Editorial

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Biographical notes: Dimitrios A. Karras received his Diploma and MSc in Electrical Engineering from the National Technical University of Athens (NTUA), Greece, in 1985 and a PhD in Electrical and Computer Engineering with honours from the NTUA in 1995. Since 2004, he has been with the Chalkis Institute of Technology, Automation Department, Greece, as a Professor in Digital Systems and Signal Processing as well as with the Hellenic Open University as a Visiting Professor in Communication Systems. He has published more than 50 journal papers in pattern recognition, image/signal processing, neural networks and bioinformatics and more than 140 research papers in international conferences. His research interests span pattern recognition and neural networks, image and signal processing and systems, biomedical systems, communications, networking and security. He has served as a programme committee member, programme and general chair in many international workshops and conferences in signal, image and automation systems. He is the Editor-in-Chief of *International Journal of SISE*.

George C. Giakos is a Professor in the Department of Electrical and Computer Engineering, and Biomedical Engineering at the University of Akron, OH, USA. In addition, he is the Director of Imaging Technologies and Surveillance Technologies, Molecular Nanophotonics and Applied Nanosciences Laboratories. His research is articulated in the design of imaging systems, ladars and surveillance sensor platforms for the Department of Defense and Homeland Security, multispectral polarimetry, exploration of molecular pathways and signatures for early detection of disease. His research group was the first in the USA to pioneer the characterisation of the detection and imaging characteristics of Cadmium Zinc Telluride for flat-panel radiography applications. His research has been rewarded with 15 US patents and more than 150 peer-review articles. He is the recipient of a Distinguished Faculty Fellow Award from the Office of Naval Research. He received numerous prestigious research awards from AFRL, NRL and NASA. He is an IEEE Fellow.

The first issue for 2012 of the *International Journal of Signal and Imaging Systems Engineering* (IJSISE) includes six motivating regular papers, dealing with critical theoretical, algorithmic, hardware and system integration topics in signal and imaging systems facing, also, important applications. More specifically, the research studies illustrated in this issue feature an appealing electrodynamic theory with important implications for signal measurements and systems, interesting robot vision and object tracking algorithms and systems, an optimised content based image retrieval (CBIR) approach, evaluation of multilevel thresholding algorithms in imaging as well as new hardware designs for implementing JPEG image compression schemes in FPGA devices.

Before going on with a concise presentation of the herein published investigation reports it is our delight to proclaim that IJSISE, already indexed in SCOPUS and several other indices, recently improved its SCOPUS related impact factors SJR (2011) and SNIP (2011) to 0.026 and 0.379 respectively, showing a good potential for the influence of the journal over the engineering community. Of course journal's promotion and achievement of better indexing remains our major goal greatly depending on your high standard contributions too.

The first research report by L.M. Hively and G.C. Giakos, from USA, examines the implications of a new electrodynamic theory, introducing dynamical variation, through adding new terms to each of Gauss' law and Ampere's law within the context of the classical

electrodynamic theory governed by the system of Maxwell's equations. The new theory predicts modified forms for the Lorentz force, the Poynting vector, and electromagnetic energy density. Among the important results of this work with applications to signal systems is the prediction of two new classes of waves, one of which is a charge-fluctuation-driven scalar wave, having energy but not momentum while the second one is a longitudinal-electric wave with energy and momentum.

In the sequel, the paper by Haili Xu, Longbiao Zhu, Jian Zhuang and Sun'an Wang, from China, investigates accurate pose estimation for an assembly robot equipped with a camera system. The pose estimation is achieved by a three dimensional registration method. A novel method for the registration of the rotated and translated part, according to its camera image and three dimensional model, is herein presented. The spatial registration parameters have been computed by finding which projection of the volume is the most similar to the camera image. Registration parameters are obtained by using an optimisation algorithm called Complicated System Genetic Algorithm (CSGA) to minimise a cost function based on Fourier Transform analysis. Experimental results demonstrate the effectiveness and practicality of the approach.

The third paper by B. Syam and Y.S. Rao, from India, studies a new approach for designing Content-Based Image Retrieval (CBIR) systems based on the principle of extensive features set. To avoid drawbacks of conventional CBIR, the authors propose a method to extract extensive features from the database images and store the same in the feature library. The extensive features set includes shape feature along with colour, texture and contourlet features. Subsequently, a Genetic Algorithm-based similarity measure is calculated between the query image features and the database image features involving Squared Euclidean Distance (SED) as the similarity measure serving as the fitness function for the Genetic Algorithm. The proposed CBIR technique is favourably evaluated in the relevant experimental study.

Then, the research report by S. Saravanakumar, A. Vadivel and C.G.S. Ahmed, from India, investigates a novel technique for object tracking with failure detection and recovery mechanisms. The target object is selected manually from the first video frame. Features of the target object region are extracted using the properties of the HSV colour space. The target area is segmented and represented either as a true colour area or grey colour area. In the subsequent frame, the target object is tracked based on feature. In case of failure, the same is detected and reduced by two schemas such as enlarging boundary technique and moving centre technique. These techniques are used for calculating the distance between the actual target object and detected target object. During failure, the boundary is enlarged to contain the target object. The moving centre technique calculated the difference between the target centre in the current and previous frame. Based on the difference value, the centre of the target is moved to contain the target object. The results obtained through application of this approach are compared with some of the recently available rival methods and are found encouraging.

The next paper by P.D. Sathya and R. Kayalvizhi, from India, adapts, compares and evaluates four stochastic optimisation techniques to solve multilevel thresholding problem in image segmentation: Genetic Algorithm (GA), Particle Swarm Optimisation (PSO), Bacterial Foraging (BF) and Modified Bacterial Foraging (MBF). Three objective functions such as Tsallis, Kapur's and Otsu's functions are considered and maximised by all the above four algorithms. Experimental results show that the BF and MBF are much better in terms of robustness and time convergence than the PSO and GA. Among the last two algorithms, MBF is the most efficient with respect to the quality of the solution in terms of Peak Signal to Noise Ratio (PSNR) value and stability.

Finally, the paper by Vijay K. Sharma, Umesh C. Pati and K.K. Mahapatra, from India, presents a comparative simulation study of PSNR in JPEG image compression conducted using two quantisation tables, one recommended by JPEG committee and another one suitable for hardware simplification. The suggested quantisation table is found suitable for hardware simplification and can be used for designing JPEG baseline encoder circuitry. The authors present a simple finite state machine (FSM) based VLSI architecture, involving discrete cosine transform (DCT) to zig-zag reordering of transformed coefficients for JPEG baseline encoder using a quantisation table suitable for less complex hardware design. The proposed architecture is implemented in FPGA devices.

We suppose that the current issue, demonstrating exciting new contributions and essential methodologies for signal and imaging systems, mutually in theory and algorithmic level but, also, in hardware level will be appealing for practitioners, engineers and researchers. We would like to express our thankfulness to all authors, reviewers and our journal manager as well as our publisher for their solid and enormous support.