“Sensor Interface Circuits: A Design Perspective”

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Abstract:
Sensors provide environmental information from the physical world that we live in to the electronic circuits that we have the processing power. The amount of information we can extract from the real world via a sensor node depends on how well the interface has been crafted. Whether it is digital or analog processing afterwards, interfacing the sensors with the electronic circuits introduces stringent constraints such as ultra-low power consumption, excellent noise performance and accurate acquisition of the signals from the sensor node. Thus, forcing the designers to come up with innovative advanced circuit and system level design techniques depending on the sensor type and application. The design challenge starts at system level by selecting the most efficient architecture. Most of the time less means more in sensor interface design and we embrace Einstein’s quote, “Everything should be made as simple as possible but not simpler”. In order to make interface design simple and efficient designers have to solve various design challenges at every design level some of which would be addressed in this talk.

This talk will cover different types of sensor interface circuits such as low-noise, low-power amplifier for bio-potential recording system and low-power, multi-path, complex, bandpass sigma-delta ADC circuit for body area networks. The main focus will be on the design challenges of analog front-end design of sensor interfaces and solutions proposed to overcome these challenges.

Speaker’s Biography:
Dr. Selcuk TALAY (M’08) received his M.Sc. and Ph.D. degrees in Electrical and Electronics Engineering from Bogazici University, Turkey. He served as a research assistant at BETA laboratory in Bogazici University where he carried out his M.Sc. and Ph.D. research on analog design automation and interface circuit design and optimization. In Feb. 2008, he joined Prof. Franco Maloberti’s group at University of Pavia, Italy as postdoctoral research associate. At IMS Laboratory, he worked on sensor interface circuits, especially high-speed and low-power ADC circuits. In Aug. 2009 he joined e-lab at Yale University as a postdoctoral research associate where he worked on hardware implementation of complex data flow computer systems for synthetic vision and bio-potential recording circuits with UWB transmitter. Before joining Dialog Semiconductor in 2013, he was serving as an expert researcher and consultant to Revolution Semiconductor Labs on the matter of complex RF/Mixed-Signal designs. His research interests include sensor interface circuits, ADCs, power management circuits, analog design automation, mixed-signal design techniques and modeling of non-linear circuits. He is an active member of IEEE-CASS and he is now serving as V-Chair of CASS at IEEE-SEM, Chapter I.

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