

24 Years Nurturing Scientists in Macao: From A Desert to A State Key Laboratory of China Excelling in the World-Stage of Electronics

Abstract

This presentation focuses on the understudied role of research groups contributing to develop the knowledge bases of developing universities in regions lagging behind in human, financial and scientific resources. It analyses the evolution of a research group that in a bit more than 2 decades achieved world-wide recognition in the field of microelectronics, with an impact on both teaching activities and engineering research and development at the University of Macau, Macao and China. Our analysis concludes that voluntarism and loose organizational structures from the start stimulate the development of solid scientific agendas and institutional identity, and that counter-intuitive policies including academic inbreeding, may also be needed and unavoidable in this effort. The use of these counter-intuitive policies and their effects, however, can be mitigated by transforming education to highlight internationalization at the world-top level with extremely high quality standards and measurable outcomes. This requires the committed involvement of research group leaders in both research and education. Lastly, another key component of university development may lie in hiring and giving freedom to young promising scholars with will and drive to lead and act. The contents will include a reference to the evolution from the initial area of Analog circuits that 40 years ago were considered in extinction since Digital circuits were emerging everywhere. This assumption was completely incorrect since our world is still Analog and the amazing development in the Digital domain led to stringent requirements in the translation interface between the real Analog World and the Digital Information that has been required to become faster, more accurate, consuming less power and occupying a smaller area on chip. Further, it implied that scientific work in the now called area of Analog and Mixed-Signal VLSI became a mixture combining theory and creativity merging engineering with human art and in high demand in an ultra-fast changing technological world. This will be illustrated by referring examples of works originated in Switched-Capacitor High-Frequency Filtering in CMOS sub-micron technologies that evolved now to a whole new spectrum of Analog and Mixed-Signal Circuits in state-of-the-art nanoscale CMOS which has been further extended to an exciting developing new area designated by Microfluidics that merges electronics with chemistry and biology.

Short Biography



Rui P. Martins (IEEE Member'88 – Senior Member'99 – *Fellow*'08), born in April 30, 1957, received the Bachelor (5-years), the Masters, and the Ph.D. degrees, as well as the *Habilitation* for Full-Professor in electrical engineering and computers from the Department of Electrical and Computer Engineering, Instituto Superior Técnico (IST), TU of Lisbon, Portugal, in 1980, 1985, 1992 and 2001, respectively. He has been with the Department of Electrical and Computer Engineering (DECE) / IST, TU of Lisbon, since October 1980.

Since 1992, he has been on leave from IST, TU of Lisbon (now University of Lisbon since 2013), and is also with the Department of Electrical and Computer Engineering, Faculty of Science and Technology (FST), University of Macao (UM), Macao, China, where he is currently a Chair-Professor since August 2013. In FST he was the Dean of the Faculty from 1994 to 1997 and he has been Vice-Rector of the University of Macao since 1997. From September 2008, after the reform of the UM Charter, he was nominated after open international recruitment, and reappointed (in 2013), as Vice-Rector (Research) until August 31, 2018. Within the scope of his teaching and research activities he has taught 21 bachelor and master courses and, in UM, has supervised (or co-supervised) 40 theses, Ph.D. (19) and Masters (21). Co-authored: 6 books and 9 book chapters; 18 Patents, USA (16) & Taiwan (2); 381 papers, in scientific journals (115) and in conference proceedings (266); as well as other 60 academic works, in a total of 474 publications. He was a co-founder of Chipidea Microelectronics (Macao) [now Synopsys] in 2001/2002, and created in 2003 the *Analog and Mixed-Signal VLSI Research Laboratory* of UM, elevated in January 2011 to State Key Laboratory of China (the 1st in Engineering in Macao), being its Founding Director, position that he still holds.

Prof. Rui Martins is an *IEEE Fellow*, was Founding Chairman of both IEEE Macau Section (2003-2005) and IEEE Macau Joint-Chapter on Circuits And Systems (CAS) / Communications (COM) (2005-2008) [*2009 World Chapter of the Year of IEEE CAS Society (CASS)*]. He was General Chair of 2008 IEEE Asia-Pacific Conference on CAS – *APCCAS'2008*, and was Vice-President for Region 10 (Asia, Australia and the Pacific) of *IEEE CASS* (2009-2011) and later Vice-President (World) Regional Activities and Membership of *IEEE CASS* (2012-2013), and Associate Editor of *IEEE Transactions on CAS II: Express Briefs* (2010-2013), nominated *Best Associate Editor of T-CAS II* in that period. Plus, he was a member of the IEEE CASS Fellow Evaluation Committee (2013 and 2014), and *CAS Society* representative in the Nominating Committee, for the election in 2014, of the Division I (CASS/EDS/SSCS) - Director of the IEEE. He was the General Chair of the ACM/IEEE Asia South Pacific Design Automation Conference – *ASP-DAC'2016* and received the *IEEE Council on Electronic Design Automation (CEDA) Outstanding Service Award 2016*. He was a Nominations Committee Member of *IEEE CASS* (2016) and is currently the Chair of the IEEE CASS Fellow Evaluation Committee (2017). He was the recipient of 2 government decorations: the Medal of Professional Merit from Macao Government (Portuguese Administration) in 1999, and the Honorary Title of Value from Macao SAR Government (Chinese Administration) in 2001. In July 2010 was elected, unanimously, as Corresponding Member of the Portuguese Academy of Sciences (in Lisbon), being the only Portuguese Academician living in Asia.