

CV Date

21/01/2025

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		
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A.1. Current position

Job Title	Beatriz Galindo Junior Fellow & Distinguished 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
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 Fellow and Distinguished Professor at the University of Malaga's Department of Systems Engineering and Automation. My research intersects robotics, advanced mechanical design & sensing, computer vision, and space, focusing on exploring novel robotic mobility systems and autonomous navigation pipelines. I have 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, from lunar permanently shadowed regions to underground martian caves.

I spent most of my early research career abroad, participating in international projects, founding initiatives, and leading research teams across 7 countries and 3 continents. During my PhD, I led the project “High-speed lunar locomotion,” a first-of-a-kind collaboration between ESA and Tohoku University. This marked the beginning of a new line of research on fast-moving planetary rovers, aiming at increasing lunar rover speeds by two orders of magnitude. 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 featuring a novel suspension mechanism, which was later featured by NHK News.

After my Ph.D., I joined EPFL’s Space Center, transitioning from academia for 2.5 years, where I founded and directed the Lunar Hub to advance lunar R&D in Switzerland. Managing over €3M in funding, I contributed to innovation/tech transfer projects including ESA-ADRIOS, CAPSYS, RELNAV, led by ClearSpace, and NESTS, led by Ariane Group. I 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 2024. In April 2023, I returned full-time to academia joining EPFL’s Advanced Quantum Architecture Laboratory (AQUA) as a postdoctoral researcher and PI of the DRAGONFLY project, funded by armasuisse S+T, to craft autonomous navigation methods for robots driven by single-photon cameras.

Throughout my career, I have been honored with prestigious 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 been invited to present my work at multiple universities and events such as the Embassy of Italy in Bern, at the EPFL Space Center Public Seminar Series, and at the Space Tech Summit as part of the “50 Global Innovators” track, to name a few.

I have supervised (directed or co-directed) 29 graduate student projects (7 master’s theses and 22 semester/exchange student projects to date) and coordinated initiatives involving more than 200 students. While not officially supervising doctoral theses, I have supported the work of 5 PhDs at Tohoku University and EPFL. As a postdoc, 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 am a guest editor for the *Journal of Intelligent & Robotic Systems*. Previously, I co-chaired ISPARO2024, was on the ERF2024 Space Robotics Workshop committee, and participated in NASA SSERVI’s Swiss Affiliate Network.

Part C. RELEVANT ACCOMPLISHMENTS

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

CA: corresponding author. (n° x / n° y): position / total authors. If applicable, indicate the number of citations

- 1 **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
- 2 **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
- 3 **Scientific paper**. **D. Rodríguez-Martínez** (CA); K. Yoshida. 2017. High-speed lunar rovers. ROOM: The Space Journal. 2-12, pp.54-56.
- 4 **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 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.
- 2 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.
- 3 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.
- 4 **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.
- 5 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.
- 6 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.
- 7 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.
- 8 **D. 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.
- 9 P. 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.** Monocular SPAD camera for enhanced vision in complex and uncertain environments. armassuise 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 €.
- 2 **Project.** Quantum LiDAR for NLOS applications. armassuise 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 €.
- 3 **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.
- 4 **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. (École Polytechnique Fédérale de Lausanne (EPFL)). 10/11/2022-31/12/2023. 140.000 €.
- 5 **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.
- 6 **Contract.** ADRIOS ClearSpace Service Phase 1B/2 European Space Agency (ESA). PI; Jean-Paul Kneib (École Polytechnique Fédérale de Lausanne (EPFL)). 01/05/2021-01/05/2023. 1.175.000 €. Role: Project Manager for EPFL.
- 7 **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.
- 8 **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.
- 9 **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 €.
- 10 **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.