

# 2018

Universidade de Aveiro

**Nuno Borges  
Carvalho**

## [CURRICULUM VITAE]

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Universidade de Aveiro



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# NUNO BORGES CARVALHO

This Curriculum Vitae, describes the technical-scientific activities of Prof. Nuno Borges Carvalho.

Prof. Nuno Borges Carvalho is a Full Professor in the Department of Electronics, Telecommunications and Informatics, DETI, Universidade de Aveiro, UA, and a researcher at the Instituto de Telecomunicações - Aveiro Pole since 1995.

During his teaching career he has been a Professor devoted to courses on Electronics/Telecommunication Systems and scientific activities devoted to Radio Frequency Circuits and Systems.

Its educational component covers other aspects of action, beyond the academic component, such as the coordination of the implementation of the Bologna process in his department, DETI-UA, responsible for coordination and co-authorship in the writing of the documents that were the basis for new courses proposals to the Ministry of Higher Education. It was also the coordinator of the CMU-Portugal program at the Universidade de Aveiro from 2007 to 2009, in this case it was responsible for managing the Professional Master (Master of Science in Information Networking), MSIN and also for managing the joint doctoral programs between CMU and UA.

Prof. Nuno Borges de Carvalho is currently the course director of the Doctoral Program in Electrical Engineering from the Universidade de Aveiro and is also the leading proponent and responsible for the engineering professional advanced training course on "Radio System Design", devoted to continuing engineering education.

Throughout his career he held positions such as administrative level program coordination CMU-Portugal in DETI, as mentioned earlier, was Vice-Chairman of the Board of Directors of DETI in 2003 and Chair of the Scientific Committee of the DETI in the academic year 2009/10.

In the technical-scientific components, he is an IEEE Fellow, he published more than 200 scientific papers in international journals and conferences, not forgetting the activity in editorial and review of scientific works. He is co-author of two books published by prestigious international publishers and also wrote a few chapters of several books published internationally.

He participated as principal investigator or coordinator in projects with scientific and/or industry focus, both at a national and international level.

He also coordinates various activities of international significance, such as: Chair and active member of the Technical Committee MIT-11, which is the technical committee for the promotion and development of the measurements and instrumentation scientific area within IEEE MTT (Microwave Theory and Techniques) society, he is an active member of MIT-20, 24 and 26, which are the technical committees devoted to the promotion and development in the area of wireless communications, RFID and Wireless Power Transmission. He is a member of TPRC (Technical Program Review Committee) of the

European Microwave Conference since 2006, member of the IMS TPRC (International Microwave Symposium) since 2008 and the International Radio and Wireless Symposium since 2011, furthermore, he also coordinates the activity of Metrology of URSI Portugal, being the Chair of Committee A.

Since 2014 he is the chair of the IEEE Portugal Section.

From an administrative point of view he is the co-coordinator of the Wireless Communications Area in the Instituto de Telecomunicações, National Coordinator of the radio systems group in IT-Aveiro. He is also a Member of management committee of IT Aveiro Pole and Vice-Chair of the IEEE MTT / ED / AP Chapter.

In recent years he organized various workshops locally and internationally, particularly in several international microwave symposiums. Moreover he won several scientific awards, national and international, giving particular emphasis to the 2000 IEE Measurement Prize.

# PERSONAL INFORMATION

Full Name: Nuno Miguel Gonçalves Borges de Carvalho  
Marital Status: Married with Raquel Castro Madureira, 3 children  
Nationality: Portuguese  
Born Date: 1972, April, 29  
Born Place: Luanda (Angola)  
e-mail: nbcarvalho@ua.pt  
web page: <http://www.av.it.pt/nbcarvalho/>  
Employment: Full Professor at the Department of Electronics, Telecommunications and Informatics, DETI, Universidade de Aveiro and a Senior Researcher at the Instituto de Telecomunicações - Aveiro Pole  
Member of the Portuguese Engineering Association.  
URSI Member.  
IEEE Fellow, (Student Member from 1992 to 1999, Member from 1999 to 2005, Senior Member from 2005 to 2015).

## ACADEMIC DEGREES

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**October 2009** → “Agregação”<sup>1</sup> in Electrical Engineering with a lecture devoted to “Metrology for Radio-Frequency Nonlinear Systems Characterization”, Universidade de Aveiro, approved by unanimity.

**Jan. 2000** → PhD in Electrical Engineering - Universidade de Aveiro, with the Thesis title - "Nonlinear Distortion Optimization in Multi-carrier Power Amplifiers", approved by unanimity.

**June 1995** → “Licenciatura”<sup>2</sup> in Telecommunication Electronics Engineering, (5 years course), Universidade de Aveiro, with the final mark of 17 (in 20).

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<sup>1</sup> Agregação is an academic title awarded by Portuguese Universities that testifies to the quality of the curriculum, professional, scientific and pedagogical, capacity and capability to manage independent research projects and conduct independent scientific work.

<sup>2</sup> Licenciatura degree corresponds to a five year program, and was the traditional approach before the Bologna Process to the Integrated Master plan.

## ACADEMIC PROFESSIONAL EXPERIENCE

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**2013 – Today** → Full Professor at the Department of Electronics and Telecommunications at the Universidade de Aveiro.

**2009 – 2013** → Associate Professor with “Agregação” at the Department of Electronics, Telecommunications and Informatics at the Universidade de Aveiro.

**2004 – 2009** → Associate Professor at the Department of Electronics and Telecommunications at the Universidade de Aveiro.

**2000 – 2004** Assistant Professor at the Department of Electronics and Telecommunications at the Universidade de Aveiro.

**1997 – 2000** Assistant Lecturer at Department of Electronics and Telecommunications at the Universidade de Aveiro.

**1996-1997** Computing Sciences Teaching as a Young Professor at Universidade de Aveiro.

## MANAGEMENT POSITIONS

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**2007 – 2013** → Director of the PhD program in Electrical Engineering - Universidade de Aveiro.

**2010 – Today** → Council Member of the Department of Electronics, Telecommunications and Informatics– Universidade de Aveiro.

**2007 – 2010** → Coordinator of the international relationship between CMU-USA and Universidade de Aveiro.

**2009 – 2010** → Coordinator of the Scientific Committee from the Department of Electronics, Telecommunications and Informatics - Universidade de Aveiro.

**2008 – 2009** → Vice-Coordinator of the Scientific Committee from the Department of Electronics, Telecommunications and Informatics - Universidade de Aveiro.

**2005 – 2007** → Counselor Professor for the Student Association, AETUA (Associação de Estudantes de Telecomunicações da Universidade de Aveiro).

**2003 – 2005** → Member of the directive council of the Department of Electronics, Telecommunications and Informatics – Universidade de Aveiro.

**2000 – 2002** → Counselor Professor of the Aveiro IEEE student branch.

**2009 – Today** → Member of the Management Commission of the Instituto de Telecomunicações – Aveiro Pole.

**2010 – Today** → Coordinator of the Radio-system group in the Instituto de Telecomunicações.

**2007 – Today** → Coordinator of the scientific area on Wireless Communications - Instituto de Telecomunicações.

# SCIENTIFIC PRODUCTION

In the next sections the scientific production will be presented, including publications in international journals and conferences, as also the citations from two main indexing international services: ISI web of knowledge and Google Scholar.

The Scientific Research activity of Nuno Borges Carvalho is focused in Radio-frequency and microwave circuits and systems, and can further be divided into the next sub-areas:

1. Instrumentation and design of special characterization approaches to nonlinear RF circuits and systems;
2. Analysis, modeling and algorithms for nonlinear circuits and systems CAD/CAE;
3. Special circuit and system design approaches for Software Defined Radio (SDR) and location systems;
4. Wireless Power Transmission circuit and system design.

Prof. Nuno Borges Carvalho has also been invited as keynote speaker in certain international conferences and events, which are described in the following sub-sections.

## BOOKS

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**L.1.** J. C. Pedro and **Nuno Borges Carvalho**, “Intermodulation Distortion in Microwave and Wireless Circuits”, Artech House Inc, Norwood, Aug. 2003 ISBN: 1-58053-356-6, 450 pages.

*Preface: “This unique new book is your single resource for all issues related to intermodulation and multi-tone distortion in microwave and wireless circuits. Beginning with an overview of the general concepts of distortion in microwave and wireless devices, it delves into the theory and practical aspects of nonlinear distortion, tools for nonlinear analysis, mathematical representations of wireless circuits and devices, and design methods for minimizing distortion.*

*The book presents the full range of distortion specs to help ensure you select the right telecommunications equipment for your needs. Choose from the full range of design methods for highly linear circuits to optimize linearity in small-signal and high-power amplifiers and mixers. Practical advice on modeling and computer-aided tools guides you toward successful analysis and design. Moreover, the book helps you design other highly-linear circuits and systems related to microwave and wireless communications and it includes the most comprehensive treatment of the application of Volterra methods in the technical literature”.*

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*Google Scholar: 206.*

- L.2. Nuno Borges Carvalho** and Dominique Schreurs, “Microwave and Wireless Measurement Techniques”, Cambridge University Press, in press, November 2013, 350 pages, ISBN: 9781107004610.

Preface: “From typical metrology parameters for common wireless and microwave components to the implementation of measurement benches, this introduction to metrology contains all the key information on the subject. Using it, readers will be able to:

- interpret and measure most of the parameters described in a microwave component’s datasheet
- understand the practical limitations and theoretical principles of instrument operation
- combine several instruments into measurement benches for measuring the microwave and wireless quantities

Several practical examples are included, demonstrating how to measure intermodulation distortion, error vector magnitude, S-parameters, and large signal waveforms. Each chapter then ends with a set of exercises, allowing readers to test their understanding of the material covered and making the book equally suited for course use and for self-study.”

- L.3. N.B.C. Carvalho**, RGG Gomez-Garcia, AC Cidronali, White Space Communication Technologies, Cambridge University Press, London, 2014,

## CHAPTERS IN BOOKS

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- CL.1.** José Carlos Pedro and **Nuno Borges Carvalho**, “Mixed Time and Frequency Domain Behavioral Modeling and Simulation” -Book: Fundamentals of Nonlinear Behavioral Modeling for RF and Microwave Design, Artech House, ISBN 1-58053-775-8, Editor(s): John Wood and David Root , 244 pages.

*Google Scholar: 56*

- CL.2. Nuno Borges Carvalho**, “Nonlinear distortion measurement techniques“, Book: Characterization and Modelling Approaches for Advanced Linearisation Techniques, SignPost, ISBN 81-308-0027-6 , Editor(s) José Angel García, José María Zamanillo and Máirtín O’Droma.

*Google Scholar: 4*

- CL.3.** P.M. Cruz, H.C. Gomes and **Nuno Borges Carvalho**, "Receiver Front-End Architectures - Analysis and Evaluation" – Book: Advanced Microwave and Millimeter Wave Technologies Semiconductor Devices Circuits and Systems, Edited by Moumita Mukherjee, In-Tech, Austria, March 2010.

- CL.4.** N. Bonifácio; André, P.S and **Nuno Borges Carvalho**; "Resonant Wireless Power Transmission" - Chapter in Advances in Energy Research – Vol. 8, Edited by: Morena V. Acosta, Nova Publisher, New York, 2011.

- CL.5. Nuno Borges Carvalho** and Wonhoon Jang, “Crest Factor Reduction Techniques”, - Chapter in Digital Front-End in Wireless Communications and Broadcasting: Circuits and Signal Processing, Edição: Fa-Long Luo, Cambridge University Press, London, 2011.

- CL.6.** Pedro Cruz and **Nuno Borges Carvalho**, “Characterization of Software Defined and Cognitive Radio Front-Ends for Multi-mode Operation” - Chapter

in *Advances in Microwave and Millimeter Wave Circuits and Systems: Emerging Design, Technologies and Applications*, Edited by: Apostolos Georgiadis, Hendrik Rogier, Luca Roselli, Paolo Arcioni, John Wiley & Sons, 2012.

- CL.7.** Boaventura, A.; Fernandes, R. D.; Matos, J. N. ; Carvalho, N.B.C.; "Unconventional RFID Systems" - Chapter in *Green RFID Systems*, Luca Roselli, Cambridge University Press, 2013.

## THESES

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**OCC1. Nuno Borges Carvalho**, "Optimização da Distorção Não-linear de Intermodulação em Amplificadores de Sinais Multi-Portadora", PhD Thesis, Departamento de Electrónica and de Telecomunicações, Universidade de Aveiro, Jan. 2000.

**OCC2. Nuno Borges Carvalho**, "A Metrologia nos SisTemes Não-Lineares de Radiofrequência", Agregação lecture, Departamento de Electrónica and de Telecomunicações, Universidade de Aveiro, Oct. 2009.

## INTERNATIONAL JOURNALS

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**RI1. Nuno Borges Carvalho** and J. C. Pedro, "Multi-tone Frequency Domain Simulation of Nonlinear Circuits in Large and Small Signal Regimes", *IEEE Transactions on Microwave Theory and Techniques*, Vol. MTT-46, N° 12, Pages 2016-2024, Dec. 1998.

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*Google Scholar: 30; ISI: 13*

**RI2.** J. A. Garcia, A. Mediavilla, J. C. Pedro, **Nuno Borges Carvalho**, A. Tazón and J. L. Garcia, "Characterizing the Gate to Source Nonlinear Capacitor Role on GaAs FET IMD Performance", *IEEE Transactions on Microwave Theory and Techniques*, Vol. MTT-46, N° 12, Pages 2344-2355, Dec. 1998.

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*Google Scholar: 28; ISI: 25*

**RI3.** J. C. Pedro, **Nuno Borges Carvalho** and R. Madureira, "Nonlinear Distortion Model for VCO-PLL FM Transmission Systems", *IEEE Transactions on Circuits and Systems II: Analog and Digital Signal Processing*, Vol. CAS-46, N° 3, Pages 348-352, Mar. 1999.

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*Google Scholar: 5; ISI: 4*

**RI4. Nuno Borges Carvalho** and J. C. Pedro, "Large and Small Signal IMD Behavior of Microwave Power Amplifiers", *IEEE Transactions on Microwave Theory and Techniques*, Vol. MTT-47, N° 12, Pages 2364-2374, Dec. 1999.

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*Google Scholar: 127; ISI: 37*

**RI5.** J. C. Pedro and **N. B. Carvalho**, "On the Use of Multi-Tone Techniques for Assessing RF Components' Intermodulation Distortion", *IEEE Transactions on Microwave Theory and Techniques*, Vol. MTT-47, N° 12, Pages 2393-2402, Dec. 1999.

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*Google Scholar: 115; ISI: 59*

- RI6.** J. A. Garcia, J. C. Pedro, M. L. de La Fuente, **N. B. Carvalho**, A. Mediavilla and A. Tazón, "Resistive FET Mixer Conversion Loss and IMD Optimization By Selective Drain Bias", IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-47, N° 12, Pages 2382-2392, Dec. 1999.

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*Google Scholar: 32; ISI: 14*

- RI7.** **N. B. Carvalho** and J. C. Pedro, "Compact Formulas to Relate ACPR and NPR to Two-Tone IMR and IP3", Microwave Journal, Vol. 42, N°12, Pages 70,77-78,80,82,84, Dec. 1999.

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*Google Scholar: 23; ISI: 2*

- RI8.** J. A. Garcia, M. L. de la Fuente, J. C. Pedro, **N. B. Carvalho**, Y. Newport, A. Mediavilla and A. Tazón, "Time-Varying Volterra-Series Analysis of Spectral Regrowth and Noise Power Ratio in FET Mixers", IEEE Transactions On Microwave Theory and Tech., Vol. MTT-49, N° 3, Pages 545-549, Mar. 2001.

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*Google Scholar: 6; ISI: 3*

- RI9.** J. C. Pedro and **N. B. Carvalho**, "Evaluating Co-Channel Distortion Ratio in Microwave Power Amplifiers", IEEE Transactions on Microwave Theory and Tech., Vol. MTT-49, N°10, Pages 1777-1784, Oct. 2001.

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*Google Scholar: 17; ISI: 8*

- RI10.** J. C. Pedro and **N. B. Carvalho**, "A Novel Nonlinear Distortion Characterization Standard for RF and Microwave Communication Systems", Artigo convidado à IEE Engineering Science and Education Journal, Vol. 10, N° 3, Pages 113-119, Jun. 2001.

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*Google Scholar: 2*

- RI11.** J. C. Pedro and **N. B. Carvalho**, "Characterizing Nonlinear RF Circuits for Their In-Band Signal Distortion", IEEE Transactions on Instrumentation and Measurement, Vol. IM-51, N°3, Pages 420-426, Jun. 2002.

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*Google Scholar: 9; ISI: 3*

- RI12.** **N. B. Carvalho** and J. C. Pedro, "Modeling MESFET's for Nonlinear Analog Circuits", International Journal of Analog Integrated Circuits and Signal Processing, Vol. 33, N° 2, Pages 95-106, Nov. 2002.

- RI13.** **N. B. Carvalho** and J. C. Pedro, "A Comprehensive Explanation of Distortion Side Band Asymmetries", IEEE Transactions on Microwave Theory and Tech., Vol. MTT-50, N°9, Pages 2090-2101, Sep. 2002.

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*Google Scholar: 130; ISI: 42*

- RI14.** C. Fager, J. C. Pedro, **N. B. de Carvalho** and H. Zirath, "Prediction of IMD in LDMOS Transistor Amplifiers Using a New Large-Signal Model", IEEE

Transactions on Microwave Theory and Tech., Vol. MTT-50, N°12, Pages 2834-2842, Dec. 2002.

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*Google Scholar: 71; ISI: 38*

- RI15.** C. Fager, J. C. Pedro, **N. B. de Carvalho**, H. Zirath, F. Fortes and M. J. Rosário, "A Comprehensive Analysis of IMD Behavior in RF CMOS Power Amplifiers", IEEE Journal of Solid-State Circuits, Vol: 39, N°: 1, Jan. 2004, Pages:24 - 34.

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*Google Scholar: 55; ISI: 34*

- RI16.** Pedro Miguel Lavrador, **Nuno Borges Carvalho** and Jose Carlos Pedro, "Evaluation Of Signal To Noise And Distortion Ratio Degradation In Nonlinear Systems", IEEE Transactions on Microwave Theory and Techniques, Vol: 52, N°: 3, Mar. 2004, Pages: 813 – 822.

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*Google Scholar: 15; ISI: 11*

- RI17.** José Carlos Pedro and **Nuno Borges Carvalho**, "An Integrated Overview of CAD/CAE Tools and Their Use on Wireless Communication Circuits Design", International Journal of RF and Microwave Computer Aided Engineering, Vol. 14, N°6, Pages 507-534, Nov. 2004.

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*Google Scholar: 1; ISI: 1*

- RI18.** João Moreira Rebelo and **Nuno Borges Carvalho**, "TMAs Alleviate Cellular-Network Strain", Wireless Design Systems, May 2004.

- RI19.** P. M. Cabral, J. C. Pedro and **N. B. Carvalho**, "A Nonlinear Device Model of Microwave Power GaN HEMTs for High-Power Amplifier Design", IEEE Transactions. on Microwave Theory and Tech., Vol. MTT-52, N° 11, Pages .2585-2592, Nov. 2004.

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*Google Scholar: 46; ISI: 36*

- RI20.** J. C. Pedro, **N. B. Carvalho**, C. Fager and J. A. Garcia, "Linearity Versus Efficiency in Mobile Handset Power Amplifiers: A Battle Without a Loser", Microwave Engineering Europe, Pages 19-26, Aug. 2004.

- RI21.** J. C. Pedro and **N. B. Carvalho**, "Designing Multisine Excitations for Nonlinear Model Testing", IEEE Transactions on Microwave Theory and Tech., Vol. MTT-53, N° 1, Pages 45-54, Jan. 2005.

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*Google Scholar: 32; ISI: 23*

- RI22.** P Pedro M. Cabral, José C. Pedro and **Nuno B. Carvalho**, "A Unified Theory for Nonlinear Distortion Characteristics in Different Amplifier Technologies", Microwave Journal, Pages 62-78, Apr. 2005.

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*Google Scholar: 1; ISI: 5*

- RI23.** **N. B. Carvalho**, J. C. Pedro, W. Jang and M. B. Steer, "Nonlinear Simulation of Mixers for Assessing System-Level Performance", Intern. Journal of RF and Microwave Computer-Aided Engineering, Vol. 15, N° 4, Jul. 2005, Pages 350-361.

- RI24.** **N. B. Carvalho**, J. A. García, E. Azpitarte and J. C. Pedro, "Load-Impedance Selection for Maximized Large-Signal IMD Sweet-Spot Effects", Intern. Journal of RF and Microwave Computer-Aided Engineering, Vol. 15, N° 5, Sep. 2005, Pages 434-440.

- RI25.** P. Colantonio, J. A. García, F. Giannini, C. Gómez, **N. B. Carvalho**, E. Limiti, J. C. Pedro, "High Efficiency And High Linearity Power Amplifier Design", International Journal of RF and Microwave Computer Aided Engineering, Vol. 15, N° 5, Sep. 2005, Pages 453-468.

- RI26.** Antonio Santos, Americo Soares, Fernando Redondo, **Nuno Carvalho**, "Tracking Trains in Secondary Lines via Radio Frequency Systems", IEEE Transactions on Intelligent Transportation Systems, Vol. 6, N° 2, Jun. 2005 Pages 244 – 258.

- RI27.** João P. Martins and **Nuno Borges Carvalho**, "Multi-tone Phase and Amplitude Measurement for Nonlinear Device Characterization", IEEE Transactions on Microwave Theory and Techniques, Vol. 53, N° 6, Parte 2, Jun. 2005 Pages 1982 - 1989.

- RI28.** Pedro M. Cabral, José C. Pedro and **Nuno B. Carvalho**, "Modeling Nonlinear Memory Effects on the AM/AM, AM/PM and Two-Tone IMD in Microwave PA Circuits", International Journal of RF and Microwave Computer-Aided Engineering, Vol. 16, N° 1, Jan. 2006, Pages :13-23.

- RI29.** **Carvalho, N.B.**; Pedro, J.C.; Jang, W.; Steer, M.B.; "Nonlinear RF circuits and systems simulation when driven by several modulated signals", Microwave Theory and Techniques, IEEE Transactions on , Vol. 54, N° 2, Part 1, Feb. 2006 Pages 572 – 579.

- RI30.** **Carvalho, N.B.**; Pedro, J.C.; Martins, J.P.; "A Corrected Microwave Multisine Waveform Generator", Microwave Theory and Techniques, IEEE Transactions on, Vol. 54, N° 6, Part 2, Jun. 2006 Pages 2659 – 2664.

- RI31.** Martins, J. P.; Cabral, P. M.; **Borges Carvalho, N.**; Pedro, J. C.; "A Metric for the Quantification of Memory Effects in Power Amplifiers", Microwave Theory and

Techniques, IEEE Transactions on, Vol. 54, N° 12, Part 2, Dec. 2006 Pages :4432 – 4439.

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*Google Scholar: 15; ISI: 9*

**RI32.** Martins, J.P.; Carvalho, **N.B.**; **Pedro, J.C.**; “Intermodulation Distortion of Third-Order Nonlinear Systems With Memory Under Multisine Excitations”, Microwave Theory and Techniques, IEEE Transactions on, Vol. 55, N° 6, Part 2, Jun. 2007, Pages: 1264 – 1271.

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*Google Scholar: 10; ISI: 7*

**RI33. Carvalho, N.B.**; Remley, K.A.; Schreurs, D.; “The MIT-II web Page: A Multitude of Information Resources on Microwave Measurements [Member Benefits]”, Microwave Magazine, IEEE, Vol. 8, N° 4, Aug. 2007 Pages: 106 – 114

**RI34.** Pedro Claro and **Nuno Borges Carvalho**, “Local Positioning System Based on Artificial Neural Networks”, Lecture notes on Computer Science, 2007, Pages 699-708.

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*Google Scholar: 1*

**RI35. Carvalho, N.B.**; Remley, K.A.; Schreurs, D.; Gard, K.C.; “Multisine Signals for Wireless System Test and Design”, Microwave Magazine, IEEE, Vol. 9, N° 3, Jun. 2008, Pages: 122 – 138.

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*Google Scholar: 13; ISI: 9*

**RI36.** Gomes, H.G.; **Carvalho, N.B.**; "RFID for Location Proposes Based on the Intermodulation Distortion", Sensors & Transducers Magazine, Vol. 106, N° 7, Pages 85 - 96, Jul. 2009.

**RI37.** Rui E. Santos, **Nuno Borges Carvalho** and Kevin Gard, “Characterization of SNDR Degradation in Nonlinear Wireless Transmitters”, International Journal of RF and Microwave Computer-Aided Engineering, Vol. 19, N° 4, Pages 470 - 480, Jul., 2009.

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*Google Scholar: 1; ISI: 2*

**RI38.** P.M. Cruz, **N.B. Carvalho** and K.A. Remley, "Designing and Testing Software-Defined Radios", IEEE Microwave Magazine, Vol. 11, N° 4, Pages 83-94, Jun., 2010.

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*Google Scholar: 9; ISI: 4*

**RI39. Carvalho, N.B.**; "MIT-S Workshop Series (IMWS) and MGA Committee News [Around the Globe]", IEEE Microwave Magazine, Vol. 11, N° 6, Pages 124 - 126, Oct., 2010.

**RI40. Nuno Borges Carvalho**, “Power Amplifier Linearization Behavior in Presence of Dynamic Effects”, IET Antennas, Propagation and Microwaves, IET Microwaves Antennas & Propagation , Vol. 4, N° 1, Pages 113 - 120, Jan., 2010.

- RI41.** P.M. Cruz and **N.B. Carvalho**, "Wideband Behavioral Model for Nonlinear Operation of Bandpass Sampling Receivers", IEEE Transactions On Microwave Theory and Techniques, Vol. 59, N° 4, Pages 1006-1015, Apr. 2011.
- RI42.** Gomes, H.G.; A. R. T. Testera; **Carvalho, N.B.**; M. B. Barciela; K. R. Remley; "Diode Power Probe Measurements of Wireless Signals", IEEE Transactions on Microwave Theory and Tech., Vol. 59, N° 4, Pages 987 - 997, Apr. 2011.
- RI43.** Z. Liu, M. A. Violas, and **N. B. Carvalho**, "Digital predistortion for RSOAs as external modulators in radio over fiber systems," Opt. Express, Vol. 19, N° 18, Pages 17641-17646, Aug. 2011.
- RI44.** Bras, L.; **Carvalho, N.B.**; Pinho, P., "Pentagonal Patch-Excited Sectorized Antenna for Localization Systems," Antennas and Propagation, IEEE Transactions on , vol.60, no.3, pp.1634,1638, March 2012
- RI45.** Silva, N.V.; Oliveira, A.S.R.; Gustavsson, U.; **Carvalho, N.B.**, "A Novel All-Digital Multichannel Multimode RF Transmitter Using Delta-Sigma Modulation," Microwave and Wireless Components Letters, IEEE , vol.22, no.3, pp.156,158, March 2012
- RI46.** da Silva Cascalheira, M.; Pinho, P.; Teixeira, D.; **De Carvalho, N.B.**, "Indoor guidance system for the blind and the visually impaired," Microwaves, Antennas & Propagation, IET , vol.6, no.10, pp.1149,1157, July 17 2012
- RI47.** Boaventura, A.J.S.; **Carvalho, N.B.**, "Extending Reading Range of Commercial RFID Readers," Microwave Theory and Techniques, IEEE Transactions on , vol.61, no.1, pp.633,640, Jan. 2013
- RI48.** Silva, N.V.; Oliveira, A.S.R.; **Carvalho, N.B.**, "Design and Optimization of Flexible and Coding Efficient All-Digital RF Transmitters," Microwave Theory and Techniques, IEEE Transactions on , vol.61, no.1, pp.625,632, Jan. 2013
- RI49.** Zhansheng Liu; Violas, M.A.; **Carvalho, N.B.**, "Modeling and Simulation of a Reflective Semiconductor Optical Amplifier Modulator Using X-Parameters," Photonics Technology Letters, IEEE , vol.25, no.3, pp.272,274, Feb.1, 2013
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## SOFTWARE PACKAGES

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**S1. Nuno Borges de Carvalho**, José Carlos Pedro and Paulo Jorges Silva, “Multi-tone Figures of Merit”, Version 1.0, Instituto de Telecomunicações, Universidade de Aveiro, 2000.

This software package can be downloaded from <http://www.rfglobalnet.com>, <http://www.wirelessdesignonline.com>. This software package calculates multi-tone Intermodulation (IMD) Figures of Merit, like ACPR, M-IMR, NPR and CCPR from conventional two tone IMD figures of merit, IP3. The formulas implemented on this software were published on: J. C. Pedro e N. B. Carvalho, "On the Use of Multi-Tone Techniques for Assessing RF Components' Intermodulation Distortion", IEEE Trans. on Microwave Theory and Techniques, vol. MTT-47, n° 12, pp.2393-2402, Dec. 1999.

**S2.** Ludimar Guenda and **Nuno Borges de Carvalho**, several smart phone applications related to location systems, wireless sensor networks and energy harvesting can be downloaded from the Google Store (Google Play): <http://bit.ly/zmM7Ii>

## CITATION TO PUBLISHED PAPERS

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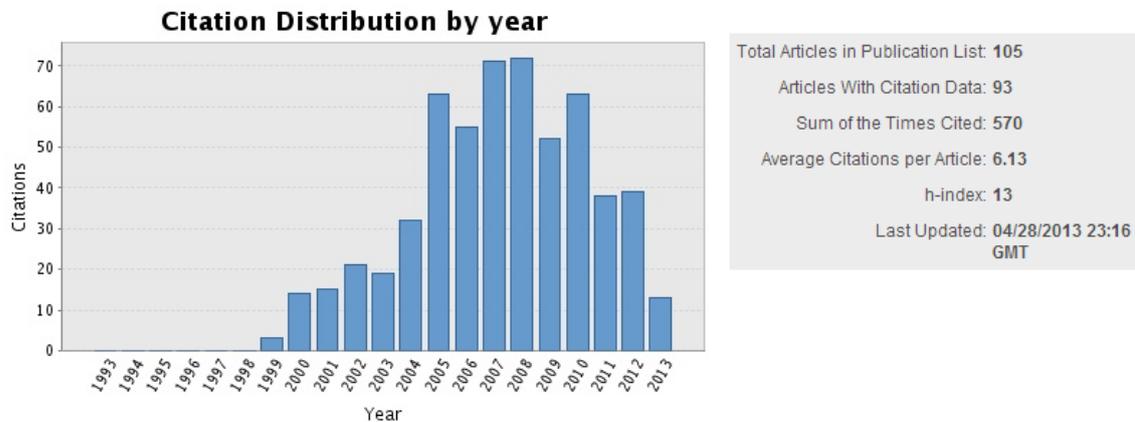
In the previous sections we identified the citations for each paper in quotes for international journals and books, the indicators used were the Thomson Reuters ISI Web of Knowledge and Google Scholar.

This section describes, in accordance with these international indicators, the number of citations to published work.

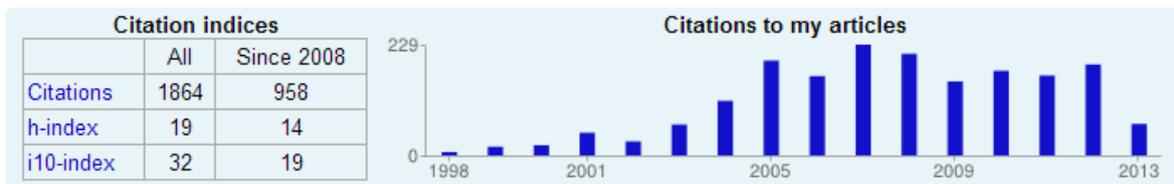
The ISI Web of Knowledge indicates 570 articles mentioning the work published by Prof. Nuno Borges Carvalho, note that these quotes are just quotes existing in this database, there may be other unaccounted. The next picture is a capture graph representing the number of citations per year. These data can be found at

<http://www.researcherid.com/rid/A-8645-2008>.

This graph shows the number of times the articles on the publication list have been cited in each of the last 20 years.  
Note: Only articles from Web of Science with citation data are included in the calculations. [More information about these data.](#)



Google Scholar refers 1864 citations; note that these quotes are just quotes existing in this database. The following graph represents these values and their temporal evolution.



These values can be seen in:

<http://scholar.google.com/citations?hl=en&user=FKzPn8wAAAAJ>

## COORDINATION OF RESEARCH PROJECTS

Participation in projects by Dr. Nuno Borges de Carvalho can be divided in three variants: the projects funded by Portuguese agencies, international agencies and funded or promoted by private entities.

From a basic research point of view, Prof. Nuno Borges Carvalho has been involved in projects funded by the Portuguese Science and Technology Foundation (FCT) and the European Space Agency (ESA). These projects of theoretical-scientific nature are naturally geared to the production of theory and scientific publications. One of the measures of success of such projects is the number of produced publications.

The main activities developed within these projects was focused on the study and understanding of nonlinear distortion phenomena in RF circuits and systems, typically

power amplifiers, transceivers for Software Defined Radio and RF-DC converters, commonly used in RFID systems.

In this sense the work includes the analysis, instrumentation, modeling and design of RF circuits optimized both in linearity, and efficiency. In this context partnerships with international universities and laboratories were also pursued, those include: Centre of Tecnologic Telecomunicacions de Catalunya (Spain), University of Vigo (Spain), University of Cantabria (Spain), University of Alcalá (Spain), North Carolina State University, (USA), University of Leuven (Belgium), Chalmers University (Sweden), University of Gävle (Sweden) and National Institute of Standards and Technology (NIST-CO-USA).

In this context the project with the higher impact from a social point of view is the GaNSpace. In this project the outcome was to design a system for measuring GaN devices, which will be placed in space, aboard INMARSAT, in July 2013, the test board circuit is based on Gallium Nitride (GaN) and was fully developed at Universidade de Aveiro.

The industrial project sponsors are usually companies or entities in which the promoter is a company. In this type of projects the success metric is typically a prototype or a demonstrator, a patent and the publication of results in national or international conferences, in which one can promote the idea/concept and therefore use the discussion sessions to improve the development of the commercial prototype.

In this context, the projects were typically focused on the topic of radio frequency systems dedicated to specific niche markets, with a focus on location and positioning using RF signals. Some of the companies that sponsor the research work are: PTInovação, YDreams, MICRO I/O, PHILLIPS Portugal, Miguel Rios Design, MaisIs, BREEZE, Acronym, Celfinet, EFACEC, Portuguese Navy, RN2S and Cicloria Consortium.

Recently an European Project was also awarded to a consortium where the objective will be to design highly linear high power amplifiers for space applications based on GaN with power space combination.

A summary of the projects Prof. Carvalho coordinate are:

**2013 - Today** → IC1301 – WIPE COST Action General Chair.

*Funding Entity:* European Union (COST Office).

**2013 - Today** → GANSAT: GaN Power Amplifiers for Satellite Applications (European Union FP7-Space).

*Funding Entity:* European Union.

**2013 - Today** → CREATION: cognitive radio transceiver design for energy efficient data transmission (XCL/EEI-TEL/0067/2012).

*Funding Entity:* Portuguese National Science Foundation.

**2013 - Today** → PANORAMA II – High bit-rate Microwave Links.

*Funding Entity:* QREN via PTInovação.

**2013 - Today** → RFOVERLAY – Digital RF over Ethernet.

*Funding Entity:* PTInovação.

**2012 - Today** → WAVESYS.

*Funding Entity:* QREN via Wavecom.

**2012 - Today** → PROENERGY-WSN: Prototypes for Wireless Sensor Networks Energy Efficient and Self-sustained (PTDC/ EEATEL/122681/2010).

*Funding Entity:* Portuguese National Science Foundation.

**2011 - Today** → CICLORIA – geo-referenced multimedia tourist guide system.

*Funding Entity:* CICLORIA Consortium (Several City Halls: Estarreja, Ovar e Murtosa).

**2010 - 2012** → GREENTEL

*Funding Entity:* PTInovação.

**2010 - 2012** → TACCS - Cognitive Radios Adaptable Wireless Transceivers (PTDC/EEATEL/099646/2008)

*Funding Entity:* Portuguese National Science Foundation.

**2010 - 2012** → NAPIS

*Funding Entity:* Portuguese Navy.

**2009 - 2012** → National Delegate for COST IC0803

*Funding Entity:* European Union

**2009 - 2012** → Virtual Responder.

*Funding Entity:* Portuguese National Science Foundation.

**2009 - 2011** → PANORAMA.

*Funding Entity:* QREN.

**2008 - 2011** → GaN-Space.

*Funding Entity:* European Space Agency.

**2008 - 2010** → MBSR - Multitechnology Base Station Router.

*Funding Entity:* PT Inovação

**2008 - 2010** → VirtualB – Indoor Person Location.

*Funding Entity:* PTInovação

**2007 - 2008** → LOPES – Indoor Person Location.

*Funding Entity:* Agência de Inovação

**2007 - 2010** → Large Signal Measurements for Nonlinear Behavioral Model Extraction.

*Funding Entity:* CRUP

**2005 - 2008** → ColteMepai – Compensation of Long Term Memory Effects in Power Amplifier Intermodulation Distortion, POSC/EEA-ESE/55739/2004.

*Funding Entity:* Portuguese National Science Foundation.

**2005 - 2006** → ViAve – DSRC system development destined to the automatic toll gate payment.

*Funding Entity:* BRISA.

**2005 - 2006** → MusiLage – Multi-sine wave generator, IT/LA.

*Funding Entity:* Portuguese National Science Foundation.

**2005 - 2006** → Local-WiFi

*Funding Entity:* PTInovação

**2004 - 2005** → I-Garment

*Funding Entity:* European Space Agency.

**2004 - 2007** → TARGET – Top Amplifier Research Groups in an European Teamwork.

*Funding Entity:* European Commission, 6th Framework Programme for Research, Technological Development and Demonstration.

**2002 - 2006** → MEGaN – Model Extraction of GaN Transistors.

*Funding Entity:* Portuguese National Science Foundation.

**2002 - 2005** → OALMT – Multi-carrier amplifier characterization - E-72/03.

*Funding Entity:* CRUP

**2002 - 2005** → FindIT

*Funding Entity:* Agência de Inovação

**2002 - 2006** → TRIVIAL - Interactive Video over Radio Links

*Funding Entity:* Phillips

**2002 - 2004** → OPAMS –Optimum Power Amplifiers for Modulated Signals, POCTI/ESE/37531/2001.

*Funding Entity:* Portuguese National Science Foundation.

**2000-2002** → LDMOSCA –RF MOS Low distortion circuits, ESE/34074/99-00.

*Funding Entity:* Portuguese National Science Foundation.

**1999-2001** → LINMIX – Linearity Assessment in Active Mixers - PRAXIS/C/EEI/14160/1998

*Funding Entity:* Portuguese National Science Foundation.

# MANAGEMENT OF RESEARCH TEAMS

Prof. Nuno Borges Carvalho is currently the coordinator of Radio Systems group at the Instituto de Telecomunicações Aveiro pole (<http://radiosystems.av.it.pt>). Radio Systems group is dedicated to the study and development of technology solutions for emerging Radio Frequency systems, focusing on systems from Software Defined Radio to Wireless Power Transmission, which have their main application in RFID systems.

The group is currently composed of six University Professors, two Postdocs and eight PhD students, plus several Masters students and Scientific Research Fellows.

To date Prof. Nuno Borges Carvalho has led and leads 13 PhD students and several MSc students (more than 30). Emphasis is placed on collaboration with foreign universities, the case of Gävle in Sweden and dissertations that were held in a business environment, in this case some collaborations can be highlighted, as: CP, NEC, ANACOM, CELFINET, ACRONYM, MICRO-I/O, PTInovação.

## POS-DOC SUPERVISOR

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### 2013 – Today

*Name:* Dr. Pedro Cruz

*Theme:* Software Defined Radio System Design

*Funding Entity:* National Science Foundation Award.

### 2010 – Today

*Name:* Dr. Wonhoon Jang

*Theme:* Software Defined Radio Transmitters

*Funding Entity:* National Science Foundation Award.

## PHD SUPERVISOR

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### 2011 – Today

*Name:* Ricardo Fenandes

*Theme:* Electromagnetic Energy Harvesting in Wireless Sensor Networks

*Funding Entity:* National Science Foundation Award  
(SFRH/BD/69392/2010).

### 2011 – Today

*Name:* Sérgio Lopes

*Theme:* Hybrid Location in Mobile Wireless Sensor Networks based on Radio-Frequency and Inaudible Acoustic Signals

*Funding Entity:* IEETA.

## 2011 – Today

*Name:* Ludovico Bolas

*Theme:* Militar Cognitive Radio Applications

*Funding Entity:* Portuguese Navy.

## 2011 – Today

*Name:* Alírio Boaventura

*Theme:* Efficient Microwave Power Transmission for RFID and Energy Harvesting Systems

*Funding Entity:* National Science Foundation Award (SFRH/BD/80615/2011).

## 2010 – Today

*Name:* Zhansheng Liu

*Theme:* Research on Nonlinearities in Radio over Fiber Systems

*Funding Entity:* National Science Foundation Award (SFRH/BD/68376/2010).

*Defesa Prevista em:* 2013

## 2010 – Today

*Name:* José Pedro Borrego

*Theme:* Análise de SisTemes Não Lineares Sujeitos a Sinais Transientes

*Funding Entity:* ANACOM.

## 2009 – Today

*Name:* Luis Brás

*Theme:* Indoor Location Systems

*Funding Entity:* National Science Foundation Award (SFRH/BD/61834/2009).

## 2008 – Today

*Name:* Nelson Silva

*Theme:* Reconfigurable Architectures for Software-Defined Radios

*Funding Entity:* National Science Foundation Award (SFRH/BD/76807/2011).

## 2008 – 2013

*Name:* Pedro Cruz

*Theme:* Software Defined Radio System Design

*Funding Entity:* National Science Foundation Award.

## 2007 – 2011

*Name:* Hugo Cravo Gomes

*Theme:* Study of the Impact of Nonlinear Distortion in Radio Reception Architectures

*Funding Entity:* National Science Foundation Award (SFRH/BD/39440/2007).

**2002 – 2006**

*Name:* Pedro Miguel Cabral

*Theme:* Nonlinear Modelling of Power Transistors for RF and Microwaves

*Funding Entity:* National Science Foundation Award.

**2002 – 2006**

*Name:* Pedro Miguel Lavrador

*Theme:* Contribution to the Study of the Impact of Nonlinear Distortion in Telecommunications Systems

*Funding Entity:* National Science Foundation Award.

#### MSC SUPERVISOR (PRÉ-BOLOGNA PROCESS)

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**2005 – 2006** - Hugo Gomes - RFID for Location Purposes

**2006 – 2007** - Rui Estanqueiro Santos - Nonlinear Distortion in Wireless Systems

**2006 – 2006** - Charles Nader - PA for WiMax Applications

**2006 – 2006** - Paul Saad - PA for Wi-Fi Applications

**2005 – 2006** - Pedro Miguel Claro - Local positioning System based on Wi-Fi Networks

**2002 – 2004** - João Paulo Martins - Study techniques for linearization of RF Devices

**2001 – 2003** - António José Duarte Figueiredo Guilherme dos Santos – Location of Trains via Radio Signals

#### MSC SUPERVISOR (POS-BOLOGNA PROCESS)

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**2011 – 2012** - João Condeço - Commercial Radios Online

**2011 – 2012** - Fábio Rico - Location and Communication System for the Universidade de Aveiro

**2011 – 2012** - Luís Dias - Electromagnetic Energy Harvesting Systems

**2011 – 2012** - Emanuel Santana – Geo referenced systems using Android phones

**2010 – 2011** - Carlos Pereira - Geo referenced systems using Android phones

**2010 – 2011** - Mariana Cascalheira – Indoor navigation systems for blind people

**2010 – 2011** - Diana Teixeira - Indoor navigation systems for blind people

**2010 – 2011** - Diogo Ribeiro – Instrumentation of the characterization of Software Defined Radio

2010 – 2011 - José Pedro Magalhães – Using the human cochlea concept for Software Defined Radio design

2009 – 2010 - Vanessa Silva – M2M using GSM approaches

2009 – 2010 - Diogo Condeço – Museum tracking system

2009 – 2010 - Teófilo Monteiro – radio receiver based in the human cochlea

2008 – 2009 - Paulo Saraiva - Vitaljacket : location

2008 – 2009 - João Lima – Remote processing units

2008 – 2009 - Abílio Neves – Remote interaction using FPGA's

2008 – 2009 - Nuno Bonifácio – Wireless Power Transmission

2008 – 2009 - Luís Brás – Location systems based on wireless sensor networks

2008 – 2009 - Alírio Boaventura – RFID reader for 13MHz

2008 – 2009 - Ludimar Guenda – Location system based on M2M modules

2007 – 2008 - Gonçalo Martins - Co-location of Wireless Systems in a Mobile Infrastructure

2007 – 2008 - Ruben Ferreira - Epistemic Radios

2007 – 2008 - Sónia Luís - Military Wireless Interference

2007 – 2008 - Pedro Cruz - Nonlinear Distortion in ADC Systems

2007 – 2008 - Pedro Sá - Project of a Satellite Payload RF front end

2006 – 2007 - Manuel Baptista - Identification of Modulated Signals from Spectrum and Time Waveforms

2006 – 2007 - José Pedro Borrego - Passive Intermodulation in Wireless Communication Scenarios

2006 – 2007 - Pedro Prata - RFID for Warehouses Applications

2006 – 2007 - Sérgio Pires - Impact of non-ideal channels in UWB Systems

## RESEARCH FELLOWSHIP SUPERVISING

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2011 – 2012 → Fellowship Research Supervising of Diana Teixeira related to the research project TICE-Rádio.

2011 – 2012 → Fellowship Research Supervising of Mariana Cascalheira related to the research project Greentel.

2011 – 2012 → Fellowship Research Supervising of Diogo Ribeiro related to the research project TACCS.

2008 – 2012 → Fellowship Research Supervising of Ludimar Guenda related to the research project Napis.

**2011 – 2011** → Fellowship Research Supervising of Daniel Morais related to the research project Napis.

**2009 – 2010** → Fellowship Research Supervising of Miguel Bergano related to the research project Panorama.

**2009 – 2010** → Fellowship Research Supervising of Luís Silva related to the research project Panorama.

**2008 – 2011** → Fellowship Research Supervising of Marco Oliveira related to the research project Napis.

**2008 - 2008**→ Fellowship Research Supervising of Marco Araújo related to the research project Virtual- Boundaries.

**2008 - 2008**→ Fellowship Research Supervising of Hugo Mostardinha related to the research project GaN-Space.

**2008 - 2008**→ Fellowship Research Supervising of Pedro Miguel Sá related to the research project GaN-Space.

**2007 - 2008**→ Fellowship Research Supervising of Arnaldo Oliveira Martins related to the research project LOPES.

**2005 - 2007**→ Fellowship Research Supervising of Rui Estanqueiro Santos related to the research project ColteMepai.

**2005 - 2007**→ Fellowship Research Supervising of Rui Estanqueiro Santos related to the research project Musilage.

**2005 - 2006**→ Fellowship Research Supervising of João Paulo Martins related to the research project ColTemepai.

**2002 - 2005**→ Fellowship Research Supervising of João Paulo Martins related to the research project OPAMS.

**2000 – 2001**→ Fellowship Research Supervising of João Paulo Martins related to the research project LDMOSCA.

# IMPACT IN TECHNICAL AND INDUSTRY COMMUNITIES

Prof. Nuno Borges Carvalho had an impact on technical and industry communities around the world, these activities are mainly devoted to management and coordination of knowledge in their areas of specialty, mainly RF and Microwave circuits and systems.

In this sense it has been called to perform many different activities for review and editing journals nationally and internationally. Internationally the most important societies such as the IEEE (Institute of Electrical and Electronics Engineers), IOP (Institute of Physics), URSI (Union Radio Scientifique Internationale) or IET (The Institution of Engineering and Technology) have requested periodically reviewing of several scientific articles in various areas of knowledge within the scientific area of radio communications.

At the editorial level he belonged to several committees, including Technical Program Committees of the major conferences on his area, such as the European Microwave Conference or the International Microwave Symposium. He was also the guest editor for special issues of IEEE Transactions on Microwave Theory and Techniques, the IEEE Microwave Magazine and IEEE Journal of Emerging Technologies on Circuits and Systems he is currently Associate Editor for the IEEE Microwave Magazine.

Moreover he was responsible for proposing and coordinating several successful workshops in IEEE International Microwave Symposiums, with a high number of participants and was Chair or Vice-Chair of international conferences with the support of the IEEE.

In the context of international commissions he is Chair of the IEEE-MTT-11 Committee (Microwave Measurements). He belongs to the IEEE - MTT-20 (Wireless Communications MTT-20), IEEE - MTT-24 (RFID), and IEEE - MTT-26 (Wireless Power Transmission).

He is the current coordinator of the A-commission from URSI Portugal, the Vice-chair of the IEEE MTT/AP/ED Portuguese chapter and the Chair of the IEEE Portuguese Section.

## ORGANIZATION OF INTERNATIONAL EVENTS

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### **January 2012**

*Event:* Winter School on the Technology Challenges for the Internet of Things

*Position:* Chair

*Location:* Centro de Congressos, Aveiro

### **January 2012**

*Event:* Workshop on the Future of Radio

*Position:* Chair

*Location:* IT-Aveiro, Aveiro

## **December 2011**

*Event:* Workshop on White Space Technologies (with Rhode and Schwarz)

*Position:* Chair

*Location:* IT-Aveiro, Aveiro

## **November 2011**

*Event:* Workshop on Space Technologies & Synergies with Technological Poles

*Position:* Co-Chair

*Location:* IT-Aveiro, Aveiro

## **June 2011**

*Event:* Workshop on “Practical Compression, IMD, Load Pull and Behavioral Modeling Measurements”

*Position:* Chair

*Location:* International Microwave Symposium, 2011, Baltimore, USA

## **June 2011**

*Event:* Workshop on “Wireless Sensor Network Technologies for Emerging Applications”

*Position:* Chair

*Location:* International Microwave Symposium, 2011, Baltimore, USA

## **March 2011**

*Event:* Software Defined Radio Short Course

*Position:* Chair

*Location:* Universidade de Aveiro

## **Fevereiro 2010**

*Event:* IEEE International Microwave Workshop Series on “RF Front-ends for Software Defined and Cognitive Radio Solutions”

*Position:* Chair

*Location:* Reitoria da Universidade de Aveiro, Aveiro

## **Fevereiro 2010**

*Event:* COST IC-0803 Workshop

*Position:* Chair

*Location:* Reitoria da Universidade de Aveiro, Aveiro

## **June 2008**

*Event:* Workshop on “Measurements for Wireless System-Level Evaluation”

*Position:* Chair

*Location:* International Microwave Symposium, 2008, Atlanta, USA

## **June 2006**

*Event:* Workshop on “Memory Effects in Power Amplifiers”

*Position:* Principal Chair

*Location:* International Microwave Symposium, 2006, San Francisco, USA

## **January 2006**

*Event:* International Workshop on Integrated Nonlinear Microwave and Millimetre-Wave Circuits

*Position:* Co-Chair

*Location:* Reitoria da Universidade de Aveiro, Aveiro

## **EDITORIAL ACTIVITIES**

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### **2013 - Today**

*Position:* Associate Editor

*Journal:* IEEE Transactions on Microwave Theory and Techniques

*Site:* <http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=22>

### **2013**

*Position:* Guest Editor

*Journal:* IEEE Journal on Emerging and Selected Topics on Circuits & Systems (JETCAS)

*Theme:* Special Issue on: “Advanced Circuits and Systems for CR/SDR Applications”, with Dr. Roberto Gomez-Garcia, Prof. Fadhel M. Ghannouchi, Prof. Howard C. Luong.

*Site :* [http://jetcas.polito.it/JETCAS\\_CFP-Advanced\\_Circuits\\_and\\_Systems\\_for\\_CR-SDR\\_Applications.pdf](http://jetcas.polito.it/JETCAS_CFP-Advanced_Circuits_and_Systems_for_CR-SDR_Applications.pdf)

### **2012 - Today**

*Position:* Steering Committee

*Conference:* Radio and Wireless Week Conference 2013

*Site:* <http://www.radiowirelessweek.org/>

### **2011 - Today**

*Position:* Associate Editor

*Journal:* IEEE Microwave Magazine

*Site:* <http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=6668>

### **2010 - Today**

*Position:* Technical Program Committee

*Conference:* Radio and Wireless Week Conference

*Site:* <http://www.radiowirelessweek.org/>

## 2010 - Today

*Position:* Technical Program Committee

*Conference:* ARFTG

*Site:* <http://www.arftg.org/>

## 2009 - Today

*Position:* Editorial Advisory Board

*Journal:* Journal of Sensors & Transducers

*Site:* [http://www.sensorsportal.com/HTML/DIGEST/Editorial\\_board.htm](http://www.sensorsportal.com/HTML/DIGEST/Editorial_board.htm)

## 2010 - Today

*Position:* Editorial Board

*Journal:* International Journal of Microwave Science and Technology

*Site:* <http://www.hindawi.com/journals/ijmst/editors/>

## 2011

*Position:* Publicity Chair

*Conference:* IEEE International Conference on RFID-Technology and Applications (RFID-TA2011) – Barcelona - Spain

*Site:* [http://ewtw.cttc.es/images/CFP/cfp\\_rfidta.pdf](http://ewtw.cttc.es/images/CFP/cfp_rfidta.pdf)

## 2010

*Position:* International Advisory Committee

*Conference:* IEEE MTT-S International Microwave Workshop Series On IEEE Intelligent Radio for Future Personal Terminals – Daejeon - Korea

*Site :* [http://imws2011.kaist.ac.kr/images/Final\\_Program.pdf](http://imws2011.kaist.ac.kr/images/Final_Program.pdf)

## 2008-Today

*Position:* Technical Program Review Committee

*Conference:* IEEE International Microwave Symposium

*Site :* <http://www.mtt.org>

## 2009-Today

*Position:* Technical Program Review Committee

*Conference:* European Microwave conference

*Site:* <http://www.eumweek.com/>

## 2006

*Position:* Guest Editor

*Journal:* IEEE Transactions on Microwave Theory and Techniques

*Theme:* Special Issue devoted to Microwave Measurements, “Measurements for Large-Signal Characterization and Modeling of Nonlinear Analog Devices, Circuits, and Systems”, with Dr. Kate Remley - NIST and Dr. David Root - Agilent

*Site :* <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=01668329>

2004

*Position:* Technical Program Committee

*Conference:* 4ª Conferência Nacional de Telecomunicações

1999-Today

*Position:* Reviewer Board

*Conference:* IEEE Transactions on Microwave Theory and Techniques

## REVISION ACTIVITIES

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### JOURNALS

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- Institution of Physics Measurement Science and Technology Magazine.
- IEEE Transactions on Communications.
- IEEE Transactions on Microwave Theory and Techniques.
- IEEE Transactions on Circuit and Systems.
- IEEE Transactions on Intelligent Transport Systems.
- IEEE Microwave and Wireless Components Letters.
- IEEE Transactions on Electronic Design.
- IEEE Transactions on Neural Networks.
- Transactions on Signal Processing, Elsevier.
- International Journal of RF and Microwave Computer-Aided Engineering.
- Journal on Emerging and Selected Topics on Circuits & Systems (JETCAS)

### CONFERENCES

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- IST-Mobile Summit 2003
- Conftele 2003, 2005, 2007, 2009
- PIMRC 2005 e 2006
- “Journées Nationales Microondes 2001”, Poitiers, França.
- TPRC (Technical Program Review Committee) da European Microwave Conference
- TPRC (Technical Program Review Committee) da International Microwave Symposium, IMS
- International Workshop on Integrated Nonlinear Microwave and Millimetre-Wave Circuits

- Automatic RF Techniques Group Conference

## INVITED LECTURES

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- CC.1** N. B. Carvalho, “The Effects of Nonlinear Distortion in Radio Systems”, As Telecomunicações para a Today Década, Universidade de Aveiro, Apr., 2001.
- CC.2** N.B.Carvalho, “Como Funcionam os Telemóveis”, Universidade de Aveiro, 2001, 2002.
- CC.3** N.B.Carvalho, “O Mundo sem Fios”, Universidade de Aveiro, 2003.
- CC.4** N.B.Carvalho, “Memory Effects in Power Amplifiers”, 2006 RF and Microwave Electronics Meeting, Lisboa.
- CC.5** N.B.Carvalho, “The Importance of Radio Metrology for Health Impact Evaluation”, 1.º Portuguese URSI Committee, Lisboa, 2007.
- CC.6** N.B.Carvalho, “Peak to Average Power Ratio”, 2007 RF and Microwave Electronics Meeting, Aveiro.
- CC.7** N.B.Carvalho, “Hardware/Physical Problems in Security”, WinSys – International Conference on Wireless Information Networks and Systems, Porto, 2008
- CC.8** N.B.Carvalho, “The importance of Metrology in Wireless Communication Systems (From AM/FM to SDR Systems)”, Keynote Speaker - International Conference on Wireless Information Networks and Systems, Porto, 2008
- CC.9** N.B.Carvalho, ”O Rádio do Futuro”, Rádio em Congresso, Lisboa, Mar., 2011
- CC.10** N.B.Carvalho, ”RFID Technologies: Status and Challenges”, Panel session on RFID-TA, Barcelona, Sep., 2011
- CC.11** N.B.Carvalho, ”As Comunicações Rádio no Futuro”, Wireless Inovation, Aveiro, Oct., 2011
- CC.12** N.B.Carvalho, ” Electromagnetic Energy Harvesting Systems”, Keynote Speaker Conference on Electronics, Telecommunications and Computers, Lisboa, Nov., 2011
- CC.13** N.B.Carvalho, ”Sistemas de Transmissão de Energia”, Ordem dos Engenheiros Sul, Lisboa, Nov., 2011

## PHD JURY PARTICIPATION

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**Dec., 2011** → Pedro Mota PhD defense, with the theme “In-circuit Test and Linearization of RF Power Amplifiers”, Faculdade de Engenharia da Universidade de Porto, Supervisor: José Machado da Silva.

**2009** → Jorge dos Santos Freitas de Oliveira, PhD defense, with the theme “Análise de Comportamentos Multi-Ritmo em Sistemas Electrónicos”, Universidade de Aveiro, Supervisor: José Carlos Pedro.

**Aug., 2008** → Mestre Maciej Myslinski, PhD defense, with the theme “Using Modulated Signals for the Validation and Construction of Nonlinear Behavioral Models for Microwave Components”, KU Leuven, Leuven, Belgium, Supervisor: Dominique Schreurs.

**Dec., 2007** → Manuel de Jesus Ferreira Dinis, PhD defense, with the theme “Desempenho de um sistema Celular na Banda Larga na Faixa dos 40GHz”, Universidade de Aveiro, Supervisor: José Carlos Neves

**Nov., 2005** → Emigdio Malaver, PhD defense, with the theme at Universidade de Cantabria, Santander, Spain, Supervisor: José Angel Garcia.

## R&D COMMITTEE MANAGEMENT

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**2012 – Today** → Chair of IEEE-MTT-11 (Microwave Measurements <http://www.mtt-archives.org/~mtt11/>)

**2013 – Today** → Vice-chair of IEEE MTT/AP/ED Portuguese chapter.

**2012 – Today** → IEEE-MTT-24 committee member (RFID)

**2012 – Today** → IEEE-MTT-26 committee member (WPT)

**2010 – 2012** → Vice-Chair of IEEE-MTT-11 (Microwave Measurements)

**2010 – 2013** → Chair of IEEE MTT/AP/ED Portuguese chapter.

**2010 – Today** → IEEE-MTT-20 committee member (Wireless Communications <http://www.mtt-archives.org/~mtt20/>)

**2007 – Today** → Chair A-committee A, URSI Portugal.

**2007 – 2010** → Management of the IEEE-MTT-11 webpage.

**2007 – 2010** → Vice-chair do IEEE MTT/AP/ED Portuguese chapter.

## PRIZES

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Prof. Nuno Borges Carvalho has won awards both at nationally and internationally level.

**Dec. 2011** → First place with the work “Sistemas de Sensores Passivos”, at Fraunhofer Portugal Challenge, awarded to the PhD student Ricardo Fernandes.

**Dec. 2010** → First place with the work “Rádio do Futuro”, at the PLUG 2010 sponsored by APRITEL – The association of Portuguese Telecom Operators, to the TACCS project, where Nuno Borges de Carvalho is the principal investigator.

**Dec. 2007** → Second place to the work MBSR - Multitechnology Base Station Router, sponsored by PTInovação.

**May 2004** → Second place to the work Local-WiFi., sponsored by PTInovação

**06 de Dec. de 2000** → IEE 2000 Measurement Prize, sponsored by IEE – The Institute of Electrical Engineers.

**20 de Jun. de 1998** → Third place at the student paper competition in the International Microwave Symposium, IMS, 1998.

**1995 – 1997** → PhD Grant from JNICT (Portuguese National Science Foundation) PRAXIS XXI/BD/5630/95.

**07 de Oct. de 1996** → Engº Ferreira Pinto Basto Prize, sponsored by ALCATEL PORTUGAL to the best student in the “Licenciatura em Engenharia Electrónica e Telecomunicações”.

**15 de Jun. de 1996** → Prize to the best engineering student in the Universidade de Aveiro, sponsored by the Portuguese Engineering Association..

# KNOWLEDGE TRANSFER

## PORTUGUESE PATENT

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**PN1. Patent pending registered Dec. de 2011 – 106073 – “ Sistema de Guia Multimédia Baseados em Navegação Multi-Tecnologia”**

*Inventors:* Nuno Borges de Carvalho, Ludimar Guenda e Diogo Miguel do Céu Condeço.

**PN2. Patent pending registered Jul. de 2011 – “SisTheme de Seguimento (Tracking) Utilizando Fotografias Georreferenciadas”**

*Inventors:* Nuno Borges de Carvalho, Ludimar Guenda e Fábio Ferreira.

**PN3. PATENTE DE INVENÇÃO NACIONAL Nº 102521– “Sistema de Medida de Distorção Não Linear Co-Canal”, Boletim da Propriedade Industrial, Apêndice do Diário da República de Terça Feira, 30 de Apr. de 2002, Pages1438,**

*Inventors:* Nuno Borges de Carvalho e José Carlos Pedro.

**PN4. PATENTE DE INVENÇÃO NACIONAL Nº 103590 - "Método Para Localizar Pessoas ou Objetos Usando uma Rede Sem Fios", Boletim da Propriedade Industrial, Apêndice do Diário da República de 22 de Dec. de 2008, Pages 17,**

*Inventors:* Nuno Borges Carvalho, Pedro Miguel Claro e Mário Rui Santos

## INTERNATIONAL PATENTS

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**PIN1 International Patent Nº 103616 – “Integrated System for Multichannel Monitoring and Communication in the Management of Rescue Teams”**

Países: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LI, LU, LT, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR

*Inventors:* Nuno Borges Carvalho, Tiago Fonseca e Miguel Rios

## COLLABORATION WITH SPIN OFF COMPANIES

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As part of its activities in projects related to companies Prof. Nuno Borges Carvalho has collaborated and encouraged the creation of several spin off companies from the Universidade de Aveiro, the collaboration was usually as a consultant or as an expert.

Some of these companies have been or are chaired by former students, some of whom used the knowledge gained in the group to develop activities of a professional nature, two of those most important cases were: RN2S, who used a software package originally produced at the Instituto de Telecomunicações and ThinkIT where one of its products was based on the patent " Tracking system Using Georeferenced Photos".

The list of companies with closer collaborations is:

ThinkIT – Information Technologies

*website:* [thinkit.pt.vu/](http://thinkit.pt.vu/)

RN2S, LDA

*website:* [www.escutar.eu/](http://www.escutar.eu/)

IUZ, TECHNOLOGIES, LDA

*website:* [www.iuz.pt](http://www.iuz.pt)

BE.UBI

*website:* <http://www.beubi.com>

***Formiga Urbana*** - PRODUTOS DIGITAIS, UNIPESOAAL LDA

*website:* [www.formigaurbana.com/](http://www.formigaurbana.com/)

***ECOINSIDE***- Soluções em ecoeficiência e sustentabilidade, LDA

*website:* [www.ecoinside.pt/](http://www.ecoinside.pt/)



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PROFESSOR NUNO BORGES CARVALHO

**Full Professor**

Instituto de Telecomunicações – Pólo de Aveiro  
Departamento de Electrónica, Telecomunicações e Informática  
Universidade de Aveiro  
Portugal