Space Agency (ESA) FLPP. PI: Emmanuelle David (École Polytechnique Fédérale de Lausanne (EPFL)). 01/03/2021-31/07/2021. Role: Project Manager for EPFL.
- 9 Contract.** ADRIOS ClearSpace Service Phase 1B/2. European Space Agency (ESA). PI; Jean-Paul Kneib (EPFL). 01/05/2021-01/05/2023. 1.175.000 €. Role: Project Manager.
- 10 Contract.** Capture system concept validation Swiss Innovation Agency (Innosuisse). Jean-Paul Kneib (École Polytechnique Fédérale de Lausanne (EPFL)). 01/06/2020-31/10/2021. 607.900 €. Role: Project Manager for EPFL.
- 11 Contract.** Impulse-SpaceRelNav: Relative navigation technologies for failed satellite removal. Swiss Innovation Agency (Innosuisse). Jean-Paul Kneib (École Polytechnique Fédérale de Lausanne (EPFL)). 01/11/2019- 01/11/2020. 1.536.759 €. Role Project Manager for EPFL.
- 12 Contract.** High-speed lunar locomotion Tohoku University Graduate School of Engineering (GPMech) Grant. PI: David Rodríguez Martínez. 01/01/2018-01/10/2020. 12.500 €.
- 13 Contract.** Study, analysis and development of a high-speed locomotive system for an improved-mobility lunar prospecting rover European Space Agency (ESA) Networking-Partnering Initiative (NPI) Research Programme. PI: David Rodríguez Martínez. 01/01/2018-01/07/2020.