# SIGNAL

**Bulletin mensuel des microsystèmes**
**Microsystems Monthly Newsletter**

**RESMIQ**
Regroupement Stratégique
en Microsystèmes du Québec

## FROM THE EXECUTIVE COMMITTEE

In this fourth newsletter of 2012, we present the major events and news of our center. Firstly, the preparation for NEWCAS2012 is progressing rapidly, authors were notified of the outcome of the review process. The committee put a lot of efforts in order to raise the quality of the content of the conference which translates in an acceptance rate of 42%, the lowest ever. In pursuing the objective to present a conference of the highest standard, we obtained the commitment of three keynote speakers who will present their achievements over the three days of the conference. We wish to convey our thanks and congratulations to the organizing committee for the success of NEWCAS. We also thank all of our colleagues who provided valuable assistance to the organization of the conference by devoting a great part of their time reading and evaluating the many papers submitted. Regarding the results of the Discovery Grants from NSERC, results were announced recently. Congratulations to all our colleagues for their success. As for our involvement in academic activities, the two days intensive training provided by COMSOL on Multiphysics has enabled several researchers and graduate students to familiarize themselves with this tool. Finally we remind all of you our upcoming annual symposium part of the ACFAS at Montréal's Convention Center on May 7. For this occasion a scientific poster competition will be presented as well as an overview of research activities done by the members of our research center. We hope to see you there. Finally, note that three graduate students, supervised by members of ReSMiQ, were awarded a scholarship for international internship from the FRQNT. We invite you to visit our website to learn about our undertaken activities such as seminars, intensive courses and competitions for the upcoming months.

**Best regards,**
M. Sawan, director

## RESMIQ'S ACTIVITIES

### ReSMiQ annual symposium
*Microsystems and networking : A necessary mix*
May 7, 2012, Montréal, Canada
More details

## NEWS FROM OUR MEMBERS

### EXPOSURE

Dr. Roy from *Université Laval* and his team presented the concept of a self-organized wireless network entitled AmbNet at the InterDigital Innovation Challenge Competition.
More details

### INVOLVEMENT

Dr. Roy from *Université Laval* is general Co-Chair of the 76th Vehicular Technology Conf. (VTC) to be held in September 2012 in Québec City, Canada.
More details

Dr. Sawan from Polytechnique represented our center during the scientifc and economic mission to Brazil (São Paulo & Rio De Janeiro).

### ACHIEVEMENT

Dr. Fontaine from *Université de Sherbrooke,* Dr. Granger from ETS, Dr. Savaria from *Polytechnique*, Dr. Sawan from *Polytechnique* and Dr. Tahar from Concordia received a grant as project leader within the context of the FRQNT's research team program grant.
More details

> **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 Multi-core (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

## RESEARCH CONTRIBUTIONS

Some of the research achievements of our members.

This month, three major contributions are presented.

**1.** C. Shahnaz, **Z. Wei-Ping**, **M.O. Ahmad**, Pitch Estimation Based on a Harmonic Sinusoidal Autocorrelation Model and a Time-Domain Matching Scheme, IEEE Transactions on Audio, Speech, and Language Processing, vol. 20, no. 1, 2012.

In this paper, a method for the estimation of pitch from noise-corrupted speech observations based on extracting a pitch harmonic and the corresponding harmonic number is proposed. Starting from the harmonic representation of clean speech, a simple yet accurate harmonic sinusoidal autocorrelation (HSAC) model is first derived ( Fig. 1). By employing this HSAC model expressed in terms of the pitch harmonics of the clean speech, a new autocorrelation-domain least-squares fitting optimization technique is developed to extract a pitch harmonic from the noisy speech. Then, the harmonic number associated with the pitch harmonic is determined by maximizing an objective function formulated as an impulse-train weighted symmetric average magnitude sum function (SAMSF) of the noisy speech. A comprehensive evaluation of the pitch estimation results shows the superiority of the proposed method over some of the state-of-the-art methods under low levels of SNR.
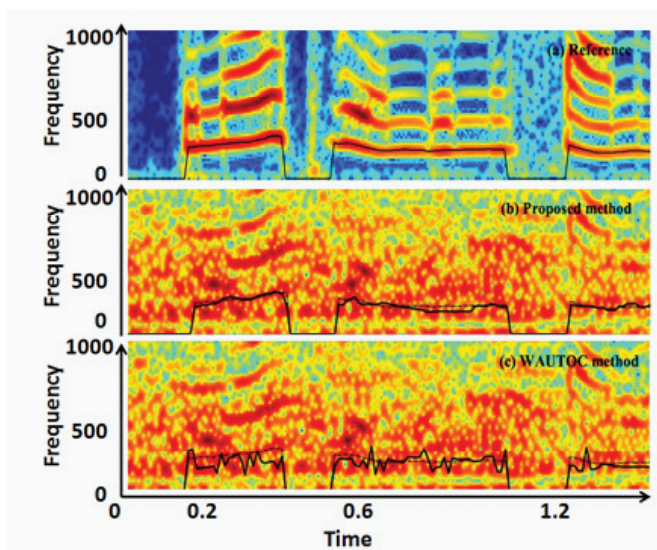


Fig. 1. Pitch contours of different methods at SNR=-10 dB in multi-talker babble noise.

**2.** C. Zhang, **C. Wang**, **M. O. Ahmad**, A Pipeline VLSI Architecture for Fast Computation of the 2-D Discrete Wavelet Transform, IEEE Transactions on Circuits and Systems I: Regular Papers, 2012, online.

In this paper, a scheme for the design of a high-speed pipeline VLSI architecture for the computation of the 2-D discrete wavelet transform (DWT) is proposed. The main focus in the development of the architecture is on providing a high operating frequency and a small number of clock cycles along with an efficient hardware utilization by maximizing the inter-stage and intra-stage computational parallelism for the pipeline. The inter-stage parallelism is enhanced by optimally mapping the computational task of multi decomposition levels to the stages of the pipeline and synchronizing their operations. The intra-stage parallelism is enhanced by dividing the 2-D filtering operation into four subtasks that can be performed independently in parallel and minimizing the delay of the critical path of bit-wise adder networks for performing the filtering operation. It is shown that the performance in terms of the processing speed of the architecture designed based on the proposed scheme is superior to those of the architectures designed using other existing schemes, and it has similar or lower hardware consumption.

**3.** SR. Rivard, JG. Mailloux, R. Beguenane, **HT. Bui**, Design of high-performance parallelized gene predictors in MATLAB, BMC Research Notes, vol. 5, no. 183, 2012.

This paper proposes a method of implementing parallel gene prediction algorithms in MATLAB. The proposed designs are based on either Goertzel's algorithm or on FFTs and have been implemented using varying amounts of parallelism on a central processing unit (CPU) and on a graphics processing unit (GPU). Results show that an implementation using a straightforward approach can require over 4.5 h to process 15 million base pairs (bps) whereas a properly designed one could perform the same task in less than five minutes. In the best case, a GPU implementation can yield these results in 57 s.

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

Visit our web site: www.resmiq.org

© ReSMiQ, April 2012 / **Vol.4 Nº4**