

Designing Smart Sensor Circuits and Systems

Overview

Sensors are everywhere! Temperature sensors throttle SoCs, accelerometers activate airbags, and gyroscopes and magnetometers are now standard smart phone components. These are all examples of smart sensors, i.e. sensors that are co-integrated with their readout electronics and so provide digital output. However, processing the weak analog output of typical sensors is quite challenging, especially when it must be done in standard CMOS, whose precision is limited by $1/f$ noise, component tolerances and mismatch. In this tutorial, a system approach to the design of smart sensors will be presented. The use of dynamic techniques, such as chopping, auto-zeroing, dynamic element matching and sigma-delta modulation, to trade speed for precision will be discussed. The proposed methodology will be illustrated by case studies describing the design of state-of-the-art CMOS sensors for the measurement of wind velocity, magnetic field and temperature.

Course Dates	21st-25th November, 2016
Host Institute	IIT Madras
No. of Credits	1
Maximum No. of Participants	60
You Should Attend If...	<ul style="list-style-type: none">▪ You are a student in the area of analog/mixed signal/sensor interface IC design.▪ You wish to learn from a world renowned expert in the area.▪ You want to get up to speed on the important area of sensors
Course Registration Fees	<p>The participation fees for taking the course is as follows: Student Participants: Rs.1000 Faculty Participants: Rs.3000 Government Research Organization Participants: Rs.10000 Industry Participants: Rs.40000</p> <p>The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.</p> <p>Mode of payment: Demand draft in favour of “Registrar, IIT Madras” payable at Chennai.The demand draft is to be sent to the Course Coordinator at the address given below.</p>
Accommodation	<p>The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel</p>

Course Faculty



Kofi Makinwa holds degrees from Obafemi Awolowo University, Ile-Ife (B.Sc., M.Sc.), Philips International Institute, Eindhoven (M.E.E.), and Delft University of Technology, Delft (Ph.D.). From 1989 to 1999, he was a research scientist at Philips Research Laboratories, where he designed sensor systems for interactive displays, and analog front-ends for optical and magnetic recording systems. In 1999 he joined Delft University of Technology, where he is currently an Antoni van Leeuwenhoek Professor of the Faculty of Electrical Engineering, Mathematics and Computer Engineering and Chair of the Electronic Instrumentation Laboratory.

Dr. Makinwa holds 21 patents, has authored or co-authored over 200 technical papers and 6 books and has co-edited 4 more. He currently serves as a member of the ISSCC Forum committee and the program committees of the VLSI Symposium, the European Solid-State Circuits Conference (ESSCIRC) and the workshop on Advances in Analog Circuit Design (AACD). He has served on the program committees of the International Solid-State Circuits Conference (ISSCC), the International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers), the IEEE Sensors Conference and Eurosensors. He was a distinguished lecturer of the IEEE Solid-State Circuits Society (2008 to 2011) and a three-time guest editor of the Journal of Solid-State Circuits (JSSC). He has given several invited talks and tutorials at international conferences such as ISSCC, ESSCIRC, ASSCC and the VLSI symposium. At the 60th anniversary of ISSCC, he was recognized as one of its top ten contributing authors.

Course Coordinator

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