

IEEE DL Palermo Visits San Diego SSCS Chapter

On 8 March 2018, IEEE Solid-State Circuits Society (SSCS) Distinguished Lecturer (DL) Samuel Palermo, from Texas A&M University, delivered the presentation, "Design Techniques for Scalable, Sub-pJ/b Serial I/O Transceivers," at the San Diego SSCS Chapter (chaired by Tony Babaian). The afternoon seminar was hosted by Qualcomm and included a crowd of 58 attendees and over 100 who attended remotely. The audience was treated to a condensed tutorial of advanced wireline concepts in the easy-to-follow and down-to-earth approach for which Prof. Palermo is known.

In his talk, Palermo emphasized the importance of I/O links capable of 1 pJ/bit energy efficiency given ever-increasing human- and machine-driven data traffic. He presented a plethora of power-scalable I/O techniques, including supply scaling with data rate, interleaving of multiple lower-frequency

clock phases, fast power-state transitioning for burst-mode operation, and low-swing voltage-mode transmitters. He then covered the use of poly-phase filters and injection-locked oscillators for low-power clocking. Finally, he discussed various low-power equalization techniques, including analog impedance modulation for voltage-mode finite impulse response equalization in transmitters and feedback infinite impulse response filtering in receiver decision feedback equalizers.

This seminar will be broadcast as an SSCS webinar at a future date with Palermo taking live questions after the webinar.

Abstract

To meet the interchip bandwidth demands of future systems and comply with limited IC power budgets, both



Sam Palermo

chip-to-chip data rates and I/O energy efficiency must improve. This is a significant challenge for electrical interconnect architectures, which currently offer the lowest-cost solutions, as the frequency-dependent loss of conventional electrical channels prohibit significant data-

rate scaling without efficient equalizer circuits. Key design techniques that enable scalable, sub-pJ/b serial I/O transceivers will be presented. The first part of the talk, low-power transmitter and receiver designs capable of low-voltage operation and fast power-state transitioning will be discussed. Next, low-complexity clocking architectures are detailed. A discussion on low-power equalizer circuits that enable the support of higher data rates over lossy channels concludes the talk.

—Alvin Loke

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SSCS Tainan Chapter Hosts DL Yong Ping Xu

The Tainan Chapter of the IEEE Solid-State Circuits Society (SSCS) welcomed Distinguished Lecturer (DL) Yong Ping Xu, associate professor of electrical and computer engineering at the National University of Singapore. The talk took place on 6 December 2017 at the National Chia Yi University, Taiwan. Prof. Xu's talk, "MEMS Inertial Sensors," attracted a large number of participants.



SSCS DL Yong Ping Xu and the attendees of the SSCS Tainan seminar.

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Attendees had many questions for Xu and engaged in lively discussions after the talk.

Abstract

Microelectromechanical system (MEMS) inertial sensors are used to measure the acceleration and angular rate of a subject. Compared with traditional inertial sensors, the MEMS inertial sensor has the advantages of small form factor, light weight, low power, and low cost. MEMS inertial sensors can be found in many applications, such as gaming, control, positioning, and navigation. Among them, navigation application requires high resolution and low-bias instability. The existing MEMS inertial sensors have yet to meet



SSCS DL Yong Ping Xu gave the lecture “MEMS Inertial Sensors” at an event hosted by the SSCS Tainan Chapter.

these requirements for inertial navigation. This talk will introduce the concepts and operating principles of MEMS accelerometers based on displacement and force sensing and the tuning fork gyroscopes. The talk will briefly present a high-performance MEMS oscillating accelerometer, which demonstrated, for the first time, a sub- μ g bias instability. The second part of the talk will focus on the readout circuit design of an open-loop mode split tuning fork gyroscope with a sub-degree bias instability.

—Tsung-Heng Tsai
SSCS Tainan Chapter Chair

IEEE DL Pieter Harpe Visits Lund University, Sweden

IEEE Solid-State Circuits Society Distinguished Lecturer (DL) Pieter Harpe, assistant professor, Eindhoven University of Technology, The Netherlands, presented the lecture “Advanced SAR ADCs—Efficiency, Accuracy, Calibration, and References” at Lund University, Sweden, on 30 November 2017. Approximately 25 people attended, including five people from Ericsson in Lund, two Lund University faculty members, and undergraduate students in IC design at Lund University. After the lecture, many questions were asked, which led to a very engaging discussion.

Abstract

This lecture will discuss advanced techniques that enabled the substantial performance improvement of successive approximation register (SAR) analog-to-digital converters (ADCs) in



Lecture attendees listened to DL Pieter Harpe’s talk.



DL Pieter Harpe’s talk was “Advanced SAR ADCs—Efficiency, Accuracy, Calibration, and References.”

recent years. After a brief introduction on SAR ADCs, a short overview of recent trends will be given. Then, four design examples with different targets will be shown. The first topic deals with minimizing power consumption. The second and third designs aim to increase accuracy by means of linearization, noise reduction techniques, and calibration. Finally, the last part describes an efficient method to co-integrate the reference buffer with the SAR ADC.

—Abira Sengupta

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