“Low-voltage Analog Design in CMOS Scaled Technology”

Oulu University - Oulu (Finland)

December, 16th-19th, 2014

Abstract: The course gives the trends of the behaviour of MOS devices in scaled technologies. The most important new phenomena changing the MOS performance are introduced. Their effects in the design of analog circuits are presented, with particular attention to the design of Low-Voltage Low-power cases.

- **Day 1 - Introduction - What is Scaled Technology**
  - Basic CMOS operation
  - CMOS TechScal trends
    - TechScal MOS device behaviour modifications
  - What is LV
    - LV at transistor level
      - MOS in saturation region
      - MOS in subthreshold region
    - Current mirrors
- **Day 2 - LV & TechScal design**
  - Opamp
    - Two-stage class-A & class-AB
    - Multi-stage
    - Rail-to-rail
    - Common-mode feedback
  - Bandgap
- **Day 3 - Complex systems**
  - Closed-loop Continuous-time Systems
    - Analog Active-RC filters
  - Open-loop Continuous-time Systems
    - Gm-C filter design
    - Advanced Continuous-time filters
  - Sampled-data Systems
  - SC circuit design
- **Day 4 - A/D Converters Trends**
  - Pipeline
  - SAR
  - Sigma-Delta

Scheduling

- **Day 1-4: 9.00-10.30 / 11.00-12.30 / 14.00-15.30 / 16.00-17.30**
Andrea Baschirotto graduated in Electronic Engineering (summa cum laude) from the University of Pavia in 1989. In 1994, he received the Ph.D. degree in electronics engineering from the University of Pavia. In 1994, he joined the Department of Electronics, University of Pavia, as a Researcher (Assistant Professor). In 1998, he joined the Department of Innovation Engineering, University of Lecce, Italy, as an Associate Professor. In 2007, he joined the Department of Physics, University of Milan-Bicocca, Italy, as an Associate Professor. Andrea Baschirotto has a long-term experience in microelectronics for what concerns teaching, researching, and industrial designing. He is teaching regular Academic courses since 1997. He organized the full educational courses for Electronics Engineering (Bachelor, Master, and Ph.D.) at University of Lecce. He uses to give industrial courses since 1996 (in Bosch, STMicroelectronics, ITC-IRST, Conexant, Mikron, etc…). He is a speaker at the MEAD Summer courses held at EPFL (Lausanne – Switzerland). He uses to give short courses/tutorial at the most important conferences (ISSCC, ISCAS, PRIME).

About his research activity, he founded and he is leading the Microelectronics Group at University of Lecce, which is collaborating with several companies and research institutions (IMEC, Infineon, University of Pavia, RFDomus, STMicroelectronics, etc….). His main research interests are in the design of CMOS mixed analog/digital integrated circuits, in particular for low-power and/or high-speed signal processing. He participated to several research collaborations, also funded by National and European projects. He is/has been responsible of some National and Regional projects for the design of ASIC. Since 1989, he also personally collaborated with several companies on the design of mixed signals ASICs, like STMicroelectronics, Mikron, ACCO, ITC-IRST, RFDomus (now GloNav), Conexant, etc….

He has authored or co-authored more than 190 papers in international journals and presentations at international conferences, 6 book chapters, and holds 25 USA patents. In addition, he has co-authored more than 120 papers within research collaborations on high-energy physics experiments.

Andrea Baschirotto was Associate Editor IEEE Trans. Circuits Syst. – Part II for the period 2000-2003, and he is now serving IEEE Trans. Circuits Syst. – Part I as an Associate Editor. He has been the Technical Program Committee Chairman for ESSCIRC 2002 and he was the Guest Editor for the IEEE JSSC for ESSCIRC 2003 and ESSCIRC2007. He was the General Chair of IEEE-PRIME2006 and AACC2008.

He is the member of the Technical Program Committee of several international conferences (ISSCC, ESSCIRC, AACC, DATE, etc…). He is serving since several years the ESSCIRC TPC as Data Converter Subcommittee Chairman. He has been the secretary of the European Committee of ISSCC Technical Program Committee. He is an IEEE-Fellow. He is the founder and the Chairman of the IEEE Solid-State Circuit Society Italian Chapter.