CV Date	19/10/2023

Part A. PERSONAL INFORMATION

First Name	Antonio		
Family Name	Barrientos Cruz		
Sex	Male	Date of Birth	
ID number Social Security, Passport			
URL Web			
Email Address	antonio.barrientos@upm.es		
Open Researcher and Contributor ID (ORCID)	0000-0003-1691-3907		

A.1. Current position

Job Title	Catedrático de Universidad		
Starting date	2018		
Institution	Universidad Politécnica de Madrid		
Department / Centre	Automatica, Ingeniería eléctrica y electrónica e Informática industrial / Escuela Técnica Superior de Ingenieros Industriales		
Country		Phone Number	
Keywords	Robotics; Automatization and instrumentation; Control		

A.3. Education

Degree/Master/PhD	University / Country	Year
Master Universitario en Instrumentación e Ingeniería Biomédica	Universidad Nacional de Educación a Distancia / Spain	2003
Doctor Ingeniero Industrial	Universidad Politécnica de Madrid / Spain	1986
Ingeniero Industrial, Esp Automática Electrónica	Universidad Politécnica de Madrid / Spain	1982

Part B. CV SUMMARY

Antonio Barrientos is Full professor on Robotics and Automatic Control at the Universidad Politécnica de Madrid . He obtained his MSc degree in Automatic and Electronic Engineering from the Polytechnic University of Madrid (UPM) in 1982. Subsequently, in 1986, he earned his PhD in Robotics from the same institution, garnering prestigious awards such as the "Premio Extraordinario de Doctorado de la UPM 1985" and the "Premio a la mejor Tesis Doctoral por la Fundación José Artigas 1986." His commitment to education was further acknowledged with the "Premio a la mejor labor docente realizada por un profesor menor de 35 años" from the Universidad Politécnica de Madrid in 1992. In 2002, he broadened his academic horizons by obtaining an MSc degree in Biomedical Engineering from the Universidad Nacional de Educación a Distancia.

Since 1988, Antonio has been a dedicated professor in the fields of robotics, computer engineering, and control engineering at the Polytechnic University of Madrid. Over a span of more than 35 years, he has actively engaged in teaching, research, and the transfer of technology within the realm of robotics, contributing to the development of industrial and service robots for various applications.

Antonio Barrientos is a trailblazer in robotics research, with pioneering contributions across diverse domains. His publications span a wide spectrum of topics, including assembly robotics (1991) [https://doi.org/10.1016/0921-8890(91)90005-6], path planning (1994) [https://doi.org/10.1163/156855395X00256], tele-robotics (1998) [https://ieeexplore.ieee.org/document/680632], and the application of evolutionary algorithms in robotics (2007) [https://doi.org/10.1145/1276958.1277102]. Over the last 15 years, his primary focus has been on

field robotics, particularly in surveillance, search and rescue robotics, and advancements in agricultural robotics.

Currently, he holds the position of Head of the Robotics and Cybernetics research group at the Centre for Automatic and Robotic in the Technical University of Madrid – Spanish National Research Council , as well as deputy director of the Department of Automatic Control. His career includes leadership roles in approximately 40 competitive research projects, funded either through public sources or via transfer contracts with companies. Antonio is also an author of several textbooks in Robotics and Manufacturing

Research six-year terms CNEAI: 5 (Last year Granted: 2020) (4 Investigación + 1 Transferencia)
Doctoral theses supervised in the last: 15 (últimos 10 años)
Total Pub. (WoS Core): 142 Total Citations: 1296 (date:: 2023-10-13)
Total Pub. (Scopus): 157 Total Citations: 2007 (date:: 2023-10-13)
Total Pub. (Google Scholar): 347 | Total Citations: 6631 (date:: 2023-10-10)
Citations/doccuments (WoS Core): 9.106 (date:: 2023-10-13)
Total Pub. Q1: 71 | - Total Pub. Q1: 46 (WoS Core) | - Total Pub. Q1: 64 (Scopus)
Total Pub. Q1 (last 10 years): 47 | - Total Pub. Q1 (last 10 years): 32 (WoS Core) | - Total Pub. Q1 (last 10 years): 42 (Scopus)
Total Pub. D1: 52 | - Total Pub. D1: 18 (WoS Core) | - Total Pub. D1: 47 (Scopus)
H index (WoS Core): 18 (date:: 2023-10-13) | H index (Scopus): 23 (date:: 2023-10-13) | H index (Google Scholar): 36 (date: 2023-10-10)
IEEE Senior member
Co-inventor of 5 patents 2 of which obtained with previous examination

Part C. RELEVANT ACCOMPLISHMENTS

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

AC: corresponding author. (nº x / nº y): position / total authors. If applicable, indicate the number of citations

1. **Scientific paper**. Christyan Cruz; Luis Garrido; Jaime del Cerro; Antonio Barrientos. 2023. Autonomous victim detection system based on deep learning and multispectral imagery. Machine Learning: Science and Technology. IOP Science. 4-1. https://doi.org/10.1088/2632-2153/acb6cf
2. **Scientific paper**. Eduardo Gallo; Antonio Barrientos. 2023. GNSS-Denied Semi-Direct Visual Navigation for Autonomous UAVs Aided by PI-Inspired Inertial Priors. Aerospace. MDPI. 10-3. https://doi.org/10.3390/aerospace10030220
3. **Scientific paper**. Ulloa, Christyan Cruz; Dominguez, David; Del Cerro, Jaime; Barrientos, Antonio. 2022. A Mixed-Reality Tele-Operation Method for High-Level Control of a Legged-Manipulator Robot. SENSORS. 22-21. WOS (0)
4. **Scientific paper**. Diego Cerrillo; Antonio Barrientos; Jaime del Cerro. 2022. Kinematic Modelling for Hyper-Redundant Robots–A Structured Guide. Mathematics. MDPI. https://doi.org/10.3390/math10162891
5. **Scientific paper**. Christyan Cruz Ulloa; Guillermo Prieto Sanchez; Jaime del Cerro Giner; Antonio Barrientos Cruz. 2021. Autonomous Thermal Vision Robotic System for Victims Recognition in Search and Rescue Missions. SENSORS. MDPI.
6. **Scientific paper**. Andres Martin-Barrio; Jaime del Cerro; Antonio Barrientos; Helmut Hauser. 2021. Emerging behaviours from cyclical, incremental and uniform movements of hyper-redundant and growing robots. Mechanism and Machine Theory. Elsevier. https://doi.org/10.1016/j.mechmachtheory.2020.104198Helmut

7 **Scientific paper**. Jorge de Leon; Pablo Garcia-Auñon; Antonio Barrientos. 2020. A review on multi-robot systems: current challenges for operators and new developments of interfaces. Revista iberoamericana de automática e informática industrial (RIAI). https://doi.org/10.4995/riai.2020.13100

8 **Scientific paper**. Juan Jesus Roldan; Silvia Terrile; Jaime del Cerro; Antonio Barrientos. 2020. Application of immersive technologies and natural language to hyper-redundant robot teleoperation. VIRTUAL REALITY. Springer Nature. https://doi.org/10.1007/s10055-019-00414-9

9 **Scientific paper**. Pablo Garcia Aunon; Juan Jesus Roldan; Antonio Barrientos. 2018. Monitoring traffic in future cities with aerial swarms: Developing and optimizing a behavior-based surveillance algorithm. COGNITIVE SYSTEMS RESEARCH. Elsevier. ISSN 1389-0417. https://doi.org/10.1016/j.cogsys.2018.10.031

10 **Scientific paper**. Andres Martin Barrio; Silvia Terrile; Antonio Barrientos; Jaime del Cerro. 2018. Hyper-Redundant Robots: classification, state-of -the-art and issues. REVISTA IBEROAMERICANA DE AUTOMÁTICA E INFORMÁTICA INDUSTRIAL. 15-4, pp.351-362. ISSN 1697-7912. https://doi.org/10.4995/riai.2018.9207

11 **Scientific paper**. Juan Jesus Roldan Gomez; Miguel Angel Olivares; Jaime del Cerro Giner; Antonio Barrientos Cruz. 2018. Analyzing and improving multi-robot missions by using process mining. Autonomous Robots. pp.1-19. ISSN 0929-5593. https://doi.org/10.1007/s10514-017-9686-1

12 **Scientific paper**. Andres Martin Barrio; Antonio Barrientos Cruz; Jaime del Cerro Giner. 2018. The Natural-CCD algorithm, a novel method to solve the inverse kinematics of hyper-redundant and soft robots. Soft Robotics. 00-null, pp.1-16. ISSN 2169-5172. https://doi.org/10.1089/soro.2017.0009

13 **Scientific paper**. mario garzon; joao valente; juan jesus roldan; leandro cancar; antonio barrientos; jaime del cerro. 2016. A Multirobot System for Distributed Area Coverage and Signal Searching in Large Outdoor Scenarios. JOURNAL OF FIELD ROBOTICS. 33-8, pp.1087-1106. ISSN 1556-4959. https://doi.org/10.1002/rob.21636

14 **Scientific paper**. Julian Colorado; Claudio Rossi; Chao Zhang; Antonio Barrientos Cruz. 2015. Towards efficient flight: insights on proper morphing-wing modulation in a bat-like robot. Advanced Robotics. 29-24, pp.1599-1610. ISSN 0169-1864. https://doi.org/10.1080/01691864.2015.1082501

15 **Scientific paper**. Lobo, Lorena; Travieso, David; Barrientos, Antonio; Jacobs, David M.2014. Stepping on Obstacles with a Sensory Substitution Device on the Lower Leg: Practice without Vision Is More Beneficial than Practice with Vision. Plos One. 9-6. https://doi.org/Stepping on Obstacles with a Sensory Substitution Device on the Lower Leg: Practice without Vision I

16 **Scientific paper**. Julian David Colorado Montaño; Antonio Barrientos Cruz; Claudio Rossi; Kenny Breuer. 2012. Biomechanics of smart wings in a bat robot: morphing wings using SMA actuators. Bioinspiration & Biomimetics. 7-3, pp.1-16. ISSN 1748-3182.

17 **Scientific paper**. Julian David Colorado Montaño; Antonio Barrientos Cruz; Claudio Rossi; Carlos Parra. 2012. Inertial attitude control of a bat-like morphing-wing air vehicle. Bioinspiration & Biomimetics. pp.1-17. ISSN 1748-3182.

18 **Scientific paper**. Joao Ricardo Pereira Valente; David Sanz Muñoz; Jaime del Cerro Giner; Antonio Barrientos Cruz; Miguel Angel De Frutos Carro. 2012. Near-optimal coverage trajectories for image mosaicing using a mini quad-rotor over irregular-shaped fields. Precision Agriculture. pp.1-12. ISSN 1385-2256.

19 **Book chapter**. Christyan Cruz Ulloa; David Dominguez; Antonio Barrientos Cruz; Jaime del Cerro Giner. 2023. Design and Mixed-Reality Teleoperation of a Quadruped-Manipulator Robot for SAR Tasks. Robotics in Natural Settings. CLAWAR 2022. Lecture Notes in Networks and Systems. Springer. 530. ISBN 978-3-031-15225-2.

20 **Book chapter**. Christyan Cruz Ulloa; Miguel García; Jaime del Cerro Giner; Antonio Barrientos Crux. 2022. Deep Learning for Victims Detection from Virtual and Real Search and Rescue Environments. ROBOT2022: Fifth Iberian Robotics Conference. Lecture Notes in Networks and Systems. Springer. 5903, pp.3-13. ISBN 978-3-031-21061-7.

C.3. Research projects and contracts

1 **Project**. EQUIPO DE ROBOTS PARA MISIONES PARA BUSQUEDA Y RESCATE. Antonio Barrientos Cruz. (Ministerio de Ciencia e Innovación). 01/06/2020-31/05/2023. 193.000 €.

2 **Project**. ROBÓTICA APLICADA A LA MEJORA DE LA CALIDAD DE VIDA DE LOS CIUDADANOS FASE IV (ROBOCITY2030-IV. Antonio Barrientos Cruz. (Comunidad de Madrid). 01/01/2019-31/12/2022. 194.326,53 €.

3 **Project**. PCI2018-093074 ROBOT PARA EL CULTIVO EN HILERAS Y RECICLAJE DE RESIDUOS PARA LA PRODUCCION INTENSIVA DE VEGETABLES Y EFICIENCIA ENERGETICA. AGENCIA ESTATAL DE INVESTIGACIÓN (MINISTERIO DE CIENCIA, INNOVACION Y UNIVERSIDADES). Antonio Barrientos Cruz. (CENTRO DE AUTOMATICA Y ROBOTICA (CAR) - AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (CSIC) UNIVERSIDAD POLITECNICA DE MADRID (UPM)). 01/03/2018-01/03/2021. 75.000 €.

4 **Project**. FRACTAL: Flota de Robots Cooperativos teerestres y aéreos. (Universidad Politécnica de Madrid). 12/2006-12/2009. 156.090 €.

5 **Project**. DPI2014-56985-R, PROTECCIÓN ROBOTIZADA DE INFRAESTRUCTURAS CRÍTICAS. Ministerio de Economía,Industria y Competitividad. Antonio Barrientos Cruz. (Universidad Politécnica de Madrid). From 01/01/2015. 0 €.

6 **Project**. DPI2013-49564-EXP, SEÑALES QUÍMICAS PARA EL CONTROL DE ACTUADORES ROBÓTICOS. Ministerio de Economia y Competitividad. Claudio Rossi. From 01/01/2014. 35.000 €.

7 **Project**. E110505190, SMARTTM: Smart Telemetry Demonstration. European Space Agency. Antonio Barrientos Cruz. From 01/03/2011. 41.400 €.

8 **Project**. E100505776A,E100240776, RHEA: Robot Fleets for Highly Effective Crop Management in Mediterranean Agriculture. Comisión Europea. Antonio Barrientos Cruz. From 06/07/2010. 710.499,94 €.

9 **Project**. DPI 2010_17998, SISTEMAS MULTIROBOT PARA PROTECCION DE GRANDES INFRAESTRUCTURAS. Ministerio de educacion y ciencia. Antonio Barrientos Cruz. From 01/01/2010. 0 €.

10 **Project**. B-0004-ESM2-ERG, Networked Multirobot Systems NM-RS. CENTRO DE ACUSTICA APLICADA Y EVALUACION NO DESTRUCTIVA; European Defence Agency EDA. Antonio Barrientos. (Universidad Politécnica de Madrid). From 01/07/2007.

11 **Contract**. SISTEMA AUTÓNOMO DE ENJAMBRE PARA OPERACIONES TERRESTRE (SENOPTER) Ministerio de Defensa. Antonio Barrientos Cruz. (Universidad Politécnica de Madrid). 25/04/2022-24/11/2023. 54.000 €.

12 **Contract**. MULTI-UAV COORDINATION AND CONTROL INTERFACE V4 (MUAV I2C) Airbus España. Antonio Barrientos Cruz. 01/02/2014-01/02/2018. 0 €.

13 **Contract**. MULTI WAYPOINT TRAJECTORY SIMULATOR- MWTS Indra Sistemas, S.A.. Antonio Barrientos Cruz. From 16/05/2012. 11.000 €.

14 **Contract**. HELIOSTAT CLEANING TEAM-ORIENTED ROBOT Sener Ingenieria y Sistemas, S.A.. Antonio Barrientos Cruz. From 01/03/2010.

C.4. Activities of technology / knowledge transfer and results exploitation

Patent of invention. ES-2323843_B2. Sistema de telemetría empleando comunicación mediante campo magnético para diagnóstico y detección de episodios bruxistas 31/03/2009.