



Julián D. Arias Londoño

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Visiting Researcher
Department of Signals, Systems
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Full Professor (Profesor Titular)
Department of Systems Engineering
and Computer Science
Universidad de Antioquia
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Medellín, Colombia

Education

2007–2010 **Doctor on Computer Sciences 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 in 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.
currently Courses:
– Deep Learning for Signal Processing
- 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- **Research Assistant**, *Bioengineering and Optoelectronic Group*, Universidad Politéc-
December nica de Madrid, Madrid.
2009 Spain
- 2007-2010 **Research Assistant**, *Control and Digital Signal Processing Group*, Universidad
Nacional de Colombia, Manizales.
Colombia
- August- **Instructor**, *Department of Physics Engineering*, Universidad Nacional de Colombia,
December Colombia.
2007 Courses:
– Introduction to Analog and Digital Electronics.
- February- **Instructor**, *Department of Systems Engineering*, University of Caldas, Colombia.
June 2007 Courses:
– Computer architecture.
– Microprocessors.
- July- **Research Assistant**, *Bioengineering and Optoelectronic Group*, Universidad Politéc-
December nica de Madrid, Madrid.
2006 Spain
- February- **Instructor**, *Department of Physics Engineering*, Universidad Nacional de Colombia,
June 2006 Colombia.
Courses:
– Introduction to Analog and Digital Electronics.
- February- **Instructor**, *Department of System Engineering*, Universidad Cooperativa de Colombia,
June 2006 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 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

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.
- 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 A. D. Orjuela-Cañón, J. C. Figueroa-García, J.D. Arias-Londoño (Eds.). Preface, Applications of Computational Intelligence. *Communications in Computer and Information Science* , vol. 833, 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. Hönl, 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. Hönl, 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. Hönl, 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, phonatrics, 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.
- 2007 J.A. Jaramillo-Garzón, J.D. Arias-Londoño, and G. Castellanos-Domínguez. Spanish: Método híbrido de sintonización para algoritmos genéticos a partir de regresión por vectores de soporte. *Scientia et Technica*, vol. XIII, no. 37, 2007.
- 2007 J.D. Arias-Londoño, G. Castellanos-Domínguez, and J.I. Godino-Llorente. Spanish: Diseño simultáneo de una etapa de extracción de características y un clasificador basado en HMM. *Scientia et Technica*, vol. XIII, no. 35, 2007.

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-Present.
- 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

- 2019 Technical chair - 2nd Colombian Conference on Applications in Computational Intelligence. Barranquilla, Colombia, 2019.
- 2018 Technical chair - 1st Colombian Conference on Applications in Computational Intelligence. Medellín, Colombia, 2018.
- 2012 Technical chair - XVII Symposium of Image, Signal Processing, and Artificial Vision . Medellín, Colombia, 2012.
- 2012 Publication chair - 47th Annual International Carnahan Conference on Security Technology. Medellín, Colombia, 2012.

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
- 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.