

ACADEMIC DEGREES

- 1983 Electrical Engineering, Technical University of Pereira, Colombia.
- 1997 Homologated Title – Industrial Engineering - specialty/section Electricity, Technical University of Catalonia (UPC) - Ministerio de Educación y Cultura, Spain.
- 1989 Bioengineering Postgraduate, UPC.
- 1990 Bioengineering Master, UPC.
- 1996 Doctor in Biomedical Engineering, UPC. Doctoral Thesis: “Contribución al Diagnóstico Automático de Arritmias Cardíacas basado en el Código Minnesota” – Final score: Apto “Cum laude”. July 1996.

Current Position

- **Associate Professor** – Automatic and Control Department, Technical University of Catalonia (UPC), from March 19, 2011
- **Academic Secretary** – Board of Barcelona East School of Engineering (EEBE) from September 1, 2016
- **Coordinator interuniversity PhD Programme on Biomedical Engineering (PD-IB)** at the *Universitat Politècnica de Catalunya* (UPC) – *Zaragoza University* (UZ) from May 2023
- **Senior Researcher** – Biomedical signal processing & interpretation, Institute for Bioengineering of Catalonia (IBEC) from its founding, and Barcelona Institute of Science and Technology (BIST)
- **Senior Researcher** – CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Spain, from 2010
- **Vocal Member** – Board of the Sociedad Española de Ingeniería Biomédica (SEIB) from November 26, 2020
- **Vocal Member** – Board IEEE EMBS Spain Chapter from April 2024

Academic and scientific accreditation and recognitions

- Positive academic evaluation of **four five-year period** (AQU, Spain): 2006, 2010, 2015, 2020, 2025
- Positive scientific evaluation of **three six-year period** (AQU, Spain): 2006, 2011, 2017
- Recognized Autonomic Management period in UPC: 2017, 2020, 2022, 2024
- Certification UPC *en reconeixement als mèrits docents d'especial qualitat*, avaluació períodes 06/2004 – 06/2009; 06/2009 – 06/2014; 06/2014 – 06/2019.
- June 17, 2016 – Award of the best undergraduate final project “**Desenvolupament d'un dispositiu per a l'automatització d'ajusts i verificació de plaques electròniques**” awarded by the Col·legi d'Enginyers Graduats i Enginyers Tècnics Industrials de Barcelona.
- April 2023 – Award for the best oral communication “**Design of an artificial uterus through 3D printing for simulation of hysteroscopic procedures**” awarded by the Global Congress on Hysteroscopy – GCH2023
- June 14, 2024 – Award of the best undergraduate final project “**Desenvolupament d'una eina clínica per a la modelització i sensorització d'un úter**” awarded by the Col·legi d'Enginyers Graduats i Enginyers Tècnics Industrials de Barcelona.
- **Senior Member** Institute of Electrical and Electronics Engineers (IEEE), April 2012 –
- **Senior Member** Engineering in Medicine and Biology Society (EMBS – IEEE), April 2012 –

Area of expertise

Physiological Signal Processing (ECG, Respiratory, Blood Pressure, etc.), Linear and Non-linear Dynamics Analysis, Statistical and Multivariate Interpretation and Analysis of Biomedical Signal Process.

Cardiac and respiratory signal processing, respiratory diseases, respiratory and cardiorespiratory patterns, weaning trials process, chronic heart failure, cardiomyopathy diseases, cardiovascular diseases...

Characterization and analysis of physiological signals and process, classification, validation, and generation of process models.

Researcher Identification:

ORCID: <http://orcid.org/0000-0002-9910-8577>

ResearcherID: L-6544-2014

Scopus: 55901188300

PARTICIPATION IN FUNDED RESEARCH PROJECTS (last 10 years, 9)

- **Smart Health Ecosystem for managing Breathing Illnesses and Optimizing Sleep in patients with COPD, COVID and Sleep Disorders (SHE4BIOS)**
Funded by: MINECO - PID2021-126455OB-I00. Period: 2021 - 2025. PI: Raimon Jané
- **A novel non-invasive respiratory pattern monitoring tool in patients with severe COVID-19 pneumonia. Coordinated Project**
Funded by: Fundació La Marató de TV3 – 202122-31. Period: 2021 - 2024. **PI: Beatriz F. Giraldo**
- **Smart health ecosystem (tools, apps and devices) for personalized medicine and Healthcare in REspiratory diseases and Sleep disorders (SappHiRES)**
Funded by: MINECO - RTI2018-098472-B-I00. Period: 2019 - 2021. PI: Raimon Jané
- **Multimodal physiological biomarkers for noninvasive monitoring and home healthcare of COPD patients with comorbidities (M-Bio4Health)**
Funded by: MINECO - DPI2015-68820-R. Period: 2016 - 2019. PI: Raimon Jané
- **CERCA Program.** Referencia del proyecto: 2017 SGR 1770
Funded by: Secretaria d'Universitats i Recerca del Departament d'Empresa i Coneixement de la Generalitat de Catalunya. Duración: 01/01/2017 – 31/12/2020. PI: Raimon Jané
- **Assessment of Periodic Breathing to Improve Diagnostic and Treatment of Chronic Heart Failure Patients**
Funded by: Instituto de Salud Carlos III (ref. CIBER-BBN) - Intramural Collaboration – 3 groups. Period: 2018. **PI: Beatriz F. Giraldo**
- **Multiscale computational tools to improve diagnosis, risk assessment and treatment in prevalent heart diseases. (MultiTools2Heart)**
Funded by: Instituto de Salud Carlos III (ref. CIBER-BBN) - Intramural project – 6 groups. Period: 2016 – 2017. Project coordinator: J.P Martinez. **PI – SISBIO-UPC-IBEC: Beatriz F. Giraldo**
- **Multimodal analysis and m-Health tools for diagnostic and monitoring improving of Obstructive Lung Disease and Obstructive Sleep Apnea patients (M-OLDOSA)**
Funded by: Instituto de Salud Carlos III (ref. CIBER-BBN) - Intramural project – 4 groups. Submitted Period: 2016 – 2017. PI: Raimon Jané
- **Multimodal biomedical data interpretation in sleep and neurological disorders, obstructive pulmonary diseases, cardiac pathologies and cardiorespiratory interactions (BIOMIND)**
Funded by: Ministerio de Ciencia e Innovación - TEC2010-21703-C03-01. Period: 01.01.2011 - 31.12.2014. PI: Raimon Jané

PARTICIPATION IN ACADEMIC PROJECTS FUNDED

- **Improve teaching in the Graduate Programme in Clinical Engineering**
Funded by: Fundació Univeristat Politècnica de Catalunya. Period: 2011 - 2012. **PI: Beatriz F. Giraldo**

PARTICIPATION IN THE CLINICAL PROTOCOL

Hospital de Sant Joan Despí Moisès Broggi - Consorci Sanitari Integral (CSI) – Sant Joan Despí, Spain

Estimación de la correlación entre la variación en las diferentes medidas de la temperatura del aire espirado con el patrón respiratorio en voluntarios sanos mediante el análisis de señales.

Project: A novel non-invasive respiratory pattern monitoring tool in patients with severe COVID-19 pneumonia. Coordinated Project

Reference: ICPS032/22

Approval Date: July 15, 2022.

Hospital Fundación Oftalmológica de Santander FOSCAL – Bucaramanga, Colombia

Title: *Nuevos índices para la predicción del momento óptimo de la extubación de pacientes asistidos mediante ventilación mecánica, a partir de señales electrofisiológicas*

Clinical Code: Acta No. 10 Approval Date: March 29, 2019.

Title: *Study of the breathing pattern in elderly patients older than 70 years admitted to short-stay unit. Periodic breathing pattern incidence and its influence in patient outcomes*

Hospital de la Santa Creu i Sant Pau – Barcelona, Spain

Clinical PI: Dr. Sergio Herrera, **Researcher PI:** Dr. Beatriz F. Giraldo

Clinical Code: HSP-VEN-2012-168. CEIC Code: 73/2012 Approval Date: January 17, 2013.

INVITED VISITS – CONFERENCE – COURSES (last 10 years, 7)

- Universidad El Bosque, Bogotá, Colombia. Conference: *La bioingeniería entorno al desarrollo de una vida saludable*, September 23 – 24, 2015 (6 hours) (invited by Prof. Jairo Lenin Ramón).
- Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia. Conference 1: *La evolución de la tecnología y de la investigación en el desarrollo de la ingeniería biomédica*. Conference 2: *De la ingeniería hacia la medicina: la ingeniería biomédica*. Conference 3: *La tecnología al servicio de la salud*, April 6 – 9, 2016 (invited by Prof. Germán Oliveros).
- Universidad del Cauca, Popayán, Colombia. Conference: *Evolución de la tecnología y la investigación en el campo biomédico*, May 9 – 13, 2016 (invited by Prof. Carlos Alberto Gaviria).
- Universidad del Cauca, Popayán, Colombia. Course *Procesamiento y análisis de señales biomédicas de*, Programa Maestría en Automática (32 hours), July 31 – August 4, 2017 (invited by Prof. Carlos Alberto Gaviria).
- Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia. Conference 1: *Procesado y Análisis de Señales Biomédicas*. Conference 2: *Impacto y compromiso social de la Ingeniería Biomédica*. Conference 3: *Necesidades de innovación tecnológica en el sector salud para el mejoramiento de la calidad de vida del ser humano*. Course: *Procesamiento digital de señales biomédicas* (8 hours), October 23 – 27, 2017 (invited by Prof. Alejandro Arboleda).
- Escuela Colombiana de Ingeniería Julio Garavito, Bogotá, Colombia. Conference: *La tecnología al servicio de la salud*. Course: *Procesamiento estadístico de señales biomédicas* (50 hours), August – December, 2018 (invited by Prof. Juan Manuel López and Luis Eduardo Rodríguez Cheu).
- Escuela Colombiana de Ingeniería Julio Garavito, Bogotá, Colombia. PhD. Course: *Diseño de experimentos* (20 hours), July 8 – 19, 2019 (invited by Prof. Luis Eduardo Rodríguez Cheu).

Ph.D. STUDENT SUPERVISION

Graduated Ph.D. Students (4)

Ainara Garde Martínez, October 2006 – July 2010 European awarded, “Cum Laude”; *Javier A. Chaparro Preciado*, “Cum Laude”, June 2004 – July 2010; *Andrés Arcenales Viteri*, “Cum Laude”, September 2010 – October 2015; *Javier Rodríguez Benítez*, September 2015 – December 2020 European award, “Cum Laude”; *Hernando González Acevedo*, June 2022 – July 2025, “Laureada”.

Current Ph.D. Students (4)

Alejandro Arboleda, October 2017 –

Leon Balchin, May 2022 –

David Montilla García, September 2024 –

COMMITMENTS

- Academic Secretary – Barcelona East School of Engineering (EEBE), UPC from 01/06/2016 –
- Academic Secretary – Barcelona College of Industrial Engineering (EUETIB), UPC from 27/01/2015 – 30/05/2016
- Academic Secretary – Board of Automatic and Control Department, UPC from 24/04/2008 – 26/01/2015
- Associated Editor and Editorial Board member, *International Journal of Biomedical and Clinical Engineering* (IJBCE), 2014 –

- Associate Editor and Cochairman for the track “Biomedical Signal Processing” for 27th IEEE Engineering in Medicine and Biology Society, EMBC 2005, Shanghai, China. September 1-4, 2005

MEMBERSHIPS

- Senior Member Institute of Electrical and Electronics Engineers (IEEE), from M: March 2001; S.M.: April 2012 –
- Senior Member Engineering in Medicine and Biology Society (EMBS – IEEE), from M: March 2001; S.M.: April 2012 –
- Member Institute for Bioengineering of Catalonia (IBEC), from December 2007 –
- Member Comité Científico de la Cátedra Tecnología, Salud y Sociedad, October 2023 –
- Member Sociedad Española de Ingeniería Biomédica, from October 1995 –
- Member Societat Catalana de Tecnologia, from January 1998 –
- Member Comité Español de Automática (CEA – I FAC), from Juny 1999 –
- Member Centre de Recerca d'Enginyeria Biomèdica from March 1994 – Dec. 2007
- Member Centro de Referencia en Bioingeniería de Cataluña (CREBEC), Dec. 2003 – Dec. 2005.

Reviewer for papers submitted to

IEEE Transactions on Biomedical Engineering; Annals of Biomedical Engineering; Medical & Biological Engineering & Computing; Medical Engineering & Physics; Digital Signal Processing – Elsevier; Computer Methods and Programs in Biomedicine; Entropy; Healthcare Technology Letters; Conf. of the IEEE Engineering in Medicine and Biology Society; Sociedad Española de Ingeniería Biomédica.

PUBLICATIONS – *Beatriz F. Giraldo*

Book Chapters

1. Caminal P., B. Giraldo, M. Vallverdú, L. Domingo, S. Benito, G. Vázquez, D. Kaplan, A. Voss, (2007). “Nonlinear analysis of the respiratory pattern”. Biomechanical Systems technology – Volume 1: Computational Methods. Edited by Cornelius Leondes (University of California, Los Angeles, USA). pp. 297 – 319. ISBN-13: 978-981-270-981-3 / ISBN-10: 981-270-981-9. Publ. Date: Dec 2007.
2. Giraldo B., C. Arizmendi, E. Romero, R. Alquezar, P. Caminal, S. Benito, (2008). “Patients on weaning trials classified with neural networks and feature selection”. Encyclopedia of Healthcare Information Systems - Volume III, MRI-Z. Nilmini Wickramasinghe and Eliezer Geisler, Illinois Institute of Technology, USA – Editors. pp. 1061-1067. ISBN 978-1-59904-889-5.
3. Giraldo B., A. Garde, C. Arizmendi, R. Jané, S. Benito, I. Diaz, (2008). “Support vector machine classification applied on weaning trials patients”. Encyclopedia of Healthcare Information Systems - Volume III, MRI-Z. Nilmini Wickramasinghe and Eliezer Geisler, Illinois Institute of Technology, USA – Editors. pp. 1277-1282. ISBN 978-1-59904-889-5.
4. Arizmendi, C., Viviescas, J., González, H. and Giraldo, B., (2014). Patients classification on weaning trials using neural networks and wavelet transform. In: Studies in Health Technology and Informatics (ed. Mantas, J., Househ, M. S. and Hasman, A.), IOS Press. Volume 202, Integrating Information Technology and Management for Quality of Care: 107-110 (2014) 202:107-10. PMID: 25000027.
5. Giraldo B.F., A. Calvo, B. Martínez, A. Arcenales, R. Jané, S. Benito, (2014). “Blood Pressure Variability Analysis in Supine and Sitting Position of Healthy Subjects”. [XIII Mediterranean Conference on Medical and Biological Engineering and Computing 2013 IFMBE Proceedings](#) Volume 41, 2014, pp 1021-1024. Editors: Laura M. Roa Romero. ISBN: 978-3-319-00845-5 (Print) 978-3-319-00846-2 (Online).
6. Ruiz A.D., Mejía J.S., López J.M., Giraldo B.F., (2019). “Characterization of Cardiac and Respiratory System of Healthy Subjects in Supine and Sitting Position”, In: Morales A., Fierrez J., Sánchez J., Ribeiro B. (eds) Pattern Recognition and Image Analysis. IbPRIA 2019. Lecture Notes in Computer Science, vol 11867. Springer, Cham, pp. 367-377, 2019. https://doi.org/10.1007/978-3-030-31332-6_32. Print ISBN: 978-3-030-31331-9.
7. González, H., Arizmendi, C.J., Giraldo, B.F. (2025). Advances and Perspectives in Processing Techniques and Artificial Intelligence Methods for Biomedical Signal Analysis. In: Meneses-Jácome, A., Schmid-Staiger, U., Guarín C., T.C. (eds) The Circular Bioeconomy in Industry. Waste as a Resource. Springer, Cham. https://doi.org/10.1007/978-3-031-84359-4_20

International Journals (indexed in ISI-JCR) – Publications from 2010

1. Caminal P., B.F. Giraldo, M. Vallverdú, S. Benito, R. Schroeder, A. Voss, (2010). "Symbolic Dynamic Analysis of Relations between Cardiac and Breathing Cycles in Patients on Weaning Trials". *Annals of Biomedical Engineering* - ABME2188 DOI: 10.1007/s10439-010-0027-1 Volume 38, Issue 8 (2010), Page 2542-2552. Cited by 6 (2014-02).
2. Caminal P., Clarià F., Giraldo B., Jané R., Solà J., Vallverdú M. (2010). "Diagnóstico y terapia asistidos por computador. Automatización en el sector Sanitario". *Automática e Instrumentación*, ISSN: 0213-3113, n. 418, Mayo 2010, pp. 52-54.
3. Garde A., L. Sörnmo, R. Jané, B.F. Giraldo, (2010). "Correntropy-based Spectral Characterization of Respiratory Patterns in Patients with Chronic Heart Failure". *IEEE Transactions on Biomedical Engineering*, vol. 57, No. 8, August 2010, pp. 1964 – 1972. TBME-00646-2009. DOI 10.1109/TBME.2010.2044176. Cited by 5 (2014-02).
4. Garde A., R. Schroeder, A. Voss, P. Caminal, S. Benito, and B. F. Giraldo, (2010). "Patients on Weaning Trials Classified with Support Vector Machines," *Physiol. Meas.* ISSN: 0967-3334, Vol: 31, pp: 979-993, 2010.
5. Garde A., L. Sörnmo, R. Jané, B.F. Giraldo, (2010). "Breathing Pattern Characterization in Chronic Heart Failure Patients using Respiratory Flow Signal". *Annals of Biomedical Engineering*, Vol. 38, N°. 12, December 2010, pp. 3572-3580. DOI 10.1007/s10439-010-0109-0.
6. Chaparro J., B. Giraldo, (2011). "Análisis y clasificación del patrón respiratorio de pacientes en proceso de retirada del ventilador mecánico", *Revista Ingeniería Biomédica*, ISSN 1909-9762. Volumen 5, número 9, enero-junio 2011, 43-49. Escuela de Ingeniería de Antioquia-Universidad CES, Medellín, Colombia.
7. Garde A., A. Voss, P. Caminal, S. Benito, and B. F. Giraldo, (2013). "SVM-based Feature Selection to Optimize Sensitivity-Specificity Balance Applied to Weaning". *Computers in Biology and Medicine*, 43 (2013), pp. 533 – 540.
8. Garde A., B.F. Giraldo, R. Jané, T.D. Latshang, A.J Turk, T. Hess, M.M. Bosch, D. Barthelmes, T.M. Merz, J. Pichler Hefti, O.D. Schoch and K.E. Bloch, (2015), "Time-varying signal analysis to detect high-altitude periodic breathing in climbers ascending to extreme altitude". *Medical & Biological Engineering & Computing*, (2015) 53:699–712. DOI 10.1007/s11517-015-1275-x. ISSN 0140-0118. <http://hdl.handle.net/2117/77248>.
9. Arcentales A., P. Caminal, S. Benito, and B. F. Giraldo, (2015). "Classification of patients undergoing weaning from mechanical ventilation using the coherence between heart rate variability and respiratory flow signal". *Physiological Measurement*, 36 (2015) 1439–1452. doi:10.1088/0967-3334/36/7/1439.
10. González-Acevedo H., C.J. Arizmendi, B.F. Giraldo, (2015). "Diseño de un clasificador para pacientes en proceso de extubación (Classifier design for patients on weaning process)". *ITECKNE, Innovación e investigación en Ingeniería*, Vol. 12, N 2. ISSN: 1692-1798. ISSN Digital: 2339-3483. pp 131 – 137.
11. Garde A., L. Sörnmo, P. Laguna, R. Jané, S. Benito, A. Bayés-Genis, B.F. Giraldo, (2017). "Assessment of Respiratory Flow Cycle Morphology in Patients with Chronic Heart Failure". *Medical & Biological Engineering & Computing*. ISSN 0140-0118, Volume 55, Number 2. *Med Biol Eng Comput* (2017) 55:245-255, DOI 10.1007/s11517-016-1498-5.
12. Laguna P., A. Garde, B.F. Giraldo, O. Meste, R. Jané, L. Sörnmo, (2018). "Eigenvalue-based time delay estimation of repetitive biomedical signals". *Digital Signal Processing*, <https://doi.org/10.1016/j.dsp.2018.01.007>.
13. Zirak P., C. Gregori, I. Blanco, A. Fortuna, G. Cotta, P. Bramon, I. Serra, A. Mola, J. Solà-Soler, B.F. Giraldo, T. Durduran, M. Mayos (2018). "Characterization of the microvascular cerebral blood Flow response to obstructive apneic events during night sleep". *Neurophoton*. 5(4), 045003 (2018), doi: 10.1117/1.NPh.5.4.045003.
14. Rodriguez J., S. Schulz, B.F. Giraldo, A. Voss, (2019). "Risk stratification in idiopathic dilated cardiomyopathy patients using cardiovascular coupling analysis". *Front. Physiol.* 10:841. doi: 10.3389/fphys.2019.00841.
15. Pinto J, González H, Arizmendi C, González H, Muñoz Y, Giraldo BF. Analysis of the Cardiorespiratory Pattern of Patients Undergoing Weaning Using Artificial Intelligence. *International journal of environmental research and public health*. 2023 Mar 1;20(5):4430. doi: 10.3390/ijerph20054430. PMID: 36901440; PMCID: PMC10002224.
16. Rodriguez J., Schulz S., Voss A., Herrera S., Benito S., Giraldo B.F., (2023). Baroreflex activity through the analysis of the cardio-respiratory variability influence over blood pressure in cardiomyopathy patients. *Frontiers in Physiology*, Volum 14, 2023. <https://www.frontiersin.org/articles/10.3389/fphys.2023.1184293>. DOI=10.3389/fphys.2023.1184293. ISSN=1664-042X.
17. Clara Gregori-Pla, Peyman Zirak, Gianluca Cotta, Pau Bramon, Igor Blanco, Isabel Serra, Anna Mola, Ana Fortuna, Jordi Solà-Soler, Beatriz F Giraldo Giraldo, Turgut Durduran, Mercedes Mayos, (2023). How does obstructive sleep apnea alter cerebral hemodynamics?, *Sleep*, Volume 46, Issue 8, August 2023, zsad122, <https://doi.org/10.1093/sleep/zsad122>
18. Carlos Arizmendi, Jhon Reinemer, Hernando González, Beatriz F. Giraldo (2024). Diagnosis of patients with chronic heart failure implementing wavelet transform and machine learning techniques. **International Journal of Electrical and Computer Engineering (IJECE)**, [S.I.], v. 14, n. 4, p. 4577-4589, aug. 2024. ISSN 2722-2578. Available at:

<<https://ijece.iaescore.com/index.php/IJECE/article/view/29111>>. Date accessed: 09 dec. 2024.
doi:<http://doi.org/10.11591/ijece.v14i4.pp4577-4589>.

19. González, H., Carlos Julio Arizmendi, & Beatriz F. Giraldo. (2024). Development of a Deep Learning Model for the Prediction of Ventilator Weaning. *International Journal of Online and Biomedical Engineering (iJOE)*, 20(11), pp. 161–178. <https://doi.org/10.3991/ijoe.v20i11.49453>
20. González, H., Arizmendi, C.J., Giraldo, B.F. (2024). Medical Support System for Spontaneous Breathing Trial Prediction Using Nonuniform Discrete Fourier Transform. *International Journal of Online and Biomedical Engineering (iJOE)*, 20(16), pp. 1–14. <https://doi.org/10.3991/ijoe.v20i16.52859>
21. Arboleda, A.; Franco, M.; Naranjo, F.; Giraldo, B.F. (2025). Electromyographic Diaphragm and Electrocardiographic Signal Analysis for Weaning Outcome Classification in Mechanically Ventilated Patients. *Sensors* 2025, 25, 6000. <https://doi.org/10.3390/s25196000>.
22. H. González Acevedo, C. Julio Arizmendi and B. F. Giraldo (2025). "Analysis of Respiratory Flow Signals Using Poincaré Plot Descriptors for Machine Learning-Based Prediction of Ventilator Weaning Success," in *IEEE Access*, vol. 13, pp. 170523-170534, 2025, doi: 10.1109/ACCESS.2025.3615184.
23. H. González Acevedo, J.L. Rodríguez Sotelo, C. Arizmendi Pereira, B. F. Giraldo Giraldo (2025). "Prediction of weaning failure using time-frequency analysis of electrocardiographic and respiration flow signals", *Biomedical Signal Processing and Control*, vol 108, pp. 1-12, 2025. ISSN 1746-8094, <https://doi.org/10.1016/j.bspc.2025.107872>.

International Conferences papers (from 2015)

1. Arizmendi C., J. Viviescas, H. González, B.F. Giraldo, (2015). "Analysis of the interaction between the breathing pattern and heart rate in patients assisted by mechanical ventilation", *International Conference on Complex Medical Engineering (CME 2015)*, Okayama, Japan, June 18-21, 2015. ISBN: 978-4-9902522-3-6.
2. Giraldo B.F., J. Rodríguez, P. Caminal, A. Bayés-Genís, A. Voss, (2015). "Cardiorespiratory and Cardiovascular Interactions in Cardiomyopathy Patients using Joint Symbolic Dynamic Analysis", *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)*, Milano, Italy, August 25 - 29, 2015. Pp. 3016-309. ISBN: 978-1-4244-9270-1/15.
3. Solà-Soler J., B.F. Giraldo, J.A Fiz, R. Jané, (2015). "Cardiorespiratory Phase Synchronization in OSA subjects during wake and sleep states", *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)*, Milano, Italy, August 25 - 29, 2015. Pp. 7708-7711. ISBN: 978-1-4244-9270-1/15.
4. Arcentales A., P. Rivera, P. Caminal, A. Voss, A- Bayés-Genís, B.F. Giraldo, (2016). "Analysis of Blood Pressure Signal in Patients with different Ventricular Ejection Fraction using Linear and Non-linear Methods", *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)*, Orlando, EEUU, August 16 - 20, 2016. pp. 2700-2703. ISBN: 978-1-4577-0220-4/16. DOI: 10.1109/EMBC.2016.759167.
5. Argerich S., S. Herrera, S. Benito, B.F. Giraldo, (2016). "Evaluation of Periodic Breathing in Respiratory Flow Signal of Elderly Patients using SVM and Linear Discriminant Analysis", *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)*, Orlando, EEUU, August 16 - 20, 2016. pp. 4276-4279. ISBN: 978-1-4577-0220-4/16. DOI: 10.1109/EMBC.2016.759167.
6. Solà-Soler J., B.F. Giraldo, J.A. Fiz, R. Jané, (2016). "Study of Phase Estimation Methods to analyze Cardiorespiratory Synchronization in OSA patients", *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)*, Orlando, EEUU, August 16 - 20, 2016. pp. 4280-4284. ISBN: 978-1-4577-0220-4/16. DOI: 10.1109/EMBC.2016.759167.
7. Arizmendi C., J.I. Trapero, B.F. Giraldo, (2016). "Cardiorespiratory Interaction using Nonlinear Data Processing Techniques in Patients Undergoing Test Tube T", *VI Latin American Conference in Biomedical Engineering CLAIB2016*, Bucaramanga, Santander, Colombia, October 26th to 28th, 2016, Id 190. *In press*.
8. Arcentales, A., M. Raza, B. Giraldo, (2017). "Characterization of HRV and QRS slope during audiovisual stimulation", *IEEE CHILECON2017*, 18-20 October 2017, pp. 1-4. ISBN: 978-1-5386-3123-2.
9. Rodríguez J., A. Voss, P. Caminal, A. Bayés-Genís, Giraldo B.F., (2017). "Characterization and classification of patients with different levels of cardiac death risk by using Poincaré plot analysis", *39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)*, Jeju, Korea, July 11 – 15, 2017. pp. 1332-1335. ISBN: 978-1-5090-2809-2. DOI: 10.1109/EMBC.2017.8037078
10. Rodríguez J.C., Arizmendi C.J., Forero C.A., Lopez S.K., Giraldo B.F. (2017) "Analysis of the respiratory flow signal for the diagnosis of patients with chronic heart failure using artificial intelligence techniques". In: Torres I., Bustamante J., Sierra D. (eds) *VII Latin American Congress on Biomedical Engineering CLAIB 2016*,

- Bucaramanga, Santander, Colombia, October 26th -28th, 2016. IFMBE Proceedings, vol 60. Springer, Singapore. pp. 481-484, ISBN: 978-981-10-4085-6. https://doi.org/10.1007/978-981-10-4086-3_121
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