Julián D. Arias Londoño

July, 2024

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Summary

Julián D. Arias Londoño received a B.S. degree in Electronic Engineering and MEng. Degree in Engineering - Industrial Automation from the Universidad Nacional de Colombia (UNAL), Manizales, Colombia, in 2005 and 2007, respectively. In 2010, he completed a dual PhD in Computer Science and Automatics from the Universidad Politécnica de Madrid (UPM), Spain, and the UNAL. He also received the European Doctorate Mention from the UPM. From 2012 to 2021, he was part of the Dpt. of Systems Engineering, Universidad de Antioquia, Medellín, Colombia, appointed in 2020 as a Full Professor. In March 2022, Julián joined the Dpt. of Signals, Systems, and Radiocommunications at UPM, Spain, as a Research Visitor under a María Zambrano grant. His main research is in the field of pattern recognition, data mining, and machine learning applied to biosignal processing, automatic classification of biological sequences, and mining of massive data sets. He is a Senior member of the Institute of Electrical and Electronics Engineers and a member of the Ellis network. During the development of his PhD in Spain, as part of two Short Time Scientific Missions funded by the COST action 2103, he was also PhD research visitor at the Computer Science Department, University of Crete, Greece. During his career, he has authored 30 JCR journal papers and more than 25 papers in top international peer-reviewed conferences. According to Google Scholar, his research accumulates more than 2600 citations, with an h-index of 26. His disposition for collaboration and professional growth has allowed him to actively participate in national and international research networks, trying to make relevant contributions to the state-of-the-art of his discipline and use those contributions to develop practical solutions to real problems in the industry.

Education

2007–2010 **Doctor of Systems Engineering and Automatics**, *Universidad Politécnica de Madrid, Spain - Universidad Nacional de Colombia, Colombia.*, **European Doctorate Mention**

Dissertation *Stochastic characterization of nonlinear dynamics for the automatic evaluation of voice quality.* Thesis awarded Summa Cum Laude.

supervisors Juan I. Godino Llorente PhD., Germán Castellanos Domínguez PhD.

2005–2007 **Master of Engineering - Industrial Automation**, *Universidad Nacional de Colombia*, Manizales

Master thesis *Dynamic feature extraction by using discriminative hidden Markov models*

supervisor Germán Castellanos Domínguez, PhD.

2000–2005 **Electronic Engineering**, *Universidad Nacional de Colombia*, Manizales

Minor thesis *Dynamic characterization of pith contours by using hidden Markov models*

supervisor Julio F. Suárez, MSc.

Academic Experience

2022 - **Visiting Researcher (María Zambrano Fellowship)**, *ETSIT, Universidad Politécnica de Madrid*, Madrid, Spain
Courses:
– Optimization Techniques for Big Data

2020 - 2021 **Full Professor**, *Universidad de Antioquia*, Medellín, Colombia
Courses:
– Introduction to Machine Learning
– Introduction to Deep Learning

2016 - 2020 **Associate Professor**, *Universidad de Antioquia*, Medellín, Colombia
Courses:
– Introduction to Machine Learning
– Introduction to Deep Learning

2012 - 2016 **Assistant Professor**, *Universidad de Antioquia*, Medellín, Colombia
Courses:
– Introduction to Machine Learning
– Discrete-event systems simulation.
– Probabilistic Machine Learning

2010 - 2011 **Assistant Professor**, *Antonio Nariño University*, Bogotá D.C, Colombia
Courses:
– Digital Signal Processing.
– Digital Circuits.

March-December 2009 **Research Assistant**, *Bioengineering and Optoelectronic Group*, Universidad Politécnica de Madrid, Madrid
Spain

2007-2010 **Research Assistant**, *Control and Digital Signal Processing Group*, Universidad Nacional de Colombia, Manizales
Colombia

August-December 2007 **Instructor**, *Department of Physics Engineering*, Universidad Nacional de Colombia, Colombia
Courses:
– Introduction to Analog and Digital Electronics.

February-June 2007 **Instructor**, *Department of Systems Engineering*, University of Caldas, Colombia
Courses:
– Computer architecture.
– Microprocessors.

July-December 2006 **Research Assistant**, *Bioengineering and Optoelectronic Group*, Universidad Politécnica de Madrid, Madrid Spain

February-June 2006 **Instructor**, *Department of Physics Engineering*, Universidad Nacional de Colombia, Colombia
Courses:
– Introduction to Analog and Digital Electronics.

February-June 2006 **Instructor**, *Department of System Engineering*, Universidad Cooperativa de Colombia, Colombia
Courses:
– Computer architecture.
– Introduction to expert systems and pattern recognition systems.

2004-2006 **Research Assistant**, *Control and Digital Signal Processing Group*, Universidad Nacional de Colombia, Colombia

Research Projects

2022-2024 PD-RADAR: Screening and monitorization of Parkinson's disease using Radar-based biometrics" (TED2021-131688B-I00). Financed by the Spanish Minister of Science and Innovation.

Position: Co-Investigator.

2022-2024 Implementation of biofluid markers for early detection of Alzheimer's disease and other neurodegenerative diseases in Colombia (1R21AG079574-01). Financed by NIH (USA)

Position: Co-Investigator.

2022-2025 Diagnosis and evaluation of Parkinson's disease using motor and non-motor biometrics. Financed by the Spanish Minister of Science and Innovation.

Position: Co-Investigator.

2020-2022 Artificial Intelligence and data-based technologies for understanding, detecting, and analyzing COVID-19" (CM-RIS3-REACT210024193B). Financed by Comunidad de Madrid.

Position: Co-Investigator.

2018-2021 Convergent phospholipidic factors in tautopathy, cognitive damage and vascular dementia. Financed by the Colombian Department of Science, Technology and Innovation.

Position: Co-Investigator. Responsible for data analysis.

2016-2018 Fraud detection in credit and debit card transactions. Financed by the Ruta N corporation, Universidad de Antioquia, and the Company E.G.M. Ingeniería sin Fronteras S.A.S.

Position: Principal Investigator

2014-2016 Computational tool for the prediction of dissolution profiles of solid oral pharmaceutical forms. Financed by Humax Pharmaceutical S.A. and Universidad de Antioquia.

Position: Principal Investigator.

2013-2016 Discriminant Analysis of Speech Signals from Patients with Parkinson's Disease in two different stages: pre-clinical and advanced, aiming to the development of a computer-aided medical diagnostic tool. Financed by the Colombian Department of Science, Technology and Innovation.

Position: Co-Investigator.

2011 Analysis and characterization of nonlinear dynamics in voice signals for their use in automatic systems that support the diagnosis and clinical treatment of laryngeal pathologies. Financed by Universidad Antonio Nariño.

Position: Principal Investigator.

2011 Human Gait Analysis by means of Nonlinear Feature Extraction Techniques. Financed by Universidad Antonio Nariño.

Position: Co-Investigator.

2007-2010 Voice Remote Diagnosis from Biometric Measurements and other Parameterizations. Spanish: DAREVOZ: Diagnóstico asistido remoto por la voz a partir de medidas biométricas y otras parametrizaciones. Financed by the Spanish Minister of Science and Education.

Position: Research assistant.

2006 Analysis of stochastic variability in speech and ECG signals. Financed by Universidad Politécnica de Madrid, Spain - Universidad Nacional de Colombia.

Position: Research assistant.

2006 Automatic Identification of Hypernasal Speech in Children with Cleft Lip and Palate by means of Acoustic Voice Analysis. Financed by the Colombian Department of Science, Technology and Innovation.

Position: Research assistant.

2005 Auscultation and Electrocardiographic Registration on the Web to Support Medical Teleconsultation. Financed by the Colombian Department of Science, Technology and Innovation.

Position: Research assistant.

2004 Automatic Identification of Dysphonic Voices in the City of Manizales (Colombia). Financed by Universidad Nacional de Colombia.

Position: Research assistant.

Stays at Foreign Research Centers

June-July 2009 **Computer Science Department**, *University of Crete*, Crete, Greece
Supported by: European Cooperation in Science and Technology - COST

supervisor Prof. Yannis Stylianou, PhD. Currently at Apple.

October-December 2009 **Computer Science Department**, *University of Crete*, Crete, Greece
Supported by: European Cooperation in Science and Technology - COST

supervisor Prof. Yannis Stylianou, PhD.

March-December 2009 **EUIT de Telecomunicación**, *Department of Circuits and Systems Engineering*, Universidad Politécnica de Madrid, Spain

supervisor Prof. Juan I. Godino-Llorente, PhD.

September-October 2008 **EUIT de Telecomunicación**, *Department of Circuits and Systems Engineering*, Universidad Politécnica de Madrid, Spain

supervisor Prof. Juan I. Godino-Llorente, PhD.

July-December 2006 **EUIT de Telecomunicación**, *Department of Circuits and Systems Engineering*, Universidad Politécnica de Madrid, Spain

supervisor Prof. Juan I. Godino-Llorente, PhD.

Publications

Recent pre-prints

2024 Y. Sun, A. Guerrero-López, J.D. Arias-Londoño, J.I. Godino-Llorente. Automatic semantic segmentation of the osseous structures of the paranasal sinuses. *bioRxiv*, DOI 10.1101/2024.06.21.599833, 2024.

2024 E.J. Ibarra, J.D. Arias-Londoño, J. Godino-Llorente, D.D. Mehta, M. Zañartu. Subject-specific modelling of the Subglottal Pressure Estimation From Neck-Surface Vibration Signals by Domain Adaptation. *TechRxiv*, TechRxiv.171173471.15232421/v1, 2024.

2024 A. Guerrero-López, J.D. Arias-Londoño, S. Shattuck-Hufnagel, J. Godino-Llorente. MARTA: a model for the automatic phonemic grouping of the parkinsonian speech. *TechRxiv*, TechRxiv.171084943.31044695/v1, 2024.

Journals and selected conferences (last 10 years)

2024 E. Hernández-García, A. Guerrero-López, J. Arias-Londoño, J. Godino-Llorente. A voice and speech corpus of patients who underwent upper airway surgery in pre- and post-operative states. *Scientific Data*, vol. 11, 746, 2024.

2024 G. Uribe-Guerra, D. Múnera-Ramírez, J.D. Arias-Londoño.. Feed formulation using multi-objective Bayesian optimization. *Computers and Electronics in Agriculture*, vol. 224, 109173, 2024.

2024 E. Luque-Buzo, M. Bejani, J.D. Arias-Londoño, J.A. Gómez-García, F. Grandas-Pérez, J.I. Godino-Llorente. Estimation of the cyclopean eye from binocular Smooth Pursuit Tests. *IEEE Transactions on Cognitive and Developmental Systems*, In press, 2024.

2024 J.D. Arias- Londoño, J.I. Godino-Llorente. Analysis of the Clever Hans Effect in COVID-19 Detection Using Chest X-Ray Images and Bayesian Deep Learning. *Biomedical Signal Processing and Control*, vol. 90, 105831, 2024.

2023 J.D. Arias- Londoño, A. Moure-Prado, J.I. Godino-Llorente. Automatic identification of lung opacities due to COVID-19 from chest X-Ray images. Focussing the attention on the lungs. *Diagnostics*, vol. 13, 1381, 2023.

2023 E.J. Ibarra, J.D. Arias- Londoño, M. Zañartu, J.I. Godino-Llorente. Towards a Corpus (and Language)-Independent Screening of Parkinson's Disease from Voice and Speech through Domain Adaptation. *Bioengineering* vol. 10, no. 11, 1316, 2023.

2023 F.A. Bedoya-Guzmán, M. Pacheco-Herrero, I.D. Salomon-Cruz, A.M. Barrera-Sandoval, J.A. Gutierrez Vargas, J.G. Villamil-Ortiz, C.A. Villegas Lanau, J.D. Arias-Londoño, E. Area.Gomez, G.P. Cardona-Gomez. BACE1 and SCD1 are associated with neurodegeneration. *Front. Aging Neurosci.* 15:1194203, 2023.

2023 M. Bejani, E. Luque-Buzo, A. Burlaka-Petrash, J.A. Gómez-García, J.D. Arias- Londoño, F. Grandas-Pérez, J. Grajal, J.I. Godino-Llorente. Baseline wander removal applied to smooth pursuit eye movements from parkinsonian patients. *IEEE Access*, vol. 11, 2023.

2021 L. Moro-Velázquez, J. Gómez-García, J.D Arias-Londoño, N. Dehak, J.I. Godino-Llorente. Advances in Parkinson's Disease detection and assessment using voice and speech: A review of the articulatory and phonatory aspects. *Biomedical Signal Processing and Control*, vol 66. 102418, 2021.

2021 J. Gómez-García, J.D Arias-Londoño, J.I Godino-Llorente. On the design of automatic voice condition analysis systems. Part III: review of acoustic modelling strategies. *Biomedical Signal processing and Control*, vol 66. 102049, 2021.

2020 J.D Arias-Londoño, J. Gómez-García, L. Moro-Velázquez, J.I. Godino-Llorente. Artificial Intelligence applied to chest X-Ray images for the automatic detection of COVID-19. A thoughtful evaluation approach. *IEEE Access*, vol. 8, 2020.

2020 J. Villar-Vesga, J. Henao-Restrepo, D. C Voshart, D. Aguillón, A. Villegas, D. Castaño, J.D. Arias-Londoño, I.S. Zuhorn, L. Ribosvki, L. Barazzuol, G. P. Cardona-Gómez, R. A. Posada-Duque. Differential profile of systemic extracellular vesicles from sporadic and familiar Alzheimer's disease leads to neuroglial and endothelial cell degeneration. *Frontiers in Aging Neuroscience*, 12:587989. 2020.

2020 J.D Arias-Londoño, J. Gómez-García, J.I. Godino-Llorente. Multimodal and multi-output deep learning architectures for the automatic assessment of voice quality using the GRB scale. *IEEE Journal of Selected Topics in Signal Processing*, vol. 20, no. 2, pp 413-422, 2020.

2020 A. M. Sabogal-Guáqueta, J.D. Arias-Londoño, J.A. Gutierrez-Vargas, D. Sepulveda-Falla, M. Glatzel, C.A. Villegas-Lanau, G.P. Cardona-Gómez. Common disbalance in the brain parenchyma of dementias: Phospholipid profile analysis between CADASIL and sporadic Alzheimer's disease. *BBA - Molecular Basis of Disease*, vol. 1866, no. 1, 165797, 2020.

2020 J.D. Arias-Londoño, J.A. Gómez-García. Predicting UPDRS Scores in Parkinson's Disease Using Voice Signals: A Deep Learning/Transfer-Learning-Based Approach. In: Godino-Llorente J.I. (eds) *Automatic Assessment of Parkinsonian Speech. AAPS 2019. Communications in Computer and Information Science*, vol 1295. Springer, Cham.

2019 J. Jaramillo, J.D. Arias-Londoño . Fail Detection in WfM/BPM Systems from Event Log Sequences Using HMM-Type Models. In: Orjuela-Cañón A., Figueroa-García J., Arias-Londoño J. (eds) *Applications of Computational Intelligence. Communications in Computer and Information Science*, vol 1096, pp 223-234. Springer, Cham, 2019.

2019 A. Tamayo, J. Arias, D. Burgos, G. Quiroz. Sentiment Analysis of News Articles in Spanish using Predicate Features. *Lenguaje*, vol. 47, no. 2, pp 235-267, 2019.

2018 M.A. Giraldo Londoño, J.F. Duitama, J.D. Arias-Londoño. Cost-Balance Setting of MapReduce and Spark-Based Architectures for SVM. In: Orjuela-Cañón A., Figueroa-García J., Arias-Londoño J. (eds) Applications of Computational Intelligence. *Communications in Computer and Information Science*, vol 833, pp 137-149. Springer, Cham, 2018.

2018 J.D. Arias-Londoño, J.A. Gómez-García, L. Moro-Velázquez, J.I. Godino-Llorente, ByoVoz Automatic Voice Condition Analysis System for the 2018 FEMH Challenge, *IEEE International Conference on Big Data*, 2018.

2018 A. M. Sabogal-Guaqueta, J. G. Villamil, J.D. Arias-Londoño and G.P. Cardona-Gómez, Inverse Phosphatidylcholine/Phosphatidylinositol Levels as Peripheral Biomarkers and Phosphatidylcholine/Lysophosphatidylethanolamine-Phosphatidylserine as a Hippocampal Indicator of Postischemic Cognitive Impairment in Rats. *Frontiers in Neuroscience, section Neurodegeneration*, vol. 12, Paper 989, 2018.

2018 A. M. Sabogal-Guáqueta, R. Posada-Duque, Natalie Charlotte Cortes, J.D. Arias-Londoño, G.P. Cardona-Gómez. Changes in the hippocampal and peripheral phospholipid profiles are associated with neurodegeneration hallmarks in a long-term global cerebral ischemia model: Attenuation by Linalool. *Neuropharmacology*, vol. 135, pp 555-571, 2018.

2018 J.G. Villamil-Ortiz, A. Barrera-Ocampo, J.D. Arias-Londoño, A. Villegas, F. Lopera, G.P. Cardona-Gómez. Differential Pattern of Phospholipid Profile in the Temporal Cortex from E280A-Familiar and Sporadic Alzheimer's Disease Brains. *Journal of Alzheimer's Disease*, vol. 61, no. 1, pp 209-219, 2018.

2018 J. Uirbe, J.D. Arias-Londoño, and A. Perera-Lluna. Protein Disorder Prediction Using Jumping Motifs from Torsion Angles Dynamics in Ramachandran Plots, *BIOSTEC-BIOINFORMATICS* 2018. Best paper student award.

2017 J. Uirbe, J.D. Arias-Londoño, and A. Perera-Lluna. Protein disorder prediction using information theory measures on the distribution of the dihedral torsion angles from Ramachandran plots, *BIOSTEC- BIOINFORMATICS* 2017. Best paper award.

2016 G. Villamil-Ortiz, A. Barrera-Ocampo, D. Piedrahita, C.M. Velásquez-Rodríguez, J.D. Arias-Londoño and G.P. Cardona-Gómez. BACE1 RNAi Restores the Composition of Phosphatidylethanolamine-Derivates Related to Memory Improvement in Aged 3xTg-AD Mice. *Front. Cell. Neurosci.* 10:260. 2016.

2016 G. Zapata-Zapata, J.D. Arias-Londoño, J.F. Vargas-Bonilla, J.R. Orozco-Arroyave. On-line signature verification using Gaussian Mixture Models and small-sample learning strategies. *Redin*, no. 79, pp 84-97, 2016.

2016 J.R. Orozco-Arroyave, F. Hönig, J.D. Arias-Londoño, J. F. Vargas-Bonilla, K. Daqrouq, S. Skodda, J. Rusz and E. Nöth. Automatic detection of Parkinson's disease in running speech spoken in three different languages. *The Journal of the Acoustical Society of America.* vol. 139, no. 1, pp 481-500, 2016.

2015 J.D. Arias-Londoño, J.I. Godino-Llorente. Entropies from Markov models as complexity measures of embedded attractors. *Entropy*, vol. 17, no. 6, pp 3595-3620, 2015.

2015 J.R. Orozco-Arroyave, F. Hönig, J.D. Arias-Londoño, J.F. Vargas-Bonilla and E. Nöth. Spectral and cepstral analyzes for Parkinson's disease detection in Spanish vowels and words. *Expert Systems*, vol. 32, no. 6, pp 688-697, 2015.

2015 J.R.Orozco-Arroyave, E.A.Belalcazar-Bolaños, J.D.Arias-Londoño, J.F.Vargas-Bonilla, S.Skodda, J.Rusz, K.Daqrouq, F.Hönig, and E. Nöth. Characterization Methods for the Detection of Multiple Voice Disorders: Neurological, Functional, and Laryngeal Diseases. *IEEE Transactions on Biomedical and Health Informatics*, vol. 9, no. 6, pp 1820-1828, 2015.

Edition and conference committees participation

Editor

-Guest editor for the Special Issue on 'Modelling and processing language and speech in neurodegenerative disorders', IEEE Journal of Selected Topics in Signal Processing (JSTSP), 2024-2025

-Handling editor of Frontiers in Public Health, 2022

-Associate Editor, Redin, ISSN 0120-6230. July, 2014-2021. (Q3 in SJR)

-Editor of the book: Applications of Computational Intelligence. *Communications in Computer and Information Science* , vols. 833, 1096, 1346, 1471, 1746, Springer, Cham.

Organizing committees

2024 Scientific Secretariat - 2nd Automatic Assessment of Parkinsonian Speech Workshop, Cambridge, MA, USA.

2024 General technical chair - IEEE Latin American Conference on Computational Intelligence, Bogotá, Colombia.

2018 - 2020 Technical chair - Colombian Conference on Applications in Computational Intelligence.

2012 Technical chair - XVII Symposium of Image, Signal Processing, and Artificial Vision . Medellín, Colombia.

2012 Publication chair - 47th Annual International Carnahan Conference on Security Technology. Medellín, Colombia.

Referee for Journals/Conferences and research project calls

-Poland National Center for Research and Development, call: Centres of Excellence AI of the ARTIQ Joint Undertaking Programme.

-Colombian Minister of Science: calls Sena Innova, 869, 901, 908

-Artificial Intelligence in Medicine, Engineering Applications on Artificial Intelligence, IEEE Transactions on Audio, Speech and Language Processing, Journal of the Acoustical society of America, IEEE Journal of Selected Topics in Signal Processing, IEEE Transactions on Biomedical Engineering, Speech Communications, EURASIP Journal on Advanced Signal Processing, Biomedical Signal Processing and Control, Medical and Biological Engineering and Computing, SpringerPlus, Computers in Biology and Medicine

-3rd Advanced Voice Function Assessment International Workshop, AVFA2009

-International Conference on Bio-inspired systems and signal processing, BIOSIGNALS 2014 - 2019

-The Annual Conference of the International Speech Communication Association INTERSPEECH 2017-2019, 2022

-Neural Information Processing Systems, NIPS 2020, 2022

-International Conference on Learning Representation, ICLR 2020, 2022, 2023, 2024

-International Conference on Machine Learning, ICML 2021

Honors and Awards

-R3 certification (established researcher), Spanish Research Agency, Ministry of Science, Innovation and Universities, Spain, 2023

-Member of the ELLIS network since 2022

-IEEE Senior member since 2017

-Senior researcher, Colombian Department of Science Technology and Innovation - Colciencias

-Best paper award in the 8th International Conference on Bioinformatics Models, Methods and Algorithms, 2017.

-European Doctorate Mention, Universidad Politécnica de Madrid, 2010.

-Best paper award given by the Spanish Thematic Network on Speech Technologies, 2010.

-Finalist of the best paper student award in the 31st annual international conference of the IEEE EMBS, 2009.