CURRICULUM VITAE ABREVIADO (CVA)

***IMPORTANT** – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.*

Part A. PERSONAL INFORMATION

First name	ROBERTO		
Family name	HORNERO SÁNCHEZ		
Gender (*)		Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail		URL Web:	
Open Researcher and Contributor ID (ORCID) (*)			

(*) Mandatory

A.1. Current position

Position	Full Professor (Catedrático de Universidad)		
Initial date	10/03/2010		
Institution	UNIVERSIDAD DE VALLADOLID		
Department/Center	Teoría de la Señal y Comunicaciones e Ing. Telemática		E.T.S. Ingenieros de Telecomunicación
Country	Spain	Teleph. number	983185570
Key words	Biomedical Engineering, Biomedical Signal Processing, Brain Computer Interface, Neural Engineering, Sleep, Machine Learning, Deep Learning, Artificial Intelligence		

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

Period	Position/Institution/Country/Interruption cause
1999-2010	Associate Professor / University of Valladolid / Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
MSc, Telecommunication Engineering	University of Valladolid	1995
PhD, Telecommunication Engineering	University of Valladolid	1998

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

Roberto Hornero is Full Professor in the Department of Signal Theory and Communications at University of Valladolid (Spain) and Director of the Biomedical Engineering Group at the University of Valladolid (GIB-UVa), whose research interests are connected with the field of Big Data in biomedical signals and medical images. GIB-UVa is a Recognized Research Group (University of Valladolid), Consolidated Research Unit (UIC 060, Government of Castile and Leon, Spain), and member of the Biomedical Research Networking Center in Bioengineering, Biomaterials and Nanomedicine (CB19/01/00012, CIBER-BBN, Ministry of Health, Spain). During the last 10 years, he has opened different research lines in the field of biomedical signal processing: automatic processing of pulse oximetry and overnight polysomnography signals to help in the diagnosis of obstructive sleep apnoea, EEG and MEG analysis to help in the diagnosis of neurodegenerative diseases, retinal image analysis to automatically detect lesions associated with Diabetic Retinopathy, and the development of Brain Computer Interface systems to improve the quality of life of disabled people.

An intense research activity of international quality is presented in the specialty of Biomedical Engineering. He is author of 252 articles in JCR indexed journals. In the vast majority of these studies, he has had a leadership role as the lead author or director of the research. He has published in journals with a higher impact index: 125 are indexed in the first quartile (Q1) of

the 252 (49%). Moreover, he is the author of 4 books, 25 book chapters, 51 invited presentations, and more the 500 communications in international conference and national conferences.
He has continuously participated in competitive research projects. Specifically, he has collaborated as a researcher in 6 projects of the European Union, 35 national projects, and 34 regional projects. Of these, he has been Principal Investigator (PI) in 4 European projects, 22 national projects and 13 regional projects.
Regarding the quality of the transfer of results to the productive sector, he has signed 56 R&D contracts with companies or public administrations, of which he has been IP in 41 of them. In addition, he is inventor of 3 granted patents by the United States Patent and Trademark Office, 1 patent in Spain and 10 industrial property registries, which are being exploited by various companies.
He has directed 21 Doctoral Theses and he is currently Advisor of 4 pre-doctoral students aimed at obtaining their Ph.D. degree.
He has obtained 7 prizes for the publication of articles, 2 prizes for the trajectory of the research group GIB, 12 prizes for the development of projects, 5 prizes in international congresses and 22 prizes in national congresses. He has been evaluator of international projects for the European Commission.
He is Fellow of the European Alliance of Medical and Biological Engineering and Science (EAMBES), Senior Member of IEEE Society for Engineering in Medicine and Biology (EMBS) and Vice-President of the Spanish Biomedical Engineering Society (SEIB).

General indicators of quality of scientific production

- **Number of six-year research**: 4 Date of the last granted: 30/07/2020
- **Number of six-year transfer**: 1 Date of the last granted: 26/06/2020
- **Number of doctoral theses supervised**: 21
- **Total citations**: 9989 (Web of Science, Thomson Reuters); 15785 (Google Scholar)
- **Number of papers in the Journal Citation Reports** (JCR): 252
- **Papers indexed in the first quartile (Q1)**: 115
- **Hirsch Index (H)**: 53 (Web of Science), 69 (Google Scholar)

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

C.1. Publications (10 of 252)

1. Authors: Sergio Pérez-Velasco, Diego Marcos-Martínez, Eduardo Santamaría-Vázquez, Víctor Martínez-Cagigal, Selene Moreno-Calderón, Roberto **Hornero.**
   Title: Unraveling motor imagery brain patterns using explainable artificial intelligence based on shapley values.
   Computer Methods and Programs in Biomedicine, vol. 246, pp. 108048, 2024.
2. Authors: Clara García-Vicente, Gonzalo C. Gutiérrez-Tobal, Jorge Jiménez-García, Adrián Martín-Montero, David Gozal, **Roberto Hornero.**
   Title: ECG-based Convolutional Neural Network in Pediatric Obstructive Sleep Apnea Diagnosis.
   Computers in Biology and Medicine, vol. 167, pp. 107628, 2023.
3. Authors: Fernando Vaquerizo-Villar, Gonzalo C. Gutiérrez-Tobal, Eva Calvo, Daniel Álvarez, Leila Kheirandish-Gozal, Félix del Campo, David Gozal, **Roberto Hornero**.
   Title: An explainable deep-learning model to stage sleep states in children and propose novel EEG-related patterns in sleep apnea.
   Computers in Biology and Medicine, vol. 165, pp. 107419, 2023.
4. Authors: Adrián Martín-Montero, Gonzalo C. Gutiérrez-Tobal, Leila Kheirandish-Gozal, Fernando Vaquerizo-Villar, Daniel Álvarez, Félix del Campo, David Gozal, **Roberto Hornero**.
   Title: Heart Rate Variability as a Potential Biomarker of Pediatric Obstructive Sleep Apnea Resolution.
   Sleep, vol. 45 (2), pp. zsab214, 2022.
5. Authors: Eduardo Santamaría-Vázquez, Víctor Martínez-Cagigal, Sergio Pérez-Velasco, Diego Marcos-Martínez, **Roberto Hornero**.
   Title: Robust Asynchronous Control of ERP-Based Brain-Computer Interfaces using Deep

Learning.
Computer Methods and Programs in Biomedicine, vol. 215, pp. 106623, 2022.

6. Authors: Gonzalo C. Gutiérrez-Tobal, Daniel Álvarez, Fernando Vaquerizo-Villar, Andrea Crespo, Leila Kheirandish-Gozal, David Gozal, Félix del Campo, **Roberto Hornero**.
   Title: Ensemble-learning regression to estimate sleep apnea severity using at-home oximetry in adults.
   Applied Soft Computing, vol. 111, pp. 107827, 2021.
7. Authors: Fernando Vaquerizo-Villar, Daniel Álvarez, Leila Kheirandish-Gozal, Gonzalo C. Gutiérrez-Tobal, Verónica Barroso-García, Eduardo Santamaría-Vázquez, Félix del Campo, David Gozal, **Roberto Hornero**.
   Title: A convolutional neural network architecture to enhance oximetry ability to diagnose pediatric obstructive sleep apnea.
   IEEE Journal of Biomedical and Health Informatics, vol. 25 (8), pp. 2906-2916, 2021.
8. Authors: Verónica Barroso-García, Gonzalo C. Gutiérrez-Tobal, Leila Kheirandish-Gozal, Daniel Álvarez, Fernando Vaquerizo-Villar, Pablo Núñez, Félix del Campo, David Gozal, **Roberto Hornero**.
   Title: Usefulness of recurrence plots from airflow recordings to aid in paediatric sleep apnoea diagnosis
   Computer Methods and Programs in Biomedicine, vol. 183, pp. 105083, 2020.
9. Authors: Gonzalo C. Gutiérrez-Tobal, Daniel Álvarez, Andrea Crespo, Félix del Campo, **Roberto Hornero**
   Title: Evaluation of Machine-Learning Approaches to Estimate Sleep Apnea Severity from at-Home Oximetry Recordings
   IEEE Journal of Biomedical and Health Informatics, vol. 23 (2), pp. 882-892, 2019.
10. Authors: **Roberto Hornero**, Leila Kheirandish-Gozal, Gonzalo C. Gutiérrez-Tobal, et al., David Gozal (1/29)
    Title: Nocturnal Oximetry-based Evaluation of Habitually Snoring Children
    American Journal of Respiratory and Critical Care Medicine, vol. 196 (12), pp. 1591-1598, 2017.

C.3. Research projects (4 of 75)

1. Project Reference: **PID2023-148895OB-I00**
   Title: Definición de fenotipos en la apnea del sueño mediante aprendizaje profundo multitarea e inteligencia artificial explicable.
   Financing entity: Agencia Estatal De Investigación, Fondos Feder, 10.13039/501100011033, Ministerio De Ciencia, Innovación y Universidades.
   Principal Investigator: Roberto Hornero Sánchez y Gonzalo César Gutiérrez Tobal
   Affiliation entity: Universidad de Valladolid
   From: 01/09/2024 To: 31/08/2027. Financing received (in euros): 202.500,00 €
   Type of participation: Principal Investigator
2. Project Reference: **CPP2022-009735**
   Title: Modelo automático de predicción temprana de adherencia al tratamiento en pacientes con apnea obstructiva del sueño.
   Financing entity: Ministerio de Ciencia e Innovación, Proyecto de Colaboración Público Privada.
   Principal Investigator: Roberto Hornero Sánchez.
   Affiliation entity: Universidad de Valladolid
   From: 01/12/2023 To: 30/11/2026. Financing received (in euros): 318.429,21 €
   Type of participation: Principal Investigator
3. Project Reference: **PID2020-115468RB-I00**
   Title: Diseño de modelos predictivos automáticos interpretables en la apnea del sueño pediátrica. Aplicación de técnicas de deep learning e interpretación de inteligencia artificial.
   Financing entity: Ministerio de Ciencia, Innovación y Universidades, Programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad.
   Principal Investigator: Roberto Hornero Sánchez
   Affiliation entity: Universidad de Valladolid

From: 01/09/2021 To: 31/08/2024. Financing received (in euros): 302.016 €
Type of participation: Principal Investigator

4. Project reference: **0124_EUROAGE_MAS_4_E**
   Title: Red Internacional de Investigación, Innovación y Transferencia de Tecnologías para la promoción del envejecimiento activo
   Financing entity: Comisión Europea - Programa de Cooperación Interreg V-A España – Portugal (POCTEP) 2021-2027
   Principal Investigator (University of Valladolid): Roberto Hornero Sánchez
   Affiliation entity: Universidad de Valladolid
   From: 01/12/2023 To: 30/11/2026. Financing received (in euros): 1.608.857,32 €.
   Type of participation: Principal Investigator

C.4. Contracts, technological or transfer merits

Contracts (4 of 56)

1. Title: Correlación de Datos Biométricos con Estados Cognitivos y Emocionales en Escenarios de Interior de Vehículo e Investigación de Estímulos Correctivos y Funciones de Control Avanzadas: GENIUS-CASE I
   Financing entity: GRUPO ANTOLIN INGENIERIA S.A.U.
   Affiliation entity: Universidad de Valladolid.
   From: 01/12/2022 To: 31/12/2023.
   Principal Investigator: Roberto Hornero Sánchez. Amount: 123.000 €.
2. Title: System and Method of Diagnosing Adult Obstructive Sleep Apnea
   Financing entity: SERENIUM Inc (California, United States of America).
   Affiliation entity: Universidad de Valladolid.
   From: 13/01/2017 To: 31/12/2019.
   Principal Investigator: Roberto Hornero Sánchez. Amount: 150.000 €.
3. Title: System and Method of Diagnosing Pediatric Obstructive Sleep Apnea
   Financing entity: SERENIUM Inc (California, United States of America).
   Affiliation entity: Universidad de Valladolid.
   From: 01/09/2016 To: 31/12/2019.
   Principal Investigator: Roberto Hornero Sánchez. Amount: 80.000 €.
4. Title: Diseño y desarrollo de una prueba piloto para la ayuda en el diagnóstico domiciliario del síndrome de la apnea-hipopnea del sueño (SAHS).
   Financing entity: Five Flames Mobile, S.L.L.
   Affiliation entity: Universidad de Valladolid.
   From: 15/05/2013 To: 15/05/2015.
   Principal Investigator: Roberto Hornero Sánchez. Amount: 71.240 €.

Patents (2 of 4)

1. Inventors: Roberto Hornero Sánchez, José Víctor Marcos Martín, Daniel Álvarez González, Pedro Mateo Riobo Aboy, Félix del Campo Matías.
   Title: Method and Apparatus for Monitoring Sleep Apnea Severity.
   Publication No.: US Patent Application Publication US 2012/0296182 A1.
   Publication date: 22 de Noviembre de 2012. Application No.: 61/523,403.
   Priority Country: Companies that are exploiting it.
   Owner Entity: Universidad de Valladolid.
   Companies that are exploiting it: SERENIUM Inc (California, EE.UU.).
2. Inventors: Roberto Hornero Sánchez, José Víctor Marcos Martín, Daniel Álvarez González, Pedro Mateo Riobo Aboy, Félix del Campo Matías.
   Title: Method, System, and Apparatus for Automatic Detection of Obstructive Sleep Apnea from Oxygen Saturation.
   Publication No.: US Patent Application Publication US 2011/0224517 A1.
   Publication date: 15 de Septiembre de 2011. Application No.: 13/044,846.
   Priority Country: United States of America.
   Owner Entity: Universidad de Valladolid.
   Companies that are exploiting it: SERENIUM Inc (California, EE.UU.).