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 for the month of November. We begun collecting our members' CV and we wish to thank them all for their collaboration. The information we'll collect will be used in the production of our 2012 annual report and also to prepare for our FRQNT grant renewal that we must consider as of today. We also completed the evaluation of our members and each will receive shortly a letter confirming their new status. We remind that there are three categories of membership namely "regular", "associate" and "collaborator". Regarding the scientific activities we submitted a proposal to hokd our next annual symposium within the framework of the 81st Congress of ACFAS. If our proposal is accepted, the ReSMiQ 2013 annual symposium will be held in Quebec City and the organization will be ensured by Professor Gosselin from Université Laval. A guest speaker as well as presentations of several ReSMiQ research projects will be included in the program. There will also be a scientific poster competition for graduate students whose research projects are supervised by our members. The best presentations will be awarded prizes. Finally, I will take a sabbatical leave of one year and professor Mounir Boukadoum from *Université du Québec à Montréal* will be acting director for 2013. The management want to thank him for his involvment and wishes him the best of success in this endeavour. On the eve of the upcoming christmas celebrations the entire management team offers you its best wishes for the holyday season. May the year 2013 bring you peace, joy, prosperity and success.

Best regards,
M. Sawan, director

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

RESMIQ'S ACTIVITIES

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

Scholarship competition for post-doctoral fellow
APPLICATION DEADLINE – January 7, 2013.
Eligibility and Application

NEWS FROM OUR MEMBERS

EXPOSURE

Dr. Sawan from Polytechnique gave a keynote speech at the ICESTI'12 in Annaba, Algeria.
More details

Dr. Sawan of Polytechnique gave an invited talk in Pretoria and Cape Town, South Africa as part of his involvement as DL in IEEE-SSCS.
More details

INVOLVEMENT

Drs. Zhu, Savaria and Sawan were part of the Québec government delegation at the RITF transport symposium in Paris.
More details

ACHIEVEMENT

Dr. Massicotte from UQTR supervised François Nougarou who received a special mention for his thesis in electrical engineering.
More details

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

SPOTLIGHT ON OTHER CONFERENCES

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

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

The **SIGNAL** newsletter is published by ReSMiQ. For information please contact the management team : 514-340-4711 ext. 3612, email : marie-yannick.laplante@polymtl.ca
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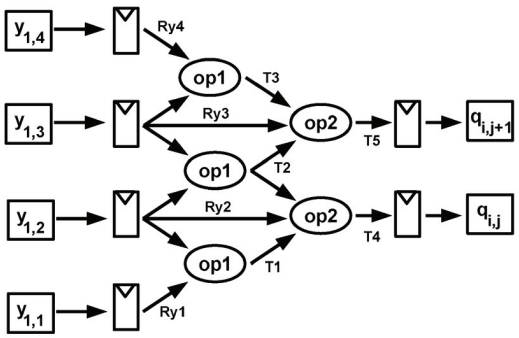
RESEARCH CONTRIBUTIONS

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

Aubertin, P. **Langlois, J.M.P.** ; **Savaria, Y.** Real-Time Computation of Local Neighborhood Functions in Application-Specific Instruction-Set Processors, IEEE Transactions on Large Scale Integration (VLSI), vol. 20, no. 11, 2012.

This paper presents a systematic approach to the design of application-specific instruction-set processors for high speed computation of local neighborhood functions and intra-field deinterlacing. The intended application is real-time processing of high definition video. The approach aims at an efficient utilization of the available memory bandwidth by fully exploiting the data parallelism inherent to the target algorithm class.




```
Ry1  := (δ y1,1)          T3    := (op1 Ry3 Ry4)
Ry2  := (δ y1,2)          T4    := (op2 T1 Ry2 T2)
Ry3  := (δ y1,3)          T5    := (op2 T2 Ry3 T3)
Ry4  := (δ y1,4)          qi,j  := (δ T4)
T1   := (op1 Ry1 Ry2)     qi,j+1 := (δ T5)
T2   := (op1 Ry2 Ry3)
```

Single SIMD Custom Instruction

An appropriate choice of custom instructions and application-specific registers is used together with a very long instruction word architecture in order to mimic a pipelined systolic array. This leads to a processing speed close to the limit imposed by memory bandwidth constraints. For three intra-field deinterlacing algorithms and 2-D convolution with four kernel sizes, the design approach yields speedup factors between 36 and 1330, Area-Time (AT) product improvements between 12× and 243×, and energy consumption reduction factors between 13 and 262.

Muhammad Tariqus Salam, Ali Hassan Hamie, Dang Khoa Nguyen, **Mohamad Sawan**. A Smart Biological Signal-Responsive Focal Drug Delivery System for Treatment of Refractory Epilepsy, Advances in Science and Technology, vol. 85, pp. 39-46, 2012.

In this paper, we propose a new biological signal-responsive implantable device that triggers direct an anticonvulsive drug into the epileptogenic zone at electrographic seizure onset. We describe the high-performance seizure-onset detection algorithm, low-power circuit technique and focal drug delivery system. The implantable device is composed of a preamplifier, a signal processor, a seizure detector and a micropump. The device records high quality intracerebral electroencephalographic (icEEG) signals using high conductive electrodes and a low noise preamplifier. The recorded signal is processed continuously using low-power technique to detect onset of seizures accurately. The low-power miniaturized micropump is able to deliver sufficient amount of anticonvulsive drug in a short duration (50µL/sec) to epileptogenic zone. The detection algorithm was validated with Matlab tools and a prototype device was assembled with discrete components in a circular (Ø 40 mm) printed circuit board. The device was validated offline using the icEEG recordings obtained from 3 drug-resistant epilepsy patients. The average seizure detection delay was 10 sec from electrographic seizure onset, well before seizure progression to adjacent functional cortex.

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