Julián D. Arias Londoño

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Visiting Researcher
Department of Signals, Systems
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Full Professor
Department of Systems Engineering
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Universidad de Antioquia
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Medellín, Colombia

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**, *Universidad Politécnica de Madrid*, Madrid, Spain.

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

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 of 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 sysmtems 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

Submitted

2022 G. E. Melo-Acosta, J. F. Duitama-Muñoz, J. D. Arias-Londoño. An Instance Selection Algorithm for Big Data in High imbalanced datasets based on LSH. *Submitted to Information Systems.*

2022 M. Pacheco, F. A. Bedoya-Guzman, J. A. Gutierrez-Vargas, A. Barrera-Sandoval, J. Villamil-Ortiz, C. A. Villegas-Lanau, J. D. Arias-Londoño, E. Area-Gómez, G. P. Cardona Gomez. BACE1 and SCD1 are associated in dementias, and their double depletion produces motor and cognitive function recovery, impacting phospholipid profile changes. *Submitted to Brain Pathology.*

2022 G. Uribe-Guerra, D. Múnera, J.D. Arias-Londoño. Bayesian Optimization with Fixed Constraints using Aceptance Functions. *Submitted to COLCACI 2022*

2022 C. A. Bustamante-Arcila, G. Castrillón, J.D. Arias-Londoño. Automatic detection of brain states using time varying functional connectivity from rs-frmri in noninvasive brain stimulation. *Submitted to COLCACI 2022*

Journals and selected conferences

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.

2014   J.C. Vasquez-Correa, J.R. Orozco-Arroyave, J.D. Arias-Londoño, J.F. Vargas-Bonilla, E. Nöth. New computer aided device for real time analysis of speech of people with Parkinson's disease. *Redin*, vol. 1, no. 72, pp 87-103, 2014.

2013   J.R. Orozco-Arroyave, J.F. Vargas-Bonilla, J.D. Arias-Londoño, S. Murillo-Rendón, G.Castellanos-Domínguez, J.F. Garcés. Nonlinear Dynamics for Hypernasality Detection in Spanish Vowels and Words. *Cognitive Computation*, vol. 5, no. 4, pp 448-457, 2013.

2012   V. Osma-Ruiz, J.I. Godino-Llorente, N. Sáenz-Lechón, J.M. Gutiérrez-Arriola, J.D. Arias-Londoño, R. Fraile, B. Scola-Yurrita. Towards collaborative work among speech therapists, phonatricians, and ENT professionals. Analysis of the impact of ciphering techniques in the performance of an integrated tool for the diagnosis of voice disorders. *Biomedical Signal Processing & Control*, vol. 7, no. 1, pp 27-36, 2012.

2011 J.D. Arias-Londoño, J.I. Godino-Llorente, M. Markaki, and Y. Stylianou. On combining information from modulation spectra and mel-frequency cepstral coefficients for automatic detection of pathological voices. *Logopedics Phoniatrics Vocology*, vol. 36, no. 2, pp 60-69, 2011.

2011 N. Sáenz-Lechón, R. Fraile, J.I. Godino-Llorente, R. Fernández-Baillo, V. Osma-Ruiz, J.M. Gutiérrez-Arriola, and J.D. Arias-Londoño. Towards objective evaluation of perceived roughness and breathiness based on mel-frequency cepstral analysis. *Logopedics Phoniatrics Vocology*, vol. 36, no. 2, pp 52-59, 2011

2011 J.D. Arias-Londoño, J.I. Godino-Llorente, N. Sáenz-Lechón, V. Osma-Ruiz, and G. Castellanos-Domínguez. Automatic detection of pathological voices using complexity measurements, noise parameters and mel-cepstral coefficients. *IEEE Transactions on Biomedical Engineering*, vol. 58, no. 2, pp 370-379, 2011.

2010 J.D. Arias-Londoño, J.I. Godino-Llorente, N. Sáenz-Lechón, V. Osma-Ruiz, and G. Castellanos-Domínguez. An improved method for voice pathology detection by means of a HMM-based feature space transformation. *Pattern Recognition*, vol. 43, no. 9, pp 3100-3112, 2010.

2009 J.D. Arias-Londoño, J.I. Godino-Llorente, J.A. Jaramillo-Garzón, and G. Castellanos-Domínguez. Dissimilarity-based classification for stochastic models of embedding spaces applied to voice pathology detection. *Rev. Fac. Ing. Univ. Antioquia*, vol. 1, no. 50, pp 102-112, 2009.

2009 G. Daza-Santacoloma, J.D. Arias-Londoño, N. Sáenz-Lechón, Victor Osma-Ruiz, J.I. Godino- Llorente, and G. Castellanos-Domínguez. Dynamic feature extraction: an application to voice pathology detection. *Intelligent Automation and Soft Computing*, vol. 15, no. 4, pp 665-680, 2009.

2008 N. Sáenz-Lechón, V. Osma-Ruiz, J.I. Godino-Llorente, M. Blanco-Velasco, F. Cruz-Roldán, and J.D. Arias-Londoño. Effects of audio compression in automatic detection of voice pathologies. *IEEE Transactions on Biomedical Engineering*, vol. 55, no. 12, pp 2831-2835, 2008.

Book

2015 J.R. Orozco-Arroyave, J.D. Arias-Londoño, J.F. Vargas-Bonilla. In Spanish: Voces de niños con labio o paladar hendido: Análisis computarizado para diagnóstico y seguimiento de patologías. Serie Investigación - Ciencia y Tecnología, Ed. Universidad de Antioquia, 2015.

Edition and conference committees participation

Editor

-Associate Editor, Redin, ISSN 0120-6230. July, 2014-2021.

-Editor of the book: Applications of Computational Intelligence. *Communications in Computer and Information Science* , vol. 1346, Springer, Cham, 2020.

-Editor of the book: Applications of Computational Intelligence. *Communications in Computer and Information Science* , vol. 1096, Springer, Cham, 2019.

-Editor of the book: Applications of Computational Intelligence. *Communications in Computer and Information Science* , vol. 833, Springer, Cham, 2018.

Organizing committees

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 and Selected Conferences

-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

-Artificial Intelligence in Medicine

-Engineering Applications on Artificial Intelligence

-SpringerPlus

-Computers in Biology and Medicine

-Scientia Et Technica, Universidad Tecnológica de Pereira, Colombia

-Revista tecnológicas, Centro de Investigación ITM, Colombia

-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

-International Conference on Learning Representation, ICLR 2020

-International Conference on Machine Learning, ICML 2021

Honors and Awards

-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.