

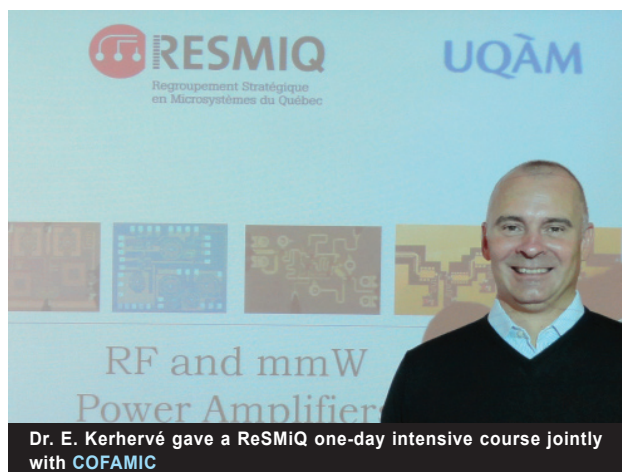
## FROM THE EXECUTIVE COMMITTEE

It is with great pleasure that we present a new edition of SIGNAL with the events and news of October 2011.

Firstly, we are making progress in preparing for our mid-term evaluation. We will receive the FQRNT visiting committee on January 24 and we strive to present our center at its best. As such we will call upon our members, industry partners, representatives of our partner institutions as well as students affiliated to ReSMiQ to meet the committee members and talk about their involvement in our center. Secondly, many of our members just submitted a discovery grant renewal application to NSERC, the deadline being October 31. We wish them all success. Finally, the ReSMiQ will soon celebrate its 25th anniversary. If you have ideas for us to celebrate this significant milestone, please contact the management team.

Best regards,

M. Sawan, director



## RESMIQ'S ACTIVITIES

### ReSMiQ / COFAMIC Seminar

BAW technologies for radiofrequency filters and duplexers by Éric Kerhervé, Novembre 2 at 1:30pm, UQAM

[More details](#)

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

## NEWS FROM OUR MEMBERS

### EXPOSURE

Dr. Boukadoum of UQAM welcomes Dr. Eric Kerhervé from the IMS laboratory at the Institut Polytechnique de Bordeaux.

Dr. Sawan from Polytechnique gave a keynote talk at SMC'11 in Alaska and CID'11 in Albany, NY.

More details [SMC'11 / CID'11](#)

Dr. Boland of ETS is visiting IMS Laboratory of the Polytechnic Institute of Bordeaux as part of a research project on avionics systems.

### INVOLVEMENT

Dr. Sawan from Polytechnique gave an SSCS IEEE Distinguished lecture at the IEEE chapters of Beijing, Shanghai and Hong Kong.

More details [Beijing / Shanghai / Hong Kong](#)

### ACHIEVEMENT

Dr. Fontaine from the University of Sherbrooke supervised the projects of Louis Arpin who won second place in the NSS Student Award for the ASIC LabPET II and Audrey Therrien Corbeil who won the NSS Paul Phelps.

## GET READY!

### NEWCAS 2012

10th IEEE International NEWCAS Conference

June 17 - 20, 2012, Montréal, Canada

[www.newcas2012.org](http://www.newcas2012.org)

## SPOTLIGHT ON OTHER CONFERENCES

IEEE Biomedical Circuits and System Conference (BIOCAS 2011), November 10 - 12, 2011, San Diego, USA.

[More details](#)

2011 International Conference on Electronics, Circuits and Systems (ICECS), December 7 - 9, 2011, Beirut, Lebanon.

[More details](#)

23rd International Conference on Microelectronics (ICM), December 19 - 22, 2011, Hammamet, Tunisia.

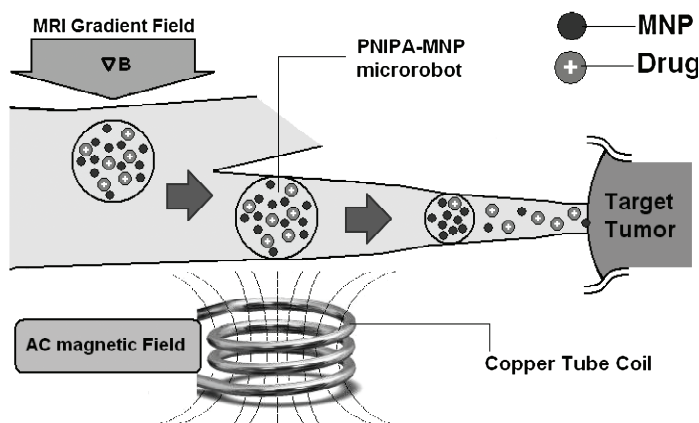
[More details](#)

## RESEARCH CONTRIBUTIONS

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

1. Seyed Nasr Tabatabaei, Jacinthe Lapointe and **Sylvain Martel**, *Shrinkable Hydrogel-Based Magnetic Microrobots for Interventions in the Vascular Network*, Advanced Robotics 25 (2011) 1049–1067

**Abstract-** We previously showed that microrobots containing ferromagnetic or superparamagnetic material can be propelled in the vascular network while being tracked for navigation control purposes using magnetic gradients generated by a clinical magnetic resonance imaging (MRI) scanner. Here, we show that it is possible to synthesize such microrobots to allow them to change size in response to heat while maintaining the same gradient-based propulsion and MRI-based tracking characteristics of the previous versions. These microrobots are made of magnetic nanoparticles (MNPs) encapsulated in thermo-sensitive hydrogels (poly(N-isopropylacrylamide)).



This configuration allows them to shrink in response to temperature elevation caused by the embedded MNPs when exposed to an AC magnetic field. In this paper, spherical PNIPA–MNP microrobots were synthesized and propelled using magnetic gradients of 400 mT/m inside a clinical MRI scanner. The same MRI scanner was used for imaging and tracking of the microrobots before the same microrobots were heated by an AC magnetic field of 4 kA/m at 160 kHz, resulting in a 25% volume reduction of the microrobots. These results suggest the possibility of implementing advanced polymorphic microrobots to accomplish complex tasks in the human body.

2. Eduardo Vellasques, Robert Sabourin, **Eric Granger**, *A high throughput system for intelligent watermarking of bi-tonal images*, Applied Soft Computing, online.

In intelligent watermarking of document images, evolutionary computing (EC) techniques are employed in order to determine embedding parameters of digital watermarking systems such that the trade-off between watermark robustness and image fidelity is optimized. However, existing techniques for intelligent watermarking rely on full optimization of embedding parameters for each image. This approach does not apply to high data rate applications due to its high computational complexity. In this paper, a novel intelligent watermarking technique based on Dynamic Particle Swarm Optimization (DPSO) is proposed. Intelligent watermarking of bi-tonal image streams is formulated as a dynamic optimization problem. This population-based technique allows to evolve a diversified set of solutions (i.e., embedding parameters) to an optimization problem, and solutions from previous optimizations are archived and re-considered prior to triggering new optimizations. In such case, costly optimization may be replaced by direct recall of quasi identical solutions. Simulations involving the intelligent watermarking of several long streams of homogeneous PDF document images resulted in a decrease of computational burden (number of fitness evaluations) of up to 97.2% with a negligible impact on accuracy.