SIGNAL

Bulletin mensuel des microsystèmes
Microsystems Monthly Newsletter

RESMIQ
Regroupement Stratégique
en Microsystèmes du Québec

FROM THE EXECUTIVE COMMITTEE

It is with pleasure that we present this edition of SIGNAL highlighting the news and events for the month of October. First of all we must mention two very prestigious distinctions awarded to two of our members. Firstly, Professor Fontaine of the University of Sherbrooke is co-recipient of the David E. Mitchell award of distinction from the Ernest C. Manning Foundation, one of the most prestigious innovation award in Canada. He received the prize for his work on the development and commercialization of the positron emission tomography scanner LabPET™, the first imaging system in the world that uses innovative technology for preclinical imaging dedicated to medical research. The second award worth noting is the Jacques-Rousseau prize presented to professor Sawan of the *École Polytechnique de Montréal* by the *Association francophone pour le savoir* (ACFAS). This award is given to a researcher that has gone well beyond his area of expertise to establishe innovative bridges between several disciplines through his scientific accomplishments. It rewards the work of Professor Sawan in the field of biomedical engineering including the development of novel methods for the design and manufacturing of microsystems dedicated to numerous diagnostic and treatment applications for neuromuscular dysfunctions. on another subject, we have initiated steps in order to organize the next ReSMiQ symposium within the ACFAS 2013 conference which will be held at *Université Laval* in Quebec City. Finally, note that under our agreement with Cadre Codesign, Mr. Popovic began to establishe contacts with our members in order to obtain information on their research program to stimulate the links between them and to establish research collaborations with industry.

Best regards,
M. Sawan, director

Dr. Fontaine receiving the David E. Mitchell award and Dr. Sawan receiving the Jacques-Rousseau award.

RESMIQ'S ACTIVITIES

Scholarship competitions for graduate students.
APPLICATION DEADLINE – January 7, 2013.
Eligibility and Application

NEWS FROM OUR MEMBERS

☀ EXPOSURE

Dr. Frechette from the Université de Sherbrooke welcomes Dr. Laurent Francis from the *Université catholique de Louvain* in Belgium.

Dr. Sawan from Polytechnique welcomes Dr. Haidar Harmanani from the Lebanese American University in Lebanon.

Dr. Sawan from Polytechnique gave a keynote speech at the UCSWSN workshop in Cairo, Egypt.
More details

◗ INVOLVEMENT

Dr. Sawan from Polytechnique was elected on the board of governors of the IEEE Circuits and Systems Society.

✦ ACHIEVEMENT

Dr. Fontaine from Université Sherbrooke is co-recipient of an innovation award from the Manning Foundation.
More details 1 / More details 2

Dr. Sawan from Polytechnique is recipient of the Jacques-Rousseau award from ACFAS.
More details 1 / More details 2

Message to members: we will be pleased to publish your news in forthcoming issues, let us know.

IEEE-NEWCAS2013 International conference
June 16 - 19, 2013, Paris, France
Call for papers

ReSMiQ Innovation Day - RID2013
Septembre 19 2013, École Polytechnique de Montréal
Call for projects

SPOTLIGHT ON OTHER CONFERENCES

IEEE Biomedical Circuits and System Conference (BIOCAS 2012), November 28 - 30, 2012, Hsinchu, Taiwan.
More details

2012 International Conference on Electronics, Circuits and Systems (ICECS), December 9 - 12, 2012, Sevile, Spain.
More details

24th International Conference on Microelectronics (ICM2012), December 17 - 20, 2012, Algiers, Algeria.
More details

Some of the research achievements of our members.

This month, two major contributions are presented.

JP.Tremblay, **Y Savaria**, **G. Zhu**, **C. Thibeault**, Safwen Bouanen, A System Architecture for Smart Sensors Integration in Avionics Applications. SAE International Journal of Aerospace, October 2012. vol. 5, no. 1-189-195.

With the next generation of avionics systems, more sensors and actuators will be required for an ever increasing number of functions. In this paper, we propose a system architecture based on several enhancements to the IEEE 1451 standard, granting it a wider application range, improved resource efficiency and a generic and reusable character. This architecture facilitates the integration of next generation smart sensors with a wide range of avionics data communication networks and allows the specification of generic features to be respected. In order to meet the requirements of avionics applications, this architecture that provides a design framework offers customization of features such as bandwidth, reliability, resources utilization and compatibility with different types of transducers, especially smart sensors. The resulting resource utilization and reliability are analyzed for several configurations that provide a basis for comparison. To validate the proposed architecture and the benefits it offers, we have designed and implemented a transducer network inspired by representative avionic needs. The implementation reported in this paper targets a LX45T Xilinx FPGA board. The transducers are connected to the data network through field buses based on the ARINC 825 protocol, while the backbone of the network is based on the AFDX specification. The analysis of the ensuing prototype shows an important increase in reliability that result from using the proposed architecture. We also show that this architecture enables important complexity reduction over a typical transducer network based on the same communication protocols for the same level of reliability.

Chun-Ming Chang, **M. N. S. Swamy**, , Analytical synthesis of odd/even-nth-order elliptic Cauer filter structures using OTRAs, International Journal of Circuit Theory and Applications, online 2012.

The operational transresistance amplifier (OTRA), the dual of the well-known operational transconductance amplifier, is an attractive element for use in circuit design. One odd-nth-order and two even-nth-order OTRA-R-C or OTRA-MOS-C elliptic Cauer filter structures are presented using new analytical synthesis methods (ASMs). Because it is assumed in the synthesis procedure that the transresistance $Rm \rightarrow \infty$, but in view of the fact that Rm is finite in practice, the more the number of OTRAs employed, the worse the precision of the output signals. By studying the sensitivity of the output to component variations, more precise output may be obtained by selecting one or two appropriate capacitance(s)/resistance(s) and adjusting their values suitably. H-spice simulations are given to validate and demonstrate the theoretical predictions.

$$V_1 = \left(\frac{1}{s}\right)\left(V_0 - \frac{a_1}{a_3}V_{out}\right) \qquad (7.1)$$

$$\left(s + \frac{a_2}{a_3}\right)V_{out} - \left(\frac{b_2}{a_3}\right)V_{in} = V_1 \qquad (7.2)$$

Third Order elliptic Cauer filter