SIGNAL
Bulletin mensuel des microsystèmes
Microsystems Monthly Newsletter
RESMIQ
Regroupement Stratégique en Microsystèmes du Québec

FROM THE EXECUTIVE COMMITTEE

We would like first to wish you an excellent year 2013, one filled with success. It is with pride that we are entering the 5th year of SIGNAL whose success cannot be denied, judging by the positive feedback and requests of subscription from readers interested in the field of microsystems and their applications. First of all, we start by mentioning the next edition of NEWCAS which, according to our principle of alternation, will be held in France this time, in Paris. The organizing committee has already launched a call for papers. We are convinced that they will enable NEWCAS to reach new heights and continue to grow, confirming the relevance of this annual event within the international research community. Concerning our upcoming activities for this year, we are planning intensive courses and seminars offered in partnership with Montreal's chapters of the IEEE SSCS and CAS and other centers such as COFAMIC. The most recent of these tutorials was offered by Professor Ham from Harvard University and was very popular, attracting many participants. Also we must not forget the annual symposium of ReSMiQ organized within the ACFAS annual conference. On May 6, we will be at Laval University in Quebec City to discuss the status of current research and exchange with our fellow members of ReSMiQ. During this event, we will hold a student poster competition with many awards of excellence for the best presentations. We invite our readers to visit our website to get all the details of upcoming events. Finally we wish a great success to Ghafar Ebrahim-Zadeh, scientific assistant at ReSMiQ and postdoctoral fellow at Polystim, who is leaving to pursue a career as a professor at York University in Toronto.

Best regards,
M. Boukadoum, Interim Director

From left to right: Drs. M. Sawan, R. Izquierdo, C. Fayomi, D. Ham (speaker) et Y. Savaria.

NEWS FROM OUR MEMBERS

EXPOSURE

Dr. Sawan from Polytechnique gave two keynote speech at ACTEA'12 in Lebannon and ICM'12 in Algeria.
Details ACTEA / Details ICM

Dr. Sawan of Polytechnique gave an invited talk in Tunisia as part of his involvement as DL in IEEE-SSCS.

INVOLVEMENT

Dr. Massicotte from UQTR is Technical program co-chair for the IEEE International NEWCAS2013 conference.
More details

ACHIEVEMENT

Dr. G. Gagnon from ETS is co-recepient of a Collaborative research and develpment grant from NSERC with an industrial contribution from Quattrium.

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

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

SPOTLIGHT ON OTHER CONFERENCES

4th IEEE Latin American Symposium on Circuits and Systems (LASCAS), Febraury 27 - March 1, 2013, Cusco, Peru.
More details

2013 IEEE International Symposium on Circuits and Systems (ISCAS), May 19 - 23, 2013, Beijing, China.
More details

2013 International Symposium on Signals, Circuits and Systems (ISSCS), July 11 - 12, 2013, Iasi, Romania.
More details

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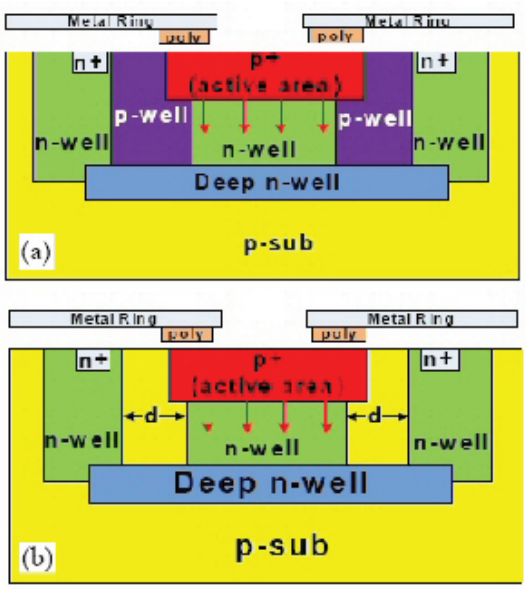
RESEARCH CONTRIBUTIONS

Some of the research achievements of our members.
This month, two major contributions are presented.

Ehsan Kamrani, Frederic Lesage, **Mohamad Sawan**, Fully On-Chip Integrated Photodetector Front-End Dedicated to Real-Time Portable Optical Brain Imaging, Scientific Research vol.2, no.4, Dec. 2012.

Optical brain imaging using functional near infrared spectroscopy (fNIRS) offers a portable and noninvasive tool for monitoring of blood oxygenation. In this paper we have introduced a new miniaturized photodetector front-end on achip to be applied in a portable fNIRS system. It includes silicon avalanche photodiodes (SiAPD), Transimpedance amplifier (TIA) front-end and Quench-Reset circuitry to operate in both linear and Geiger modes. So it can be applied for both continuous-wave fNIRS (CW-fNIRS) and also single-photon counting. Proposed SiAPD exhibits high-avalanche gain (>100), low-breakdown voltage (<12 V) and high photon detection efficiency accompanying with low dark count rates.



Cross-section of the proposed APDs: (a) The p- well (APD1) and (b) The p-sub (APD2).

The proposed TIA front-end offer a low power consumption (<1 mW), high-transimpedance gain (up to 250 MV/A), tunable bandwidth (1 kHz - 1 GHz). and very low input and output noise (~few fA/√Hz and few μV/√Hz). The Geiger-mode photon counting front-end also exhibits a controllable hold-off and rest time with an ultra fast quench-reset time (few ns).

N. Nouaouria, **M. Boukadoum**, R. Proulx, "Particle Swarm Classification: A Survey and Positioning" Pattern Recognition, Accepted in January 2013.

This paper offers a survey of recent work on Particle Swarm Classification (PSC), a promising offshoot of Particle Swarm Optimization (PSO), with the goal of positioning it in the overall classification domain. The richness of the related literature shows that this new classification approach may be an efficient alternative, in addition to existing paradigms. After describing the various PSC approaches found in the literature, the paper identifies and discusses two data-related problems that may affect PSC efficiency: high-dimensional datasets and mixed-attribute data. The solutions that have been proposed in the literature for each of these issues are described including recent improvements by a novel PSC algorithm developed by the authors. Subsequently, a positioning PSC for these problems with respect to other classification approaches is made. This is accomplished by using one proprietary and five well known benchmark datasets to determine the performances of PSC algorithm and comparing the obtained results with those reported for various other classification approaches. It is concluded that PSC can be efficiently applied to classification problems with large numbers of instances, both in continuous and mixed-attribute problem description spaces. Moreover, the obtained results show that PSC may not only be applied to more demanding problem domains, but it can also be a competitive alternative to well established classification techniques.

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