Trends on Architecture and Physical Design of Micro and Nanoelectronics Chips

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Abstract

The talk starts with a short presentation of Electronics and Microelectronics evolution. Then it will be presented a set of several trends in the design of micro and nanoelectronics circuits, including architectural issues, variability and sources of variability, EDA tools, physical design issues, printability, design of transistor networks, Layout Strategies, Regularity, 3D circuits, flexible electronics, new devices, Stretchable Silicon, Fault Tolerance, Tolerance to Radiation Effects and Factory Integration. The talk try to motivate the audience to explore the upcoming challenges in the field.

It also will be included a topic about power reduction based on the optimization of the amount of transistors used to implement a circuit, as leakage power is proportional to the number of transistors. It is shown a physical design approach to reduce the amount of transistors, including an EDA tool set to automatically generate the physical design of any transistor network. It shows an important reduction on power, improving also reliability.

Short Bio

Ricardo Reis was born in Cruz Alta, Brazil. He received a Bachelor degree in Electrical Engineering from Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil, in 1978, and a Ph.D. degree in Microelectronics from the National Polytechnic Institute of Grenoble (INPG), France, in 1983. Since 1981, he is a professor at the Informatics Institute of Federal University of Rio Grande do Sul, and a leader of the Microelectronics Group. His main research includes physical design automation, design methodologies, fault tolerant systems and microelectronics education. He has more than 400 publications including books, journals and conference proceedings. He was vice-president of IFIP (International Federation for Information Processing) and he was also president of the Brazilian Computer Society (two terms) and vice-president of the Brazilian Microelectronics Society. He received the 2015 IEEE CASS Meritorious Service Award. He was vice-president of CASS for two terms (2008/2011), representing R9. He is the founder of the Rio Grande do Sul CAS Chapter, which got the World CASS Chapter of The Year Award 2011 and 2012, and R9 Chapter of The Year 2013 and 2014. He is a founder of several conferences like SBCCI (sponsored by CASS in Brazil) and LASCAS, the CASS Flagship Conference in Region 9. He was the General or Program Chair of several conferences like IEEE ISVLSI, SBCCI, IFIP VLSI-SoC, ICECS, PATMOS. Ricardo was the Chair of the IFIP/CEDA VLSI-SoC Steering Committee, vice-chair of the IFIP WG10.5 and Chair of IFIP TC10. He also launched EMicro, an annually microelectronics school in South Brazil, that now is co-sponsored by IEEE CAS chapter. In 2002 he received the Researcher of the Year Award in the state of Rio Grande do Sul. Ricardo has also being participating in many Latin-American research activities. Prof. Reis is a member of the IEEE since 1981 and senior member since 2006. He is also member of the ACM, founding member of the SBC (Brazilian Computer Society) and also founding member of SBMicro (Brazilian Microelectronics Society).