DL Lectures
Solid-State Circuit Society
Chapter Poland

December 5, 2025, 9.00 – 11.15
(CEST) B1/B2 – H24

IEEE Solid-State Circuits Society Chapter Poland

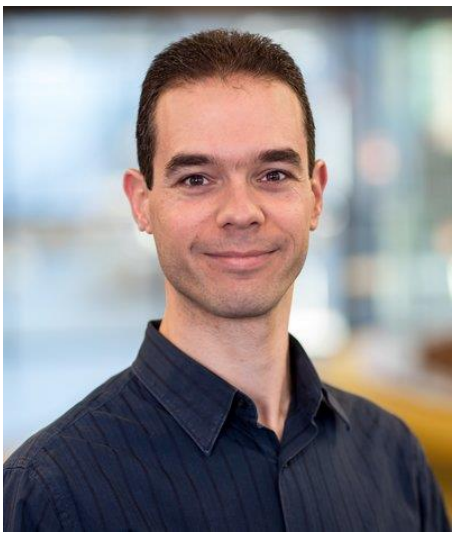
Prof. Pieter Harpe

1. "Energy Efficient ADC Design Techniques" (9 – 10 a.m.)
2. Coffee break (10 – 10.15 a.m.)
3. "Ultra low power SAR ADCs and versatile, dynamic sensor interfaces" (10.15 – 11.15 a.m.)

Abstracts:

Energy Efficient ADC Design Techniques - In this review presentation, we will have a look at ADC efficiency trends over the years as function of ADC architecture, resolution, and sampling rate. After that, state-of-the-art design examples from literature are reviewed, and the key techniques to achieve high efficiency are highlighted. This includes techniques at circuit, system, layout and algorithmic levels. ADC architectures such as Pipelined, Sigma-Delta, SAR, Noise-Shaping SAR, and others are all briefly covered. The presentation concludes with a reflection on the differences and similarities of the highlighted efficiency features.

Ultra low power SAR ADCs and versatile, dynamic sensor interfaces - In this talk, we will take a look at ultra low power sensor interfaces for IoT applications. In such applications, the sensing operation is often done at a relatively low frequency, and sometimes it is heavily duty-cycled, or it should be triggered by particular events or thresholds. For that reason, dynamic operation is beneficial as compared to static operation. We will review ADC and sensor interface architectures that can operate dynamically and that can be triggered by a single clock pulse. Various capacitive and resistive sensor interfaces are shown, and the final example shows a resistive-based temperature sensor interface including analog correction techniques for gain, offset and distortion.



Bio: Pieter Harpe (SM'15) received the MSc and PhD degrees from the Eindhoven University of Technology, The Netherlands, in 2004 and 2010, respectively. In 2008, he started as researcher at Holst Centre / imec, The Netherlands, where he worked on ultra low-power wireless transceivers, with a focus on ADC research and design. In April 2011, he joined Eindhoven University of Technology where he is currently an Associate Professor and lead of the Resource Efficient Electronics Lab. His main activities are on low-power analog and mixed-signal circuits, for instance for biomedical applications, internet of things, and edge AI. Dr. Harpe is TPC member for ISSCC and A-SSCC, Associate Editor for TCAS-I, SSCS AdCom Member-at-Large and SSCS Distinguished Lecturer. He previously served as TPC member for ISSCC, TPC member and track chair for ESSCIRC/ESSERC and co-organizer for AACD, was an IEEE SSCS Distinguished Lecturer in 2016/2017, and is recipient of the ISSCC 2015 Distinguished Technical Paper Award.

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