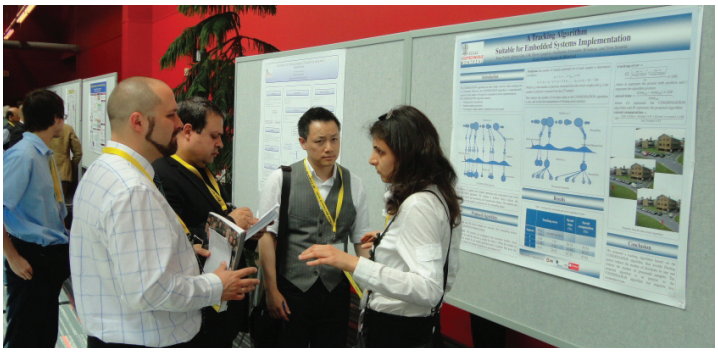
SIGNAL
Bulletin mensuel des microsystèmes
Microsystems Monthly Newsletter
RESMIQ
Regroupement Stratégique en Microsystèmes du Québec

FROM THE EXECUTIVE COMMITTEE

You are reading the fifth bulletin of 2012, which presents the events and news from our center. First, it was a real pleasure to meet at our symposium held during the 80th ACFAS conference at Montreal's Convention Center. Note on this occasion the presentation of Professor Mohammad K. Mofrad from the University of California at Berkeley. We took advantage of this annual meeting as a platform to present the research of our members and to exchange views on the emerging field of microsystems. The scientific poster competition brought 28 contributions from graduate students affiliated to ReSMiQ. The selection committee was impressed by the high quality of the work presented by students and the three best contributions were awarded a prize. We thank the members and students who participated and contributed to the success of this conference. On the other hand, we held our annual general assembly and presented the activities of the center for the past year and the annual financial report, then presented the new budget which was adopted. Thereafter, the Board of directors of ReSMiQ met and also adopted the budget for the year 2012-2013. Furthermore members of the Executive Committee and of the Board of directors have been appointed for the coming year. As for NEWCAS2012, we are ready to welcome the participants in Montreal from June 17 to 20, 2012. The program is already online on the conference website at www.newcas12.org. Finally, we are proud to announce the great scoop that ReSMiQ's efforts along with many colleagues abroad were rewarded by obtaining the organization of the ISCAS conference by Montreal for the year 2016. We wish to emphasize that this success could not have been possible without the help of our many partners.

Best regards,
M. Sawan, director



Presentation of research work at the scientific poster competition for graduate students in the 2012 annual ReSMiQ symposium.

NEWS FROM OUR MEMBERS

EXPOSURE

Dr. Sawan from *Polytechnique* gave 2 invited seminars in Seoul and Tokyo (Hitachi) and 2 distinguished lectures as part of the activities of IEEE SSCS Chapters (Tokyo and Osaka).
More details

INVOLVEMENT

Dr. Sawan from *Polytechnique* presented Montreal's bid to host the 2016 edition of IEEE Int'l Symposium on Circuits And Systems, which was met with great success.

ACHIEVEMENT

Congratulations to our members (Chodavarapu, David, Khazaka, Langlois, Martel, Sawan) who successfully renewed their NSERC Discovery grant at the 2012 research grant competition.

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

NEWCAS 2012

10th IEEE International NEWCAS Conference
June 17 - 20, 2012, Montréal, Canada
www.newcas2012.org

SPOTLIGHT ON OTHER CONFERENCES

12th International Forum on Embedded MPSoC and Multicore (MPSoC'12), July 9 - 13, 2012, Québec, Canada.
More details

55th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS 2012), August 5 - 8, 2012, Boise, Idaho, USA.
More details

XXX IEEE International Conference on Computer Design (ICCD 2012), September 30 - October 3, 2012, Montréal, Canada.
More details

IEEE Biomedical Circuits and System Conference (BIOCAS 2011), November 28 - 30, 2012, Hsinchu, Taiwan.
More details

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Visit our web site: www.resmiq.org

RESEARCH CONTRIBUTIONS

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

1. Fayçal Mounaïm, **Mohamad Sawan**, Toward A Fully Integrated Neurostimulator With Inductive Power Recovery Front-End, IEEE Transactions on Biomedical Circuits and Systems, 2012, online.

In order to investigate new neurostimulation strategies for micturition recovery in spinal cord injured patients,custom implantable stimulators are required to carry-on chronic animal experiments. However, higher integration of the neurostimulator becomes increasingly necessary for miniaturization purposes, power consumption reduction, and for increasing the number of stimulation channels. As a first step towards total integration, we present in this paper the design of a highly-integrated neurostimulator that can be assembled on a 21-mm diameter printed circuit board. The prototype is based on three custom integrated circuits fabricated in High-Voltage (HV) CMOS technology, and a low-power small-scale commercially available FPGA (Figs. 1,2). Measurements show that the DC/DC converter achieves more than 86% power efficiency while providing around 3.9-V from a 12-V input at 1-mA load, 1:3 conversion ratio, and 50-kHz switching frequency. With such efficiency, the proposed step-down inductive power recovery topology is more advantageous than its conventional step-up counterpart.

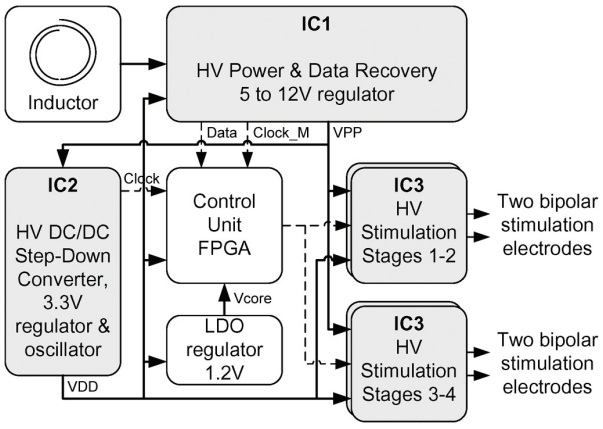

Fig. 1. Pitch contours of different methods at SNR=-10 dB in multi-talker babble noise.

Experimental results confirm good overall functionality of the system.

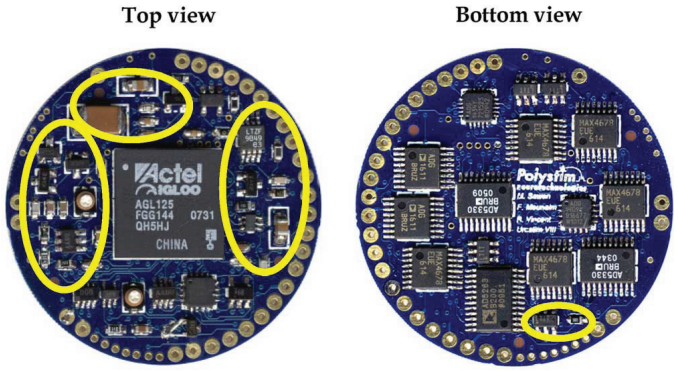

Fig. 2. Discrete components based neurostimulator's PCB (38 mm) with power and data recovery front-end area encircled.

2. S. Saeid Hashemi, **Mohamad Sawan**, **Yvon Savaria**, A High-Efficiency Low-Voltage CMOS Rectifier for Harvesting Energy in Implantable Devices, IEEE Transactions on Biomedical Circuits and Systems, 2012, online.

Authors present, in this paper, a new full-wave CMOS rectifier dedicated for wirelessly-powered low-voltage biomedical implants. It uses bootstrapped capacitors to reduce the effective threshold voltage of selected MOS switches. It achieves a significant increase in its overall power efficiency and low voltage-drop. Therefore, the rectifier is good for applications with low-voltage power supplies and large load current. The rectifier topology does not require complex circuit design. The highest voltages available in the circuit are used to drive the gates of selected transistors in order to reduce leakage current and to lower their channel on-resistance, while having high transconductance. The proposed rectifier was fabricated using the standard TSMC 0.18 micron CMOS process. When connected to a sinusoidal source of 3.3 V peak amplitude, it allows improving the overall power efficiency by 11% compared to the best recently published results given by a gate cross-coupled-based structure.

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