

About the Seasonal School:

The Seasonal School in “Circuits and Systems for the Internet-of-Things” (CAS4IoT) presents a joint academia-industry program in the field of IoT. It aims at preparing a group of 50+ post-graduated Students and design Engineers with the capacity to understand and design a broader range of circuits and systems, in the field of IoT, spanning from data converters for sensor interfaces to radios, ensuring a good balance between academia and industry, combined with a judicious selection of worldwide distinguished Lecturers.

The Department of Electrical Engineering (DEE) at the Faculty of Sciences and Technology at NOVA University of Lisbon (FCT NOVA) together with the Centre of Technology and Systems (CTS) at UNINOVA Institute have organized this IEEE CASS sponsored Seasonal School. Having more than 100 PhD students working in the fields of IoT and cyber-physical systems, DEE and CTS are currently providing most of the human and material resources needed to successfully run this Seasonal School.

<http://sites.ieee.org/portugal-btcasce/cas4iot>

About the “Hands-On” [Modules 7, 8, 11, 12]

Complementing the theoretical material presented on all morning sessions, the proposed course includes 4 x 2 hours hands-on lab sessions, during two afternoons, where IoT demo projects will be implemented.

The course demo project will consist on the design and implementation of a multi-sensor system using a programmable and commercial SoC platform. The same platform will have also to monitor the state of the battery (through voltage sensing) and use this information to feed the power management implemented algorithm.

About the Venue

The CAS4IoT course venue will be located in the main building of the Library of the Faculty of Sciences and Technology (FCT), Nova University of Lisbon (FCT NOVA), at the Campus of Caparica, in south Lisbon. FCT NOVA is one of the most prestigious Portuguese engineering and science public schools and it is located in Caparica, Almada, just across the Tagus River. The Campus of Caparica is served by a wide transport network, including combined services (bus, train, ferry) and by tram.

Registration Link



Sponsors



CAS4IoT

28 – 30, NOVEMBER 2016

Seasonal School in circuits-and-systems for the internet-of-things

Monte da Caparica
LISBON
Portugal



FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA
Departamento de Engenharia Electrotécnica



UNINOVA - CTS

Course Structure

Day 1 28 th of November		Day 2 29 th of November		Day 3 30 th of November	
Topic		Topic		Topic	
Morning	Circuit Techniques	Module 1 Ultra-LV and u-power analog circuits for IoT [Franco Maloberti]	Power	Module 5 Power & Energy Management for IoT [Marcelino Santos]	Radio
	Case Studies	Module 2 SAR ADCs for IoT: Basics and Innovations [Pieter Harpe]	Digital	Module 6 Processors and MCUs for IoT [Leonel Sousa]	Sensing
	AD conversion and Industrial	Module 3 SDMs for IoT [Nuno Paulino]	AD conversion and Industrial	Module 7 Introduction to Software Defined Hardware using a Programmable SoC platform	Hands-ON
Afternoon		Module 4 Industrial IoT [Noel O'Riordan]		Module 8 IoT Demo Project Kick-off	
				Module 11 IoT Demo project: Analog Frontend	
				Module 12 IoT Demo Project: PMU-Voltage Battery monitoring	

Registration Fees

Registration Fees	Until 6 th November 2016	After 6 th November 2016
IEEE-CAS Member	€ 390	€ 440
IEEE Member	€ 440	€ 490
Non-Member	€ 490	€ 540

Seasonal School Distinguished Lecturers

Module 1 Ultra-low voltage and micro-power analog circuits for IoT

Designing low power and low voltage analog circuits for IoT systems is challenging. Many applications require analog circuits working with sub 1-V supply voltages and with power consumption in the hundreds of nW range while preserving good performances. The present target is to have analog circuits operating at 0.5-V or less. With that supply voltage it is required to design basic building blocks like operational amplifiers, comparators and voltage reference generators. For each of them, the presentation briefly reviews the state of the art and presents some recently published examples of implemented solutions.

Franco Maloberti
Univ. of Pavia
Pavia, ITALY

Module 2 SAR ADCs for IoT: Basics and Innovations

This lecture will cover the basics and recent innovations in the field of SAR ADCs for IoT. Even though SAR ADCs have been known for a very long time, they receive a lot of attention recently thanks to their power-efficiency and beneficial scaling with technology. This lecture starts with a basic overview of SAR ADC design, and continues with discussing several recent innovations aiming for better power efficiency, improved performance, and more versatility.

Pieter Harpe
Eindhoven University of Technology
Eindhoven, THE NETHERLANDS

Module 3 Sigma delta modulators for IoT

In this module, different approaches for realizing ultra-low-power, moderate and high resolutions Sigma-Delta architectures will be presented in detail. State-of-the-art Sigma-Delta Modulator circuits, highly intensively using passive circuitry will be described together with a systematic design methodology for optimization.

Nuno Paulino
FCT NOVA, CTS/UNINOVA
Caparica, Almada, PORTUGAL

Module 4 Industrial IoT

The contents will cover two case studies of real world applications of IoT: one based on wireline IoT to control hazardous industrial equipment, and the other based on satellite radio for machine communication. The decisions concerning the architecture choices, block performance, and issues related to the IC process choice will be detailed. Selected topics on interfaces, power, IC realization and measurement will be presented.

Noel O'Riordan
S3 Group
Dublin, IRELAND

Module 5 Power-and-Energy Management for IoT

Traditional Power Management Units (PMUs) generate reference voltages and currents, produce power on reset signals and control the system start up sequence, sequencing the enable of voltage regulators. The new generation of PMUs, targeting IoT applications, is capable of entering different power gated modes, achieving nano-Amp range operation, being controlled by the Real Time Clock (RTC). Why and how are RTCs being used as brains of the IoT PMUs is going to be analyzed in the "Power-and-Energy Management for IoT" module.

Marcelino Santos
CTO SiliconGate, IST/UL, INESC-ID
Lisbon, PORTUGAL

Module 6 Microprocessors/MCUs for IoT

In the "Microprocessors/MCUs for IoT" module, the state of the art architectures of the current MPUs and MCUs will be analyzed, as well as the benchmarks for evaluating their performance and efficiency. Furthermore, the support for interconnection and communication with users, things and cloud services will also be discussed. Examples of commercial MPUs and MCUs will be provided, and the main investigation paths for developing the future processing devices for the IoT will be underlined.

Leonel Sousa,
IST/UL, INESC-ID
Lisbon, PORTUGAL

Module 9 BLE Radio Architectures and Design for the IoT Market

Module contents: Short range wireless markets; Overview of the BLE standard; BLE Radio Specifications: i) RX, TX, Synth specifications; 2) Current market specifications; BLE Architecture and Design of Functional Blocks; Specifications of radio building blocks; Architecture and Design of radio building blocks; Performance of state of the art BLE Radios.

Augusto Marques
CTO Aura Semiconductor
Bangalore, INDIA

Module 10 Nanosensors, from fundamentals to IoT deployments

The module discusses the new sensing opportunities provided by nanotechnologies. After a brief overview of the current status of nanotechnologies, it presents a review of existing types of nanosensors. The different options for fabrication are summarized before moving on to detailing some of their electrical and sensing features. Two of the challenges of nanosensors, reproducibility and reliability, are explained in depth. Finally, we discuss how to integrate nanosensors into IoT devices to carry out their deployments in the field.

Bérengère Lebental
Research Scientist at IFSTTAR
Paris, FRANCE