



# IEEE Canada



## Hamilton Section Event Notice — Technical Talk — September 2007

**Speaker** : Xiangjun Zhang (Maggie)  
**Topic** : Algorithms to Interpolate Single and Multiple Frame Image Data  
**Date** : 2007 - September - 12  
**Time** : 5:00 pm  
**Location** : McMaster University  
Information Technology Building (ITB) - Room: A113B  
1280 Main St. West, Hamilton, ON

**Abstract:** Due to physical limitation and/or cost effectiveness of image sensors, the resolution of digital images is often below the ideal level in many applications. In these situations image interpolation is a useful tool to reconstruct a high resolution (HR) image from the captured low resolution (LR) image(s). This talk will present new algorithms from Multimedia Signal Processing Lab at McMaster University for both single and multiple frame interpolation. For single image interpolation, the talk will focus on a new algorithm based on piecewise 2D autoregressive model. The model parameters and the missing pixels are estimated jointly. This task is formulated as nonlinear optimization problem. Although computationally demanding, the new technique produces superior results than current methods in both PSNR and subjective visual quality. Moreover, the non-linear optimization problem can be approximated by breaking into two sub-problems of linear least-squares estimation, which is fast and effective. For multiple frames interpolation, an algorithm based on a fast motion estimation technique is presented. Two stages of the algorithm, namely, motion estimation and HR reconstruction, rely on an area-based interpolation scheme that involves intersecting two pixel grids in arbitrary orientation, displacement, and scaling. A fast approximate solution is developed. Also, gradient descent algorithm is used for fast convergence of the motion estimation algorithm. Experimental results demonstrate the good performance of the proposed algorithm as well its robustness to noise.

**Speaker Bio:** Xiangjun Zhang is currently a Ph.D. candidate in the Department of Electrical and Computer Engineering at McMaster University. She completed the M.Eng. degree in Electrical Engineering at Tsinghua University in China and the B.S. degree in Electrical Engineering at Xian Jiaotong University in China. Her research interests are in image/video processing.

**All are welcome!**