

## Part A. PERSONAL INFORMATION

First name	Eduardo		
Family name	Rocon de Lima		
Gender (*)	Male	Birth date	20-May-1979
ID number (DNI)	51557600H	URL Web:	<a href="http://goo.gl/xESSK">http://goo.gl/xESSK</a>
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### A.1. Current position

Name of University	CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS		
Department	CENTRO DE AUTOMÁTICA Y ROBÓTICA		
Address and Country	CTRA. CAMPO REAL, KM 0.200, 28500 ARGANDA DEL REY		
Phone number	918711900	E-mail:	e.rocon@csic.es
Current position	Investigador Científico	01/02/2002	
UNESCO code	3307, 3311, 3314, 3325		
Key words	Rehabilitation Robotics, neuroscience, robotics, tremor, cerebral palsy		

### A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
2017-present	Investigador Científico/CSIC/Spain
2020-2020	Fulbright Visiting professor/Columbia University/USA
2013-2015	Profesor Visitante Especial/UFES/Brasil
2010-2017	Científico Titular/CSIC/Spain
2009-2010	Investigador RyC/CSIC/Spain
2007-2009	Investigador postdoctoral I3P/CSIC/Spain

### A.3. Education

Tech./ M.S./ PhD	University	Year
DOCTOR INGENIERO INDUSTRIAL	UNIVERSIDAD POLITÉCNICA DE MADRID	2006
INGENIERO EN AUTOMÁTICA Y ELECTRÓNICA INDUSTRIAL	UNIVERSIDADE FEDERAL DO ESPÍRITO SANTO, BRASIL	2001

## Part B. CV SUMMARY

I joined CSIC in 2002, working in an EU-funded project to engineer robotic solutions for tremor suppression (UE QLRT-2001-00536). My Ph.D. thesis (2006) focused on the development of a robotic exoskeleton to suppress tremor by adapting the force or impedance exerted on the affected joints. This work earned me the EURON George Giral Award to the best European Thesis in Robotics. As a post-doc, I lead two funded EU project proposals on robotics technology to understand and suppress tremor, for which I acted as Scientific Coordinator. During this work, I learnt how to coordinate the activities of leading European universities, research centres and SMEs, and established numerous long-lasting collaborations. It also gave me considerable mentoring experience (5 MsC students; 5 PhD students). In 2009, I was awarded a Ramón y Cajal Fellowship, the most competitive and prestigious Postdoctoral Fellowship in Spain. Notably, my proposal was ranked first in engineering.

At the age of 30, I got a Tenured Researcher position at CSIC (2010-2017). This is a remarkable achievement given that the average age to get tenured at CSIC is ~39 years. At the age of 38, I earned a promotion to Research Scientist, the position immediately below Full Professor. Within this position, I have established my own [research group](#), which is now an independent department in my centre, focused on the development of technologies to understand, monitor and restore human motor control. As part of these activities, we have expanded our research from pure robotics to the emerging field of neural engineering, adopting emerging technologies and drawing a stronger inspiration from neuroscience.

Throughout my career, I have participated in many projects (8 European, 1 USA, 13 National), 9 of which I coordinated. As part of this work, I have designed experiments, coordinated ambitious studies, and contributed to the organization of numerous scientific workshops and



meetings. In numbers, my research has generated more than 175 scientific contributions, 1 complete book, 12 book chapters, more than 60 participations in international congresses, more than 30 participations in national congresses, 5 publications in popular science magazines and 8 patents (2 of them transferred and currently in commercial exploitation). Up to the date of this document's preparation, my publications had been cited in more than 6,400 scientific papers, with an **h-factor of 43** (source Google Scholar).

Thus, I have demonstrated my capacity for conducting independent research, and to be a leader in the field. I have also built a large international network of collaborators –I have published with >200 co-authors from world-class institutions.

I am also very active in transferring my research to clinical use. Two of my eight patents have been licensed to companies, one of them, on methods for tremor suppression, to CalaHealth (USA). I am co-founder of two spin-off companies: Technaid, founded in 2006, uses the results from my PhD work is now an established company with 4 commercial products, and Werium Solutions, a more recent spin-off, develops technologies for rehabilitation of children with CP; Werium is currently in the final negotiation phase for a private investment of 3 M€.

My current research team is composed by four postdoctoral researchers (one a Marie Curie Fellow), five PhD students, and one technician. During my yet short independent researcher career (7 years), I have attracted over 5 M€ in direct funding.

## **Part C. RELEVANT MERITS**

### **C.1. Publications**

**1. Mechanical vibration does not systematically reduce the tremor in essential tremor patients**, AUTHORS: Julio Salvador Lora-Millán, Roberto López-Blanco, Juan Álvaro Gallego, Antonio Méndez-Guerrero, Jesús González de la Aleja, Eduardo Rocon.

REF.: Scientific Reports volume 9, Article number: 16476 (2019).

REMARKS: IF: 3.998, Q1 [2019 JCR]. This article describes our research on how afferent stimulation, generated using vibratory stimulation, affects tremor generation. Although the research demonstrated that this pathway does not induce tremor suppression, it helps us to further understand tremor mechanisms. These results are the foundation of the hypothesis that will be tackled in Resonate. A similar approach will be used in Resonate in order to understand the role of neuromodulation in tremor management.

**2. Exoskeleton in Rehabilitation Robotics. Tremor suppression**, AUTHORS: E. Rocon, J.L. Pons. REF: Vol. 69, 138 páginas., ISBN: 978-3-642-17658-6, Springer (STAR Series), Editor Bruno Siciliano. DOI:10.1007/978-3-642-17659-3, 15 de Enero de 2011. REMARKS: The publication of this book is carried out at the invitation of the Springer publishing house after winning the "Georges Giralt PhD Award" for the best robotics thesis in Europe published in 2006.

**3. A robot-based gait training therapy for pediatric population with cerebral palsy: goal setting, proposal and preliminary clinical implementation**, AUTHORS: Cristina Bayón, Teresa Martín-Lorenzo, Beatriz Moral-Saiz, Óscar Ramírez, Álvaro Pérez-Somarriba, Sergio Lerma-Lara, Ignacio Martínez, Eduardo Rocon.

REF.: J. Neuroeng. Rehabil., vol. 15, no. 1, p. 69, 2018.

REMARKS: IF: 2.419, Q1 [2015 JCR]. This article describes the clinical validation of the robotic platform for the rehabilitation of children with Cerebral Palsy, CPWalker. This research has continued to win the "Best Ideas" award from the Diario Médico newspaper. Currently, the candidate is coordinating the multicenter validation of this device. To this end, new prototypes are being manufactured for validation at the Rehabilitation Institute of Chicago (hospital No. 1 in the ranking among rehabilitation hospitals in the United States) and in Brazil. Both institutions are financing the construction of the new prototypes.

**4. Altered Functional Connectivity in Essential Tremor: A Resting-State fMRI Study**, AUTHORS: J. Benito-León, E. D Louis, J.P. Romero, J.A. Hernández-Tamames, E. Manzanedo, J. Álvarez-Linera, F. Bermejo-Pareja, I. Posada, E. Rocon, REF.: Medicina, 94-49, pp. e1936, DOI: 10.1097/MD.0000000000001936, 2015. REMARKS: [Factor de impacto: 5.723, Q1]. This article describes a candidate-led neuroscientific study that attempts to identify how tremor-generating pathologies affect brain structures and their connections. This work was led by the candidate with the collaboration of two of the world's leading experts in movement disorders (Dr. Julián Benito-León, Hospital 12 de Octubre and Dr. Elan Louis, Yale University). We have collaborated with national and international institutions (Yale University)



and it has resulted in a publication in a medical journal with a high impact factor, which demonstrates in a reliable way that the research promoted and coordinated by the candidate is capable of contributing knowledge to different fields of science. Furthermore, this work illustrates the scientific independence of the candidate.

**5. A Neuroprosthesis for Tremor Management through the Control of Muscle Co-contraction**, AUTHORS: J.A. Gallego, E. Rocon, J.M. Belda-Lois, J.L. Pons, REF.: Journal of NeuroEngineering and Rehabilitation, 10(1), 36. DOI:10.1186/1743-0003-10-36, 2013., REMARKS: [Factor de impacto: 2.567] JNER is positioned in the first quartile of the rehabilitation robotics field. This work received the “Highest Potential Impact” award at the 2012 IEEE EMBS Unconference on Rehabilitation Robotics..

**6. Effects of alprazolam on the cortical activity and the tremor of patients with essential tremor**, AUTHORS: J. Ibáñez, J. González de la Aneja, J.A. Gallego, J.P. Romero, R.A. Saiz-Díaz, J. Benito-León, E. Rocon, REF.: PloS One, 9(3), e93159. doi:10.1371/journal.pone.0093159, 2014. REMARKS: Factor de impacto: 3.730, Q1 [2012 JCR]. This article illustrates the new approach to the candidate's research activity, focused on understanding the biological processes of the human being as an inspirational source for the creation of new technological solutions for people with disabilities.

### **C.2. Research projects and grants (as PI)**

P1: NETremor, Plataforma digital en red para la monitorización remota del estado motor y cognitivo, la personalización del tratamiento y la autogestión de los Trastornos del Movimiento, ENTIDAD FINANCIADORA: TED2021-130174B-C31, DURACIÓN: 12/2022-11/2024, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon.

P2: D2W, Desarrollo de una plataforma robótica para ayudar a niños con Parálisis Cerebral a descubrir como caminar, ENTIDAD FINANCIADORA: PID2019-105110RB-C31, DURACIÓN: 07/2020-06/2023, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon.

P3: BenchBalance, Desarrollo de una plataforma robótica para ayudar a niños con Parálisis Cerebral a descubrir como caminar, ENTIDAD FINANCIADORA: H2020- EUROBENCH2020 -779963, DURACIÓN: 07/2020-06/2023, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon.

P4: NewControl, Integrated, Fail-Operational, Cognitive Perception, Planning and Control Systems for Highly Automated Vehicles. ENTIDAD FINANCIADORA: H2020- ECSEL-RIA-826653, DURACIÓN: 04/2019-03/2022, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon.

P5: TEAMM, Technologies to Evaluate and Advance Manipulation and Mobility. RERC, NIDILRR Rehabilitation Engineering Research Centers General, NIGH USA, DURACIÓN: 02/2019-01/2024, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon.

P6: XoSoft, Soft modular biomimetic exoskeleton to assist people with mobility impairments. H2020-ICT-688175, DURACIÓN: 01/02/2016-31/01/2016, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon

P7: ESSENTIAL, Development of an novel non-invasive ambulatory tremor suppression system based on stimulation of the afferent pathways, ENTIDAD FINANCIADORA: DPI2015-72638-EXP, Programa Explora Tecnología DURACIÓN:01/2017-12/2019 INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon

### **C.3. Contracts and technological transfer**

C1: Desarrollo y validación de la plataforma robótica de rehabilitación de niños con Parálisis Cerebral CPWalker. EMPRESA: Shirley Ryan Ability Lab, Rehabilitation Institute of Chicago, Estados Unidos. DURACIÓN: 01/01/2017-31/12/ 2018, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon

C2: NeuroPlat - Plataforma para análisis neuromotor de enfermedades de origen neurológico, MEC PET2006-0792 / Technaid S.L., DURACIÓN: 01/10/2007-31/05/2009, INVESTIGADOR/A PRINCIPAL: Dr. Eduardo Rocon de Lima

C3: Recording Cuff, Hôpital Erasmus, ULB – Bélgica, DURACIÓN: 01/12/2004-31/12/2005. INVESTIGADOR/A PRINCIPAL: Prof. José Luis Pons Rovira

C4: Tremor Coherence Analyzer (TCA), Hôpital Erasme, ULB – Bélgica, DURACIÓN: 01/08/2003-31/12/2004. INVESTIGADOR/A PRINCIPAL: Prof. José Luis Pons Rovira



#### C.4. Patents licensed (3 out of 8)

P1. E. Rocon, J.L. Pons, S. Dosen, D. Farina, Method and neuroprosthetic device for monitoring and suppression of pathological tremors through neurostimulation of the afferent pathways, N° DE SOLICITUD: EP13382169, PAÍS DE PRIORIDAD: Patente europea, FECHA DE PRIORIDAD: 2013, EMPRESA/S QUE LA ESTAN EXPLOTANDO: CalaHealth, Estados Unidos.

P2. R. Raya, R. Ceres, E. Rocon, Dispositivo Y Método Para La Reducción De Los Efectos De La Discapacidad Motora De Alta Heterogeneidad, N° DE SOLICITUD: P201331140, PAÍS DE PRIORIDAD: España, FECHA DE PRIORIDAD: 2013

P3. José L. Pons Rovira, Eduardo Rocon de Lima, Leopoldo Calderón Estévez, Ramón Ceres Ruiz, *Método y dispositivo electrónico e informático de supresión y valoración de temblor y movimiento espástico en periféricos de entrada y de mando (En explotación por TECHNAID S.L.)*, N° DE SOLICITUD: W05122894, PAÍS DE PRIORIDAD: España, FECHA DE PRIORIDAD: 2005, EMPRESA/S QUE LA ESTAN EXPLOTANDO: Technaid S.L.

#### C.5. Current Professional Organization Membership:

Institute of Electrical and Electronics Engineers (IEEE): Senior Member

#### C.6. Selected Awards and Honors

- [A1] [Fundación Caser Dependencia y Sociedad](#) 2017 Award in the R&D category for my work on the development of a robotic platform for the rehabilitation of children with CP.
- [A2] [Juan Lopez de Peñalver Award](#), Spanish Royal Academy of Engineering for early achievements.
- [A3] [Acknowledgment as an asset of CSIC research](#), CSIC, 2017.
- [A4] "Highest Potential Impact" Award for the work "A Wearable Neuroprosthesis for the Suppression of Pathological Tremor", 2012 IEEE EMBC Unconference on Rehabilitation Robotics (San Diego, USA).
- [A5] EMBEC scientific award for the paper [C1]. This prize is funded by the EMBEC organization and awarded on occasion of the EMBEC conferences to young scientists in recognition of a distinguished publication that has appeared in an international journal.
- [A6] Georges Giralt PhD Award as the best PhD thesis in Europe. The Georges Giralt PhD Award is an annual award given by EURON for the best PhD thesis in Europe.
- [A7] Extraordinary award from ETSI Industriales of Universidad Politécnica de Madrid as the best PhD thesis.
- [A8] CEA-IFAC award as the best PhD. Thesis in Robotics in Spain.
- [A9] IMSERSO Infanta Cristina 2005 award in the modality R&D in new technologies and technics for the work entitled "Elimination of technical barriers in the access to computers for people with pathological tremor".

#### C.7. Recent invited talks to internationally established conferences/international advanced schools

- [I1] Keynote speaker at [IMPACT for CP technology summit](#), San Francisco, USA, May 2018. Organized by University of Sidney.
- [I2] Keynote speaker at 2018 6<sup>th</sup> [IEEE International Brazilian Meeting of Biomechatronic](#), São Paulo, Brazil, May 2018. Theme: The Role of Robotics in the Rehabilitation of Children with Cerebral Palsy.
- [I3] Keynote speaker at [International Conference on Mechatronics](#), Bogotá, Colombia, 2017. Theme: The role of Rehabilitation Robotics in the treatment of neurological disorders.
- [I4] Invited speaker at [IEEE ICORR Workshop Human-robot synchronization for assistive technologies](#), 2017.

#### C.8. Samples of public dissemination to the general audience

[TV \(2010-present\)](#) Broadcasting documentary (TVE), Madrid Contigo (interview), Movistar+ (interview), Antena 3 (interview), broadcast show CPWalker (Cuatro,TVE).

[Radio & Newspaper](#) COPE, El Mundo, El País, RNE, SER (Spain), Radio Caracol (Colombia)