Location

The course will be held at the Fundació UPC, Technical University of Catalonia, Campus Nord, Edifici Vèrtex, Plaça Eusebi Güell, 6, Barcelona, Spain.

Contact Person

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Registration fee: EUR 625

Lecture notes (printed and CD versions) and UFDC-1 sample are included in the fee

Online Registration:

www.sensorsportal.com/HTML/SSSD_Course_2008.htm

Deadline for Registration:

31 October, 2008

Course Instructor

Prof. Sergey Y. Yurish,
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Prof. Sergey Yurish has received his PhD degree in 1997 from National University Lviv Polytechnic, UA. Since 2006 he is a professor at the Technical University of Catalonia (UPC-Barcelona, Spain). He has published more than 140 scientific and technical peer-review papers and articles, four books (including "Data Acquisition and Signal Processing for Smart Sensors" and "Smart Sensors and MEMS") and holds 9 patents. Prof. Yurish is IFSA president and editor-in-chief of *Sensors & Transducers Journal*. He regularly serves on committees for conferences and other journals. Prof. Yurish has contributed to numerous advanced engineering courses in Austria, Germany, Italy, Spain and The Netherlands. In 2003 he was a co-director of NATO Advanced Study Institute (ASI) on *Smart Sensors and MEMS* in Portugal.

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International Frequency Sensor Association (IFSA)
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SMARTSES Marie Curie Chair (EXC) project

Smart Sensors Systems Design

5-day advanced engineering course

10-14 November 2008
Barcelona, Spain

General Information

This course is suitable for engineers who design different digital and intelligent sensors, data acquisition, and measurement systems. It should be also useful for researchers, graduate and post graduate students.

The prerequisite for the course is a basic knowledge of electrical circuits and systems. Course will be taught in English. Each attendee will receive a certificate of attendance at the course.

Course Description

An advanced engineering course describes modern developments and trends in the field of smart sensor systems and digital sensors design. Its background is based on programmable parameter-to-frequency (time) converters as a smart sensor's core and structural-algorithmic methods for data extraction in order to move from a traditional analog signal domain to frequency-time signal domain (frequency, period, duty-cycle, pulse-modulated, time interval, phase-shift, etc.). Working in the frequency-time domain simplifies design, and obviates some technical and technological problems, due to the properties of frequency as informative parameter.

After a general overview of data acquisition methods, modern smart, digital and quasi-digital (with frequency, period, duty-cycle, pulse-width modulated (PWM), phase-shift, pulse number, etc., output) sensors, systems details are discussed including: sensors, ADC (frequency-to-digital conversion based on advanced methods for frequency-time domain parameters measurements with adaptive possibilities), communications buses, PC interfacing and software. A systematic approach towards the design of low-cost high-performance smart sensors systems with self-adaptation and self-identification possibilities is presented. The proposed design approach compatible with MEMS and system-on-chip implementation. It is based on the novel integrated circuits such as the Universal Frequency-to-Digital Converter (UFDC-1, UFDC-2, UFDC-1M-16), Universal Sensors and Transducers Interface (USTI and USTI-1M-20), and can overcoming current hurdles to truly widespread deployment of smart sensors and systems. Different examples of sensors systems will be given and discussed in details.

Objectives

- To give practical knowledge in digital, smart sensors and systems design; virtual instrumentation; sensors buses and interfacing circuits
- To help in evaluating and application of novel frequency-to-digital conversion methods in order to use it in smart digital sensors and data acquisition systems
- To show how to apply the Smart Transducer Interface standard IEEE 1451 to quasi-digital sensors
- To give 'hints' for software and hardware level smart sensors systems design

Contents of the Course

- Introduction
- Smart and Quasi-Digital Sensors Sate-of-the-Art
- Data Acquisition Methods for Sensor Systems
- Classical Frequency-to-Digital Conversion Methods
- Advanced and Self-Adapted Conversion Methods
- Digital Sensors and Program-Oriented Conversion Methods
- Smart Sensor Systems
- Virtual Instruments
- Sensor Buses, Protocols and Networks
- Sensor Interface Chips and Frequency-to-Digital Conversion Integrated Circuits
- Advanced Analog-to-Digital Conversion Using Voltage-to-Frequency Converters
- Digital Sensors and Smart Sensors System Design
- IEEE 1451 Standards Family and Frequency Sensors
- Direct Sensor-to-Microcontroller Interface for Resistive, Capacitance and Resistive Bridge Sensing Elements
- Future Trends