Doctoral Course

"Analog-to-Digital Converters Design Towards the Internet of Everything"

Dr. Michele Dei

IMB-CNM(CSIC) - Spain

Short Abstract: Internet of Everything (IoE) emerges on top of the relatively more known Internet of Thing (IoT) by merging to "things" also people, data and processes whereas "things" are intended to be sensors and actuators ready to be connected to the Internet. IoE unfolds a vision with greater technical complexity, societal impact and economic value which will be one of the fundamental driving forces for applied research during the next decade. In this context, electronic engineers are called to adopt new design paradigms to target the challenging specifications of almost energy autonomous sensing/actuating nodes. This course tries to provide a reference frame for current cutting-edge techniques in Analog-to-Digital converters design in mainstream CMOS technologies under the focus of IoE.

Course Contents in brief:

- Internet of Everything: concept, impact and smart systems
- Analog-to-Digital Converters: circuit primitives and basic building blocks
- Analog-To-Digital Converters: Delta-Sigma modulation
- Analog-To-Digital Converters: Successive Approximation Registers
- Analog-To-Digital Converters: Time-domain processing

Total # of hours of lecture: 16

References:

[1] R. Want, B. N. Schilit and S. Jenson, "Enabling the Internet of Things," in *Computer*, vol. 48, no. 1, pp. 28-35, Jan. 2015. doi: 10.1109/MC.2015.12

[2] https://web.stanford.edu/~murmann/adcsurvey.html (Accessed: 16-Nov-2018).

[3] J. M. de la Rosa, R. Schreier, K. Pun and S. Pavan, "Next-Generation Delta-Sigma Converters: Trends and Perspectives," in *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 5, no. 4, pp. 484-499, Dec. 2015. doi: 10.1109/JETCAS.2015.2502164

[4] M. Ding *et al.*, "A Hybrid Design Automation Tool for SAR ADCs in IoT," in *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*. doi: 10.1109/TVLSI.2018.2865404

CV of the Teacher

Michele Dei (Orcid: 0000-0001-5388-0150, Research ID: M-3281-2014) received the Laurea degree cum Laude in Electronic Engineering and the Ph.D degree in Information Engineering at the University of Pisa (Italy) in 2007 and 2010, respectively, working on the design of smart sensors for detection of physical quantities. He is currently with IMB-CNM (Instituto de Microelectrónica de Barcelona - Centro Nacional de Microelectrónica, Spain). His main area of interest is that of low-power analog integrated circuit for sensor interfacing, high resolution data converters, and analog-mixed signal design in the context of a number of high-impact research and industrial projects involving instrumentation for space imagers, graphene-based neuro-recording systems and ubiquitous bio-electro-chemical sensing for the IoT. Recently, he has been with School of Information and Communication Technology at KTH (Royal Institute of Technology, Stockholm, Sweden) granted by a co-fund Marie Skłodowska-Curie action to work in smart packaging for wireless sensing of food safety and quality.

Room and Schedule

Room: *Aula Riunioni del Dipartimento di Ingegneria dell'Informazione, Via G. Caruso 16, Pisa – Ground Floor*

Schedule:

6/5/2019 – 9.30-13.30

7/5/2019 – 9.30-13.30

8/5/2019 – 9.30-13.30

9/5/2019 – 9.30-13.30