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 in this second newsletter of 2013, events and news of our center. As you know, ReSMiQ is organising this year its annual symposium during the ACFAS conference, to be held in Quebec City on May 6. The organization of this event is ensured by Professor Benoit Gosselin of Laval University. The theme this year is innovative Microsystems for the future of Health Care. For this occasion, a speaker expert in the field, Dr. Hemmerling of McGill University Health Centre, will offer a keynote presentation and several ReSMiQ research projects will be also presented. We will take this opportunity to hold our annual general assembly after the symposium. Following our commitment to support our members in all aspects of their research, the registration fees will be covered and transportation to Laval University will be offered to them and to their students. More details will be available in the coming weeks. At the international level, the organization of NEWCAS2013 is making strides. The deadline for article submission was prolonged until 1 March 2013. The Executive Committee of ReSMiQ encourages all the members to motivate their teams to submit their contributions. We remind that the ReSMiQ will provide financial assistance to facilitate the participation of its members in this international event. Also, representatives of the company Huawei came to meet members of our center to discuss about the possibility to establish research and development partnerships in the field of telecommunications. Regarding our recurring activities, we have several intensive courses planned next spring jointly offered with the involvment of the Montreal Chapter of the IEEE SSC Society and the Department of Electrical Engineering at École Polytechnique de Montreal. We invite you to visit the respective websites of each of these organizations to find out all the details. Finally, we remind everyone that the deadline for submission of projects for the upcoming RID2013 is on April 1st and is open to all students enrolled in a Quebec university.

Best regards,
M. Boukadoum, Interim Director

RESMIQ'S ACTIVITIES

Tutorial ReSMiQ / SSCS Montréal / Dept. Génie élect. EPM
The Next Wave of Mixed-Signal Interface Electronics by Boris Murmann, March 28 at 9:00 am at École Polytechnique
More details

NEWS FROM OUR MEMBERS

EXPOSURE

Dr. Boland from ETS will spend one year as a visiting researcher at the *Laboratoire de l'intégration du Matériau au Système* (IMS) of the *Institut polytechnique de Bordeaux* en France.

ACHIEVEMENT

Dr. Fréchette from the University of Sherbrooke will be the director of a joint laboratory set up by the University of Sherbrooke in partnership with STMicroelectronics.
More details

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

SPOTLIGHT ON OTHER CONFERENCES

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

56th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS 2013), August 4 - 7, 2013, Columbus, Ohio, États-Unis. More details

Embedded Systems Week (ESWEEK), September 29 to October 4, 2013, Montréal, Canada.
More details

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RESEARCH CONTRIBUTIONS

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

G. Kowarzyk, N. Bélanger, D. Haccoun, **Y. Savaria**, Efficient Parallel Search Algorithm for Determining Optimal R = 1/2 Systematic Convolutional Self-Doubly Orthogonal Codes, *IEEE Transactions on communications*, 2013, In press.

A novel parallel and implicitly-exhaustive search algorithm for finding, in systematic form, rate R=frac{1}{2} optimal-span Convolutional Self-Doubly Orthogonal (CDO) codes and Simplified Convolutional Self-Doubly Orthogonal (S-CDO) codes is presented. In order to obtain high-performance low-latency codecs with these codes, it is important to minimize their constraint length (or "span") for a given J number of generator connections. The proposed exhaustive algorithm uses algorithmic enhancements over the best previously published searching techniques, yielding new and improved codes: we were able to obtain new optimal-span CDO/S-CDO codes (having order J={9} and J={10,11} respectively), as well as new codes having the shortest spans published to date for higher values of J (J={10,12,...,17} and J={12,...,20} for CDO and S-CDO codes respectively).

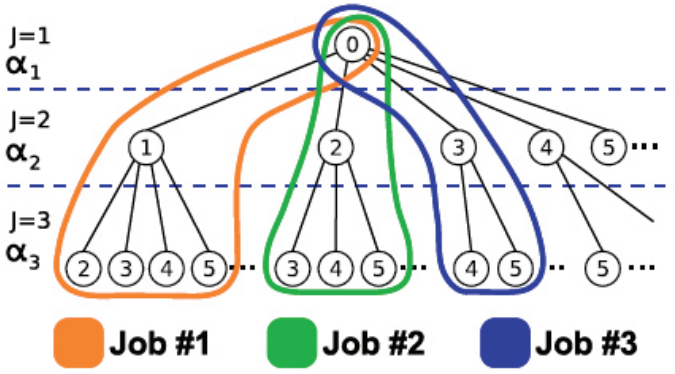
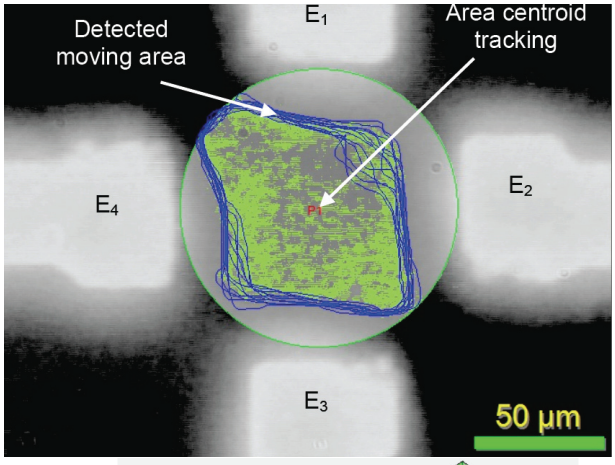


Fig. 3. The parallel implicitly-exhaustive search algorithm divides the search-tree into a set of sub-trees (or "*jobs*") that are searched in parallel by the scout ants (here for a code of order $J = 3$).

The new codes and their error performance are provided. An analysis of the evolution of the CDO/S-CDO code error performance as J increases is presented, and the shortest CDO/S-CDO code span values for each given J are compared.

Mohamed Amine Miled, Antoine Gagné, **Mohamad Sawan**, Hybrid Modeling Method for a DEP Based Particle Manipulation, *Sensors* 2013, 13(2), 1730-1753.

In this paper, a new modeling approach for Dielectrophoresis (DEP) based particle manipulation is presented. The proposed method fulfills missing links in finite element modeling between the multiphysic simulation and the biological behavior. This technique is amongst the first steps to develop a more complex platform covering several types of manipulations such as magnetophoresis and optics.



2D experimental tracking in the case of 4 electrode architectures and sampling procedure of the proposed model

The modeling approach is based on a hybrid interface using both ANSYS and MATLAB to link the propagation of the electrical field in the micro-channel to the particle motion. ANSYS is used to simulate the electrical propagation while MATLAB interprets the results to calculate cell displacement and send the new information to ANSYS for another turn. The beta version of the proposed technique takes into account particle shape, weight and its electrical properties. First obtained results are coherent with experimental results.

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