

ISSPA '99



BIBLIOTHEQUE DU CEFIST

Proceedings of the Fifth International Symposium on Signal Processing and its Applications

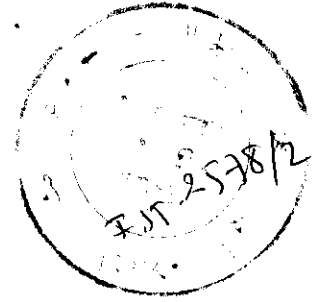


Volume 2



**Brisbane Convention & Exhibition Centre, Queensland, Australia
22 - 25 August 1999**

ISSPA '99



Proceedings
of the
Fifth International Symposium on
Signal Processing and its Applications

August 22 – 25 1999
Brisbane Convention & Exhibition Centre
Queensland, Australia

6 Tutorials in Multi-rate systems, Time-frequency signal processing, Speech recognition, Speech modelling and coding, Multi-modal image guidance, and Applications of data hiding: 22 August 1999
Main Symposium 23 – 25 August 1999

VOLUME 2

Organiser:
Signal Processing Research Centre
Queensland University of Technology
GPO Box 2434, Brisbane, QLD 4001
www: <http://www.sprc.qut.edu.au/>

ISSPA'99 Proceedings of the Fifth International
Symposium on Signal Processing and its Applications.

Editors: M. Deriche, B. Boashash and W. W. Boles

Published by
Queensland University of Technology
GPO Box 2434, Brisbane, QLD 4001
Australia

Copyright © Signal Processing Research Centre, QUT 1999
First Published in August 1999

Printed in Brisbane

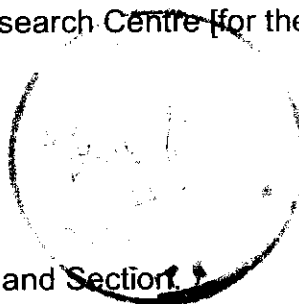
QUT Library Cataloguing-in-Publication Data

International Symposium on Signal Processing and Its Applications 5th : 1999 :
Brisbane, Qld.)

Proceedings of the Fifth International Symposium on Signal Processing and its
Applications: ISSPA '99: August 22-25, 1999, Brisbane Convention & Exhibition
Centre, Queensland, Australia / [organised by the Signal Processing Research
Centre, Queensland University of Technology, editors: M. Deriche, B. Boashash
and W.W. Boles].

Brisbane, Qld.: the Signal Processing Research Centre [for the IEEE], c1999.
2 v.: ill. ; 30 cm.

ISBN 1864354518 (set)
1864354526 (v. 1)
1864354534 (v. 2)



Symposium sponsored by: IEEE Queensland Section.
Includes bibliographical references.

IEEE Catalog Number: 99EX359

1. Signal processing - Congresses. I. Deriche, Mohamed. II. Boashash, Boualem.
- III. Boles, Wageeh W.
- IV. Queensland University of Technology. Signal Processing Research Centre.
- V. Institute of Electrical and Electronics Engineers (U.S.). Queensland (Aust.) Section.

TK5102.5 1999
621.3822 - dc21

PROCEEDINGS OF THE FIFTH INTERNATIONAL SYMPOSIUM ON SIGNAL PROCESSING AND ITS APPLICATIONS

Brisbane, Australia
22 - 25 August 1999

Sponsored by: Signal Processing Research Centre, QUT.

Co-Sponsored by: IEEE (The Institute of Electrical & Electronic Engineers) Queensland Section.

ISSPA 99 SYMPOSIUM COMMITTEE

ISSPA 99 ORGANISATION

Conference Chair

M. Deriche
Queensland University of Technology

Steering Committee Chair

B. Boashash
Queensland University of Technology

Technical Program Chair

K. Assaleh
Conexant Systems Inc., USA

Vice Technical Chair

A. Dawood
Queensland University of Technology

Finance Chair

M. Mesbah
Queensland University of Technology

Publicity Chair

G. Nourbakhsh
Queensland University of Technology

Exhibits Co-ordinator

E. Palmer
Queensland University of Technology

Local Arrangements Chair

B. Senadji
Queensland University of Technology

Publications Chair

W. Boles
Queensland University of Technology

Industry Liaison

A. Reilly
Lake DSP, Australia

USA Liaison

M. Amin
Villanova University

Asia Liaison

A. Leyman
NTU, Singapore

Europe Liaison

M. Benidir
Lab. des Sig. et Syst. France

Secretariat / Conference Organiser

International Convention Management
Services (ICMS) Pty Ltd

Symposium Secretariat

ICMS (Qld) Pty Ltd
PO Box 3496
South Brisbane
QLD 4101 Australia
Phone: +61 7 3844 1138
Fax: +61 7 3844 0909
email: isspa@icms.com.au
www.sprc.qut.edu.au/isspa99/

TECHNICAL COMMITTEE

ISSPA'99 Technical Program Chair

K. Assaleh, Conexant Systems, Inc., USA

ISSPA'99 Vice-Technical Program Chair

A. Dawood, Cooperative Research Centre for Satellite Systems, Australia

ISSPA'99 Technical Committee Members

G. Abousleman, Motorola, SSG, USA

H. Al-Rizzo, Sultan Qabous University, Sultanate of Oman

O. Alshaykh, Packet Video Technologies, USA

A. Asadi, Conexant Systems, USA

S. Attallah, Centre for Wireless Communications, Singapore

Y. Attikiouzel, Ctr for Intelligent Information Processing Systems, Australia

B. Barkat, Queensland University of Technology, Australia

M. Bayoumi, Dept of Electrical & Computer Engineering, Canada

A. Bayya, Conexant Systems Inc., USA

M. Ben Rhomdane, Rockwell Science Centre, USA

A. Benyassine, Conexant Systems, USA

N. Bergmann, Queensland University of Technology, Australia

W. Boles, Queensland University of Technology, Australia

S. Bou-Ghazale, Conexant Systems, USA

A. Bouzerdoum, Edith Cowan University, Australia

W. Campbell, Motorola, USA

V. Chandran, Queensland University of Technology, Australia

M. Deriche, Queensland University of Technology, Australia

R. Evans, University of Melbourne, Australia

K. Farrell, T-netix Inc., USA

S. Furui, Tokyo Institute of Technology, Japan

R. Iskander, Queensland University of Technology, Australia

M. Kaveh, University of Minnesota, USA

M. Khasawneh, Jordan University of Science & Technology, Jordan

B. Kleijn, Dept of Speech, Music & Hearing, KTH, Sweden

S. Maes, IBM, USA

A. Mansour, Bio-Mimetic Control Research Centre, RIKEN, Japan

I. Marsic, Rutgers University, USA

K. Mayyas, Jordan University of Science & Technology, Jordan

A. Mertins, University of Wollongong, Australia

M. Mesbah, Queensland University of Technology, Australia

K. Ngan, University of Western Australia, Australia

K. Paliwal, Griffith University, Australia

A. Quraishi, The University of Adelaide, Australia

J. Rahhal, Jordan University, Jordan

A. Rahim Leyman, Division of Information Technology, Singapore

J. Ralston, CSIRO, Australia

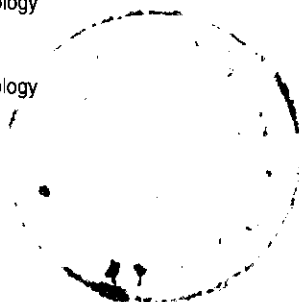
B. Senadji, Queensland University of Technology, Australia

M. Sharma, Periphonics Corporation, USA

A. Surendran, Lucent Technologies, USA

K. Torkkola, Motorola, USA

I. Zabalawi, Jordan University, Jordan



ISBN: 1 86435 451 8 (Set)

ISBN: 1 86435 452 6 (Vol. 1)

ISBN: 1 86435 453 4 (Vol. 2)

Responsibility for the content of these papers rests upon the authors. Data represented and conclusions developed by the authors are for information only and are not intended for use without independent substantiating investigation on the part of the potential user.

Table of Contents

Volume 1

Page

Plenary Session 1

Advances and Challenges in Speech, Audio and Acoustics Processing for Multimedia Communications.

Dr B. H. Juang, Bell Labs, USA..... 1

Plenary Session 2

Biomedical Signal Processing: Present and Future

Prof Y. Attikiouzel AM, Centre for Information Processing Systems, Australia..... 2

Plenary Session 3

New Directions in Automatic Speech Recognition: A Communication Perspective

Prof B. S. Atal, AT&T Labs, USA..... 3

Tutorial 1

Multirate Systems: An Introduction, Operation and Applications

Dr A. Mertins, University of Wollongong, Australia

Dr M. Deriche, Queensland University of Technology, Australia..... 4

Tutorial 2

Time-Frequency Signal Processing: Methods and Algorithms

Prof B. Boashash, Queensland University of Technology, Australia..... 5

Tutorial 3

The Purpose, History, Current State, and Some Evolving Trends in Feature Extraction for Speech Recognition

Prof H. Hermansky, Oregon Graduate Institute of Science and Technology, USA..... 6

Tutorial 4

Modelling Speech Production and Perception Mechanisms and Their Applications to Synthesis Recognition and Coding

Prof A. Alwan, University of California at Los Angeles (UCLA), USA..... 7

Tutorial 5

Multimodal Image-Guidance for Noninvasive Surgery: Registration, Segmentation, and Statistical Imaging Models

Assoc Prof E. S. Ebbini, University of Minnesota, USA..... 8

Tutorial 6

Applications of Data Hiding in Digital Images

Dr J. Fridrich, State University of New York, USA..... 9

MAO1 – Multimedia Signal Process and Transmission

Multimedia Computing – A New Object-Oriented Paradigm

R Gonzalez, Griffith University,

Australia..... 11

Analysis of Fuzzy Logic and Autoregressive Video Source Predictors Using T-Tests

B. Qiu, Monash University,

Australia..... 15

Unequal Error Protection of Images over Rayleigh Fading Channels

C. W. Yap, K. N. Ngan, The University of Western Australia, Australia..... 19

Impact of Wireless Access on Traffic Statistics <i>A. G. Qureshi, The University of Adelaide, Australia</i>	23
Statistical division based modeling for multimedia network traffic <i>B. Li, B. De Moor, Katholieke Universiteit Leuven, Belgium</i>	27
Binaural Audio in Multimedia Systems to Improve Auditory Perception for the Hearing Impaired <i>D. S. Chaudhari, P. C. Pandey, Indian Institute of Technology, India</i>	31
Software Video Coding for Handheld Conferencing <i>J. Faichney, R. Gonzalez, Griffith University, Australia</i>	35
MAO2 - Speech Modeling and Enhancement	
Decomposition of Voiced Speech into All-Pole Filter and Sinusoidal Excitation <i>W. H. Holmes, N. Malik, The University of New South Wales, Australia</i>	39
A Simplified Informax Approach for Blind Signal Separation <i>J. Xi, J. F. Chicharo, The University of Wollongong, Australia</i>	43
An Improved Model for Speech Excitation using Time-Frequency Characterisation <i>S. Ghaemmaghame, M. Deriche, Queensland University of Technology, Australia</i>	47
Audio Source Type Segmentation Using a Perceptually Based Representation <i>K. Melih, R. Gonzalez, Griffith University, Australia</i>	51
Iterative Cepstrum-Based Approach for Speech Dereverberation <i>R. A. Kennedy, B. D. Radlovic, The Australian National University, Australia</i>	55
Pitch Estimation and a measure of voicing from pseudo-spectra <i>N. Malik, W. H. Holmes, The University of New South Wales, Australia</i>	59
MAO3 - Image and Video Coding and Transmission	
Least Squares Approach for Lossless Image Coding <i>H. Ye, G. Deng, J. C. Devlin, La Trobe University, Australia</i>	63
Adaptive Linear Prediction of MPEG Video Traffic <i>W. Xu, A. G. Qureshi, University of Adelaide, Australia</i>	67
Multiscale Location Equivalence and Wavelet Image Transforms on the Quincunx Lattice <i>R. Andrews, University of Tasmania, Australia</i>	71
EZW algorithm using depth-first representation of the wavelet zerotree <i>L. Ang, H. N. Cheung, K. Eshraghian, Edith Cowan University, Australia</i>	75
An Adaptive Split-and-Merge Method for Smoothing and Compression of Image Contours <i>Y. Xiao, J. J. Zou, H. Yan, University of Sydney, Australia</i>	79
An Adaptive DCT Coding with Edge Based Classification <i>Y. Itoh, Texas Instruments Tsukuba Research & Development Center Ltd, Japan</i>	83
Region Evolution with Non-Linear Block Transformations for Fractal Image Coding <i>Y. Ruan, T. G. Nge, Nanyang Technological University, Singapore</i>	87
MPP1 - Speech and Audio Processing	
Digital Audio Watermarking and its Application in Multimedia Database <i>C. Xu, J. Wu, Q. Sun, Kent Ridge Digital Labs, Singapore</i>	91
A Robust Digital Audio Watermarking Technique <i>C. Xu, J. Wu, Q. Sun, Kent Ridge Digital Labs, Singapore</i>	95

The Modelling and Realization of Natural Speech Generation System <i>F. Chen, B. Yuan, Northern Jiaotong University, P. R. China</i>	99
An Instrumental Variable Approach for Identification of Hidden Markov Models <i>J. S. Thorne, J. B. Moore, RSISE, Australia</i>	103
Paganini - A Music Analysis and Recognition Program <i>D. R. Franklin, J. F. Chicharo, University of Wollongong, Australia</i>	107
Speech-to-text Translation by a Non-Word Lexical Unit Based System <i>M. Penagarikano, G. Bordel, Universidad del Pais Vasco, Spain</i>	111
Speaker Identification using a Polynomial-based Classifier <i>K.T. Assaleh, Conexant Systems, Inc, USA</i> <i>W. M. Cambell, Motorola SSG, USA</i>	115
Critical Band Splitting of Speech Signal for Reducing the Effect of Spectral Masking in Bilateral Sensorineural Hearing Impairment <i>D. S. Chaudhari, P. C. Pandey, Indian Institute of Technology, India</i>	119
Korean Folk Song Retrieval using Rhythm Pattern Classification <i>C. Y. Yang, J. T. Shin, J. W. Kim, H. J. Kim, Kyungpook National University, Korea</i>	123
A Novel Approach to Speech Segmentation Using the Wavelet Transform <i>A. Alani, M. Deriche, Queensland University of Technology, Australia</i>	127
On Determining Heuristically Decision Threshold In Robust AR Speech Model Identification Procedure Based On Quadratic Classifier. <i>M. Markovic, Institute of Applied Mathematics and Electronics, Yugoslavia</i>	131
A Novel Pitch Estimation Technique Using The Teager Energy Function <i>N. Abu-Shikhah, M. Deriche, Queensland University of Technology, Australia</i>	135
MPP2 - Artificial Neural Networks and Applications	
Grey-Neural Forecasting System <i>Y. T. Hsu, J. Yeh, National Taiwan University of Science and Technology, Taiwan</i>	139
Nonlinear Signals Self-Similarity and Asymptotical Estimations of Ideal Topological Stabilization <i>V. F. Dailyudenko, Institute of Engineering Cybernetics AS of Belarus, Belarus</i>	143
Edge-Preserving Neural Network Model for Image Restoration <i>P. Bao, D. Wang, The Hong Kong Polytechnic University, Hong Kong</i>	147
Nonlinear Adaptive RBF Neural Filter with Lyapunov Adaptation Algorithm and Its Application to Nonlinear Channel Equalization <i>S. K. Phooi, Z. Man, H. R. Wu, The University of Tasmania, Australia</i>	151
Fuzzy Logic Based Behaviors Blending For Intelligent Reactive Navigation Of Walking Robot <i>A. A. S Al-Jumaily, S. H. M. Amin, Universiti Teknologi Malaysia, Malaysia</i>	155
Face Recognition by using Fractal Encoding and Backpropagation Neural Network <i>P. Temdee, D. Khawparisuth, K. Chamnongthai, King Mongkut's University of Technology Thonburi, Thailand</i>	159
Quantitative Odour Modelling using Electronic Nose Information <i>U. Hanumantharaya, J. Leis, N. Hancock, University of Southern Queensland, Australia</i>	163
Seeking Signals in Data Bases using Neural Networks <i>G. Stebbins, University of California at Los Angeles, USA</i>	167

MPP3 - Statistical Signal Processing and Applications

Detection of Signals Using Digital Generalized Detector <i>V. P. Tuzlukov, National Academy of Sciences, Belarus</i>	171
Recurrence Plot Features: An Example Using ECG <i>D. T. Mewett, K. J. Reynolds, Flinders University of South Australia, Australia</i>	175
M-ary Detection Filters for Cox Process Models <i>W. P. Malcolm, Defence Science and Technology Organisation, Australia</i> <i>R. J. Elliott, University of Alberta, Canada</i>	179
A Least-Squares Based Algorithm for Transfer Function Identification <i>W. X. Zheng, University of Western Sydney, Australia</i>	183
Optimal Parameters in Modulated Laguerre Series Expansions <i>B. E. Sarroukh, A. C. den Brinker, S. J. L. van Eijndhoven, Eindhoven University of Technology, The Netherlands</i>	187
Nonlinear Dynamics methods application to electrocardiosignal Exploration <i>V. F. Dailyudenko, A. M. Krot, E. B. Minervina, Institute of Engineering Cybernetics AS of Belarus, Belarus</i>	191
The analysis of the performance of the exchange rate of the Australian dollar using waveform dictionaries <i>S. Wong, A. Flitman, Monash University, Australia</i>	195
Signal Detection in Compound-Gaussian Noise: Neyman-Pearson versus GLRT <i>E. Conte, A. De Maio, C. Galdi, Universita degli Studi di Napoli Federico II, Italy</i>	199
Detection of 2-D Cisoids Using MODE Least Square Error Functions <i>Q. Cheng, University of Western Sydney, Australia</i>	203
Performance Comparison between Matrix Pencil and MODE for 2-D Harmonic Retrieval <i>Q. Cheng, University of Western Sydney, Australia</i>	207
On noise suppression in adaptive delay estimation <i>J. Raman, L. Weyten, University of Ghent, Belgium</i>	211
On the Indeterminacies of Convolutional Blind Signal Separation based on Second Order Statistics <i>D. W. E. Schobben, P. C. W. Sommen, Eindhoven University of Technology, The Netherlands</i>	215
Research on Monitoring Rate of Lump Coal <i>F. Liu, J. Qian, X. Wang, S. Rong, College of Information and Electrical Engineering, P. R. China</i>	219
On the Estimation of Interleaved Pulse Train Phases <i>T. L. Conroy, J. B. Moore, RSISE, Australia</i>	223
High Interference Rejection Rate Achieved through an Iterative Signal Separation <i>A. Belouchrani, Ecole Nationale Polytechnique, Algeria</i> <i>K. Abed-Meraim, Telecom Paris, France</i>	227
Nonlinear Dynamics in HRV Signals After Heart Transplantations <i>J. H. Abdel Qader, L. M. Khadra, H. Dickhaus, University of Heidelberg, Germany</i>	231
The Blind Separation of Non Stationary Signals by only using the Second Order Statistics <i>A. Mansour, BMC Research Center (RIKEN), Japan</i>	235

A Review of Techniques for Automatic Detection of Neonatal Seizure Using EEG <i>N. Ryan, M. Mesbah, B. Boashash, Queensland University of Technology, Australia</i>	239
Seizure Detection of Newborn EEG using a Model Based Approach: A Review of Performance <i>N. Ryan, M. Mesbah, B. Boashash, Queensland University of Technology, Australia</i>	243
MPO1 - Time Frequency Analysis and Higher Order Spectra	
Defining Signal Descriptor By Fractional Fourier Transform. <i>P. S. Ray, Defence Science and Technology Organisation, Australia</i>	247
Parallel Computation of the Bispectrum <i>K. N. Le, G. K. Egan, K. P. Dabke, Monash University, Australia</i>	251
The Bispectral Aliasing Test: A Clarification And Some Key Examples <i>K. R. Vixie, M. Wolinsky, D. E. Sigeti, Los Alamos National Laboratory, USA</i>	255
Gabor's Signal Expansion and a Modified Zak Transform for a Quincunx-Type Sampling Geometry <i>M. J. Bastiaans, A. J. van Leest, Technische Universiteit Eindhoven, The Netherlands</i>	259
On the Non-Separable Discreet Gabor Signal Expansion and the Zak Transform <i>A. J. van Leest, M. J. Bastiaans, Technische Universiteit Eindhoven, The Netherlands</i>	263
Performance Evaluation of the B-Distribution <i>V. Sucic, B. Barkat, B. Boashash, Queensland University of Technology, Australia</i>	267
The Application of Slice Polyspectra in Nonlinear Coupled Harmonics Analysis <i>W. Hongzhi, W. Shuxun, D. Yisong, Jilin University of Technology, P. R. China</i>	271
MPP4 - Image Analysis and Understanding	
A New Way to Reduce Candidate Blocks for Block Matching Motion Estimation <i>X. Xue, H. Luo, X. Chen, L. Wu, Fudan University, P. R. China</i>	275
ROI Extraction from Motion Affected MR Images by Suppression of Blurring and Motion Artifacts in the Image Background <i>C. Weerasinghe, L. Ji, H. Yan, University of Sydney, Australia</i>	279
Recognition of Unconstrained Handwritten Numerals Using Crossing Features <i>M. Chen, M. H. Ng, Ngee Ann Polytechnic, Singapore</i>	283
On EZW Encoding of Surveillance Imagery matched for Spatial Scale on Viewer Resolution <i>R. Prandolini, Defence Science and Technology Organisation, Australia</i>	289
A Watermarking Scheme for both Spatial and Frequency Domain to Extract the Seal Image without the Original Image <i>W-G. Kim, C-W. Lee, W. D. Lee, ChungNam National University, Korea</i>	293
A New Criteria for Evaluation of Compression Technique <i>M. L. Mittal, V. K. Singh, National Remote Sensing Agency, India</i>	297
A Hybrid Watermark for Tamper Detection in Digital Images <i>J. Fridrich, SUNY Binghamton and Mission Research Corporation, USA</i>	301
Shift and rotation invariant feature of 3D patterns based on the third-order correlation <i>Y. Horikawa, Kagawa University, Japan</i>	305
Sub-Image Extraction by Learnt Lifting Wavelet Filters <i>S. Takano, K. Niijima, Kyushu University, Japan</i>	309

Low-level vision treatments inspired from Human Visual System <i>Beghdadi, A. Boudraa, Universite' Paris XIII, France</i> <i>K. Belkacem-Boussaid, University of Illinois, USA</i>	313
MPO3 - Radar and Sonar Signal Processing	
Wigner-Ville analysis of HF radar measurements of an accelerating target <i>G. J. Frazer, S. J. Anderson, Defence Science and Technology Organisation, Australia</i>	317
An Overview of the Multistatic Sonar Program in Australia <i>M. Swift, J. L. Riley, S. Lourey, L. Booth, Defence Science Technology Organisation, Australia</i>	321
Classifying Ships using Low Resolution Maritime Radar <i>D. Gibbins, D. A. Gray, University of Adelaide, Australia</i> <i>D. Dempsey, CEA Technologies Pty Ltd, Australia</i>	325
Features for High Resolution Radar Range Profile Based Ship Classification <i>S. Slomka, D. Gibbins, Cooperative Research Centre for Sensor Signal and Information Processing, Australia</i> <i>D. Gray, The University of Adelaide, Australia</i> <i>B. Haywood, Defence Science and Technology Organisation, Australia</i>	329
Ship Motion Estimation from ISAR Data <i>D. Gibbins, J. Symons, Centre for Sensor Signal and Information Processing, Australia</i> <i>B. Haywood, Defence Science and Technology Organisation, Australia</i>	333
Skywave Radar Spatial Adaptive Processing with Quiescent Pattern Control <i>M. D. E. Turley, Defence Science and Technology Organisation, Australia</i>	337
A comparison of MHT and 2D Assignment for tracking with an airborne pulse Doppler radar. <i>B. Ristic, Defence Science and Technology Organisation, Australia</i>	341
TAO1 - Biomedical Signal Processing	
Can Signal Processing help Prevent Brain Damage in the Newborns <i>P. Colditz, L. Buck, K. Foster, B. Lingwood, University of Queensland, Australia</i>	345
Design of a DSP System for Automatic Detection of Seizure Signals in Newborns <i>B. Boashash, M. Keir, Queensland University of Technology, Australia</i>	351
Intergrated DSP Control and Image Acquisition System for Measuring Monochromatic Aberrations in Human Eyes <i>P. Sulisz, M. J. Collins, B. Davis, D. R. Iskander, Queensland University of Technology, Australia</i>	355
Adaptive EEG Transient Event Discrimination Using Dynamic LMS Filter Weight Leakage <i>D. A. Campbell, La Trobe University, Australia</i>	359
Robust Batch Algorithm for Sequential Blind Extraction of Noisy Biomedical Signals <i>A Cichocki, A. K. Barros, RIKEN, Japan</i>	363
Biomedical Applications of Electrical Impedance Analysis <i>B. Lingwood, P. Colditz, Royal Women's Hospital, Queensland, Australia</i> <i>L. Ward, University of Queensland, Australia</i>	367
Extraction of Stomach Contour from X-Ray Image <i>F. Kobayashi, M. Ozaki, H. Tsuboi, M. Tanaka, Fukuyama University, Japan</i>	371

TAO2 – Digital Filter Design

Adaptive IIR Filtering for Noisy Input-Output Systems <i>W. X. Zheng, University of Western Sydney, Australia</i>	375
An Analysis of the Exponentiated Gradient Descent Algorithm <i>S. I. Hill, R. C. Williamson, Australian National University, Australia</i>	379
FIR Filtering Design and Implementation on Reconfigurable Computing Technology <i>A. Dawood, Z. Asdani, B. Bravo, Queensland University of Technology, Australia</i>	383
Performance Analysis of Normalized Least Mean P-Norm Lattice Algorithm for Alpha-Stable Processes <i>M. H. Kahaei, B. Boashash, M. Deriche, Queensland University of Technology, Australia</i>	387
A Time-Delay Digital Tanlock Loop <i>Z. M. Hussain, B. Boashash, S. R. Al-Araji, , Queensland University of Technology, Australia</i>	391
H2 Optimal Inverse of Periodic FIR Digital Filters <i>S. Wang, C. Zhang, University of Melbourne, Australia</i> <i>L. Xie, Nanyang Technological University, Singapore</i>	395
Periodic Behaviours in a Digital Filter with Two's Complement Arithmetic <i>X. Yu, Central Queensland University, Australia</i>	399
TAO3 - Wireless Communications	
Decision Feedback Equalization in Time-Varying Frequency-Selective Channels <i>D. K. Borah, B. D. Hart, The Australian National University, Australia</i>	403
Performance Study of Ram-Based Decision Feedback Equalizers with Application to Nonlinear Satellite Channels <i>W. E. Ryan, University of Arizona, USA</i> <i>J. P. LeBlanc, New Mexico State University, USA</i> <i>R. A. Kennedy, Australian National University, Australia</i>	407
Analysis of Nonlinear Signals in the Presence of Rayleigh Fading <i>T. Nguyen, B. Senadji, Queensland University of Technology, Australia</i>	411
Concatenated Sequence Majority Multiplexing DS-SSMA for Synchronous Digital Communication in Indoor Wireless Narrowband Channels <i>K. T. Tan, K. N. Ngan, University of Western Australia, Australia</i>	415
Robust Adaptive Equalization using the Filtered-X LMS Algorithm <i>J. Hu, H. R. Wu, Monash University, Australia</i>	419
Robust Time-Frequency Synchronization for OFDM Mobile Applications <i>J. E. Kleider, M. E. Humphrey, Motorola, USA</i>	423
TPP1 - Image Analysis and Understanding	
Filtering Noisy Images Using Kriging <i>T. Pham, M. Wagner, University of Canberra, Australia</i>	427
Graphic Matching Based on Constrained Voronoi Diagrams <i>H. Zhang, H. Yan, The University of Sydney, Australia</i>	431
On the Practical Estimability of Planar Roto-Translations with the Locus $(K) = 0$ <i>L. Lucchese, G. M. Cortelazzo, University of Padua, Italy</i>	435

Multi-modal Medical Volumes Fusion by Surface Matching <i>A. M. Eldeib, S. M. Yamany, A. Farag, University of Louisville, USA</i>	439
Nondestructive 2D Cross-Sectional Visualization of a Mangosteen <i>S. Arunrungrusmi, D. Khawparisuth, K. Chamnongthai, King Mongkut's University of Technology Thonburi, Thailand</i> <i>M. Okuda, Nippon Institute of Technology, Japan</i> <i>S. Ozawa, Keio University, Japan</i>	443
Post Shot Boundary Detection Technique" Flashlight Scene Determination <i>W. J. Heng, K. N. Ngan, The University of Western Australia, Australia</i>	447
Off-Line Signature Recognition using parameterized Hough Transform <i>T. Kaewkongka, K. Chamnongthai, B. Thipakorn, King Mongkut's University of Technology Thonburi, Thailand</i>	451
The Recognition of Car License Plate for Automatic Parking System <i>T Sirithinaphong, K. Chamnongthai, King Mongkut's University of Technology Thonburi, Thailand</i>	455
An Emotional Viseme Compiler for Facial Animation <i>S. K. Karunaratne, H. Yan, University of Sydney, Australia</i>	459
Representing and Identifying Jointed Objects using a Multiresolution Technique <i>W. W. Boles, Queensland University of Technology, Australia</i>	463
Gradient-Based Optical Flow: A Critical Review <i>M. Mesbah, Queensland University of Technology, Australia</i>	467
TPO1 - Speech and Audio Compression	
Optimization of a Temporal Decomposition Model of Speech <i>C. N. Athaudage, A. B. Bradley, M. Lech, RMIT University, Australia</i>	471
Digital Coding of Covert Audio for Monitoring and Storage <i>M. Mason, S. Sridharan, Queensland University of Technology, Australia</i> <i>R. Prandolini, Defence Science and Technology Organisation, Australia</i>	475
Speech Compaction Using Vector Quantisation and Hidden Markov Models <i>D. Cole, S. Sridharan, Queensland University of Technology, Australia</i>	479
High quality audio coding using a novel hybrid WLP-subband coding algorithm <i>Y. Rongshan, K. C. Chung, National University of Singapore, Singapore</i>	483
Wideband Speech Coding using MELP Model <i>W. R. Lin, S. N. Koh, X. Lin, Nanyang Technological University, Singapore</i>	487
Speech Compression by Vector Quantization of Epochs <i>P. Veprek, A. B. Bradley, RMIT, Australia</i>	491
Volume 2	
TPP2 - Radar and Sonar Signal Processing	
On Polar Versus Cartesian Coordinates for Target Tracking <i>S. Zollo, B. Ristic, Defence Science and Technology Organisation, Australia</i>	499
An Image Processing Approach for Aircraft Flight Parameter Estimation using the Acoustical Lloyd's Mirror Effect <i>K. W. Lo, S. W. Perry, B. G. Ferguson, Defence Science and Technology Organisation, Australia</i>	503

Model Errors in High Resolution Direction of Arrival Processing in a Radar Application <i>D. Rejdemyhr, Defence Research Establishment (FOA), Sweden</i>	507
Waveform Analysis of Transmissions of Opportunity for Passive Radar <i>M. A. Ringer, G. J. Frazer, Defence Science and Technology Organisation, Australia</i>	511
Composite Terrain Clutter Modelling <i>P. L. Choong, Defence Science and Technology Organisation, Australia</i>	515
The Application of Median Based Estimators in Robust Adaptive Beamforming for High Frequency Radar <i>J. S. J. Li, M. D. E. Turley, Defence Science and Technology Organisation, Australia</i>	519
Null Depth Control for Downlink Adaptive Array <i>T. Nguyen, R. Berangi, M. Faulkner, Victoria University of Technology, Australia</i>	523
Sonar Array Signal Processing for Sparse Linear Arrays <i>I. S. D. Solomon, A. J. Knight, M. V. Greening, Defence Science and Technology Organisation, Australia</i>	527
A Novel Time-Frequency Approach For Acceleration Estimation From A Single PRI <i>K. A. Kumar, M. Arvind, K. Divakar, R. Rajagopal, Bharat Electronics, India</i>	531
TPO2 - Signal Processing Education and Distance Learning	
Signal Processing Education in the Context of Multimedia Technology <i>X. Huang, G. Woolsey, University of New England, Australia</i>	535
An Efficient Strategy for Development of Flexible Learning Material <i>P. O'Shea, RMIT University, Australia</i>	539
A New Theme in Distance Learning Using MATLAB in a Software-independent Scheme <i>W. F. Swedan, M. A. Khasawneh, A. M. Zalzal, Jordan University of Science & Technology, Jordan</i>	543
A MATLAB Toolbox for Radar Array Processing <i>S. Bjorklund, D. Rejdemyhr, Defence Research Establishment (FOA), Sweden</i>	547
Digital Filter Analysis Toolbox for Matlab <i>M. J. Werter, University of California, USA</i>	551
Riding the Wave of New Strategies in Engineering Education <i>A. Dawood, M. Deriche, Queensland University of Technology, Australia</i>	555
Cognitive Styles, Subject Content and the Design of Computer Based Instruction <i>W. Boles, H. Pillay, Queensland University of Technology, Australia</i>	559
TPO3 - Industrial Applications	
Estimating Power System Modal Parameters Using Wavelets <i>P. Kang, G. Ledwich, Queensland University of Technology, Australia</i>	563
Machine Grading and Blemish Detection in Apples <i>G. Rennick, Y. Attikiouzel, A. Zaknich, The University of Western Australia, Australia</i>	567
An Image Processing Approach for Estimating the number of Live Prawn Larvae in Water <i>W. W. Boles, S. Geva, A. Busch, Queensland University of Technology, Australia</i>	571
Self-Timed Mesfet Gallium Arsenide Circuit Techniques for a Direct Digital Frequency Synthesiser <i>S. Lachowicz, K. Eshraghian, Edith Cowan University, Australia</i> <i>M. Hollreiser, European Space Research and Technology Centre, The Netherlands</i> <i>H-J. Pfeleiderer, University of Ulm, Germany</i>	575

Development of Strand Condition Diagnostic System of Continuous Slab Caster by using Wireless Telemetry <i>S-J. Lee, K-H. Cho, S-E. Kang, Pohang Iron & Steel Co., Korea</i>	579
Moving obstacle path detection for mobile robot <i>T. Suwannatat, K. Chamnongthai, King Mongkut University of Technology Thonburi, Thailand</i>	583
Some New Signal Processing Approaches for Gear Fault Diagnosis <i>W. Wang, A. K. Wong, Defence Science and Technology Organisation, Australia</i>	587
TPO4 - Multirate Signal Processing and Wavelets	
Design of Perfect Reconstruction Integer-Modulation Filter Banks <i>A. Mertins, University of Wollongong, Australia T. Karp, University of Mannheim, Germany J. Kliewer, University of Kiel, Germany</i>	591
Sequential Bayesian Wavelet Denoising <i>M. J. Coates, A. Doucet, University of Cambridge, UK</i>	595
Wavelet Design of Time-Varying Filters <i>T. A. Ridsdill-Smith, The University of Western Australia, Australia</i>	599
A New Approach to Low Bitrate Audio Coding Using A Combined Harmonic-Multiband-Wavelet Respresentation <i>M. Deriche, D. Ning, S. Boland, Queensland University of Technology, Australia</i>	603
On the Non-Separable Gabor Signal Expansion and Filter Banks <i>A. J. van Leest, Technische Universiteit Eindhoven, The Netherlands</i>	607
Correlation Properties of Wavelet Transform and Applications in Image Coding <i>J. S. Huang, D. T. Nguyen, M. Negnevitsky, University of Tasmania, Australia C. J. E. Phillips, The University of New South Wales, Australia</i>	611
Subband Coding of Cyclostationary Signals with Static Bit Allocation <i>A. Pandharipandey, S. Dasgupta, The University of Iowa, USA</i>	615
WAO1 - Speech Recognition and Speaker Identification	
Low-Complexity Small-Vocabulary Speech Recognition for Portable Devices <i>W. M. Campbell, C. C. Brown, Motorola Labs, USA K. T. Assaleh, Conexant Systems, USA</i>	619
Algorithms for Speech Classification <i>L. Liao, M. A. Gregory, RMIT University, Australia</i>	623
A High Performance Mandarin Digit Recognize <i>B. Zhang, J. Liu, G. Peng, W. S-Y. Wang, City University of Hong Kong, Hong Kong</i>	629
Enhancing Automatic Speaker Identification using Phoneme Clustering and Frame Size Selection <i>J. Pelecanos, S. Slomka, S. Sridharan, Queensland University of Technology, Australia</i>	633
Use of Spectral Subband Moments in MFCC Computation <i>E. Gjelsvik, K. K. Paliwal, Griffith University, Australia</i>	637
On the use of Filter-Bank Energies as Features for Robust Speech Recognition <i>K. K. Paliwal, Griffith University, Australia</i>	641
High Performance Telephony Speech Recognition via Cascade HMM/ANN Hybrid <i>I. Gholampur, K. Nayebi, Sharif University of Technology, Iran</i>	645

WAO2 - Artificial Neural Networks and Applications

Classification of Digital Modulation Schemes Using Neural Networks <i>G. Arulampalam, V. Ramakonar, A. Bouzerdoum, D. Habibi, Edith Cowan University, Australia</i>	649
A Neural Network Based Adaptive Non-Linear Lossless Predictive Coding Technique <i>S. Marusic, G. Deng, La Trobe University, Australia</i>	653
Automatic Wane Detection in the Images of lanks using a Neural Network <i>R. I. Chaplin, R. M. Hodgson, S. Gunetileke, Massey University, New Zealand</i>	657
Lyapunov Stability-Based Adaptive Backpropagation for Discrete Time System <i>Z. Man, S. K. Phooj, H. R. Wu, The University of Tasmania, Australia</i>	661
Design of Two-stage Cellular Neural Network Filter for Detecting Particular Moving Objects <i>K. Kondo, H. Morishita, Y. Konishi, H. Ishigaki, Himeji Institute of Technology, Japan</i>	665
Chromatic Lip Tracking using a Connectivity Based Fuzzy Threshold Technique <i>S. Lucey, S. Sridharan, V. Chandran, Queensland University of Technology, Australia</i>	669
A Dynamic Channel Assignment Technique Based on The Discrete Hopfield Neural Network Model <i>I. Zabalawi, A. Jaradat, R. Al-Khawaldeh, University of Jordan, Jordan</i>	673
WAO3 - Computing System Design and Architecture	
An Adaptive Instrument Module (AIM) for Satellite Systems <i>A. Dawood, N. Bergmann, Queensland University of Technology, Australia</i>	677
Enabling Technologies for the use of Reconfigurable Computing in Space <i>A. Dawood, N. Bergmann, Queensland University of Technology, Australia</i>	683
Demodulating Binary Phase Shift Keyed Signals using Programmable Logic Devices <i>C.J. Kikkert, C. Blackburn, James Cook University, Australia</i>	689
Smart pixel VLSI architecture for embedded zerotree wavelet coding <i>H. N. Cheung, G. Alagoda, K. Eshraghian, L. Ang, Edith Cowan University, Australia</i>	693
Datagram protocols for arbitrary topology w lans <i>G. A. Einicke, D. L. Dekker, A. R. Buckwell, CSIRO, Australia</i>	697
Normal Basis Inversion in Some Finite Fields <i>J. H. Jeng, I-Shou University, Taiwan</i>	701
A Functional Memory Based Architecture For Running Sorting <i>T. Eldos, Jordan University of Science and Technology, Jordan</i>	705
WPP1 - Signal Processing Communications	
A Study on the performance of the Partial PIC CDMA detector in the presence of time offset errors <i>K. Anderson, F-C. Zheng, M. Faulkner, Victoria University of Technology, Australia</i>	709
Bounds of biorthogonal decompositions and a lossless modification of signal-to-noise ratio <i>P. Zavorsky, T. Myoken, N. Kambayashi, M. Iwahashi, S. Fukuma, Nagaoka University of Technology, Japan</i>	713
Performance of Adaptive Predistortion with Temperature in RF Power Amplifier Linearization <i>H. Q. He, M. Faulkner, Victoria University of Technology, Australia</i>	717

A Reduced Sample Rate Bandpass Sigma Delta Modulator <i>B. Steele, P. O'Shea, RMIT University, Australia</i>	721
Cramer-Rao Bounds for M-PSK Packets with Random Phase <i>J. Drake, New Mexico State University, USA</i>	725
Frequency Shift Dither for Analogue to Digital Converters <i>C. J. Kikkert, A. Bigdeli, James Cook University, Australia</i>	729
A Spread Spectrum Network Analyser <i>C. J. Kikkert, James Cook University, Australia</i>	733
Peak to Average Power Ratio Reduction of OFDM Signals using Peak Reduction Carriers <i>E. Lawrey, C. J. Kikkert, James Cook University, Australia</i>	737
A New Channel Model for ADSL and VDSL Systems <i>D. Franklin, J. Chicharo, J. Xi, University of Wollongong, Australia</i>	741
Detection of Amplitude Modulated Signals in Noise <i>S. P. Thomas, Defence Science and Technology Organisation, Australia</i>	745
Interference Mitigation Utilising Spectral Redundancy <i>G. Parker, University of South Australia, Australia</i> <i>J. Kitchen, Defence Science and Technology Organisation, Australia</i>	749
Automatic Recognition of Digitally Modulated Communications Signals <i>V. Ramakonar, D. Habibi, A. Bouzerdoum, Edith Cowan University, Australia</i>	753
The Recovery of Carrier Envelope Information using Randomized Bandpass Sampling <i>J. J. Wojtiuk, University of South Australia, Australia</i>	757
Multiuser OFDM <i>E. Lawrey, James Cook University, Australia</i>	761
Error Propagation and Recovery in Decision Feedback Equalisers for Second Order Nonlinear Channels <i>J. Tsimbinos, Defence Science and Technology Organisation, Australia</i> <i>L. B. White, The University of Adelaide, Australia</i>	765
Prediction-based Blind Equalization using Channel Encoded Data <i>J. Mannerkoski, V. Koivunen, Tampere University of Technology, Finland</i>	769
Digital AM-VSB Modulator for Compatible PAL Systems <i>G. Redaelli, E. Gasparetto, CEFRIEL, Italy</i> <i>G. Burzi, Elettronica Industriale, Italy</i>	773
A Novel Algorithm for Automatic Constellation Classification of PSK & QAM Signals and a RBF-Based Identification <i>A. R. Leyman, R. S. Kohli, S. Divakaran, Nanyang Technological University, Singapore</i>	777
WPP2 - Image and Video Compression Wavelet Transform Based Technique for Speckle Noise Suppression and Data Compression for SAR Images <i>M. L. Mittal, V. K. Singh, National Remote Sensing Agency, India</i> <i>R. Krishnan, ADRIN, India</i>	781
Imaging Model at different Resolutions <i>S. K. Kopparapu, P. I. Corke, CSIRO Manufacturing Science and Technology, Australia</i>	785

Transmission of still images over noisy channels <i>A. Perkis, D. G. Cardelo, Norwegian University of Science and Technology, Norway</i>	789
Massively Parallel Wavelet Based Video Codec for an Intelligent-Pixel Mobile Multimedia Communicator <i>A. M. Rassau, University of Reading, UK</i> <i>G. Alagoda, K. Eshraghian, Edith Cowan University, Australia</i>	793
Robust Image Compression Using the Depth-First Search on the Wavelet Zerotree <i>L. Ang, H. N. Cheung, K. Eshraghian, Edith Cowan University, Australia</i>	797
System Analysis of an Intelligent Pixel Mobile Multimedia Communicator <i>A. M. Rassau, University of Reading, UK</i> <i>R. Mavaddat, G. Alagoda, K. Eshraghian, Edith Cowan University, Australia</i>	801
Multiscale Matching Pursuit for Image Coding <i>H. Li, I. Wolff, University Duisburg, Germany</i>	805
Hybrid Binary Image Compression <i>S. Phimoltares, K. Chamnongthai, King Mongkut's University of Technology Thonburi, Thailand</i> <i>C. Lursinsap, Chulalongkorn University, Thailand</i>	809
B-Spline Representation of Active Contours <i>D. K. Kim, Seonam University, Korea</i>	813
Advanced Model-Based Image Coding Scheme <i>M. C. Park, T. Naemura, M. Kaneko, H. Harashima, The University of Tokyo, Japan</i>	817
A Performance Study on MPEG-4 Coder <i>D. Chai, K. N. Ngan, University of Western Australia, Australia</i>	821
Locally Adaptive Resolution Method for Progressive Still Image Coding <i>O. Deforges, J. Ronsin, ARTIST Laboratory, France</i>	825
Wavelet Image Compression Based on Significance Clustering and Rate Distortion Optimization <i>J. M. Zhong, C. H. Leung, University of Hong Kong, Hong Kong</i> <i>Y. Y. Tang, Hong Kong Baptist University, Hong Kong</i>	831
Vector Quantization for Image Compression based on Fuzzy Clustering <i>A. Boudraa, Q. Kanafani, A. Beghdadi, A. Zergainoh, Universite' Paris XIII, France</i>	835
WPO1 - Array Processing	
Nearfield Broadband Adaptive beamforming <i>T. D. Abhayapala, R. A. Kennedy, R. C. Williamson, Australian National University, Australia</i> <i>D. B. Ward, University College UNSW, ADFA, Australia</i>	839
Estimating the Polar Distribution of Snapping Shrimp with a Wide Aperture Array <i>B. G. Ferguson, J. L. Cleary, Defence Science and Technology Organisation, Australia</i>	843
Initialising Constant Modulus Algorithm for Smart Antenna Applications <i>B. Xu, H. Mehrpour, The University of New South Wales, Australia</i> <i>T. B. Vu, University of Hong, Kong Kowlong, Hong Kong</i>	847
Optimum Weighted ESPRIT for 2-D Angle Estimation Using a Circular Array <i>Q. Cheng, University of Western Sydney, Australia</i> <i>R. Yang, University of New South Wales, Australia</i>	851
Using Sources of Opportunity to Estimate Digital Compensation for Receiver Mismatch in HF Arrays <i>G. A. Fabrizio, D. A. Gray, M. D. Turley, Australia</i>	855

Measurement and Analysis of Multipath by a Rough Surface Reflector using a Digital Array Antenna <i>S. Bjorklund, P. Grahn, A. Nelander, Defence Research Establishment (FOA), Sweden</i>	859
A Reduced Complexity Least Squares Algorithm for Look Direction Constrained Broadband Arrays with Maximally Flat Response Zeros <i>C. C. Ko, F. Ye, National University of Singapore, Singapore</i>	863
WPP3 - Array Processing	
Hierarchical Beamforming Aspects of OSMA <i>G. A. Hampson, A. B. Smolders, G. W. Kant, Netherlands Foundation for Research into Astronomy, The Netherlands</i>	869
Beamforming for a source located in the interior of a Sensor Array <i>D. B. Ward, University of New South Wales, Australia</i> <i>R. C. Williamson, The Australian National University, Australia</i>	873
2-D Angle Estimation using the Constrained MUSIC with Circular Array <i>T. Akiyama, T. Yamaoka, N. Hamada, Keio University, Japan</i>	877
An Iterative Root-MUSIC for 2-D Angle Estimation <i>Q. Cheng, X. Meng, University of Western Sydney, Australia</i>	881
An Adaptive Nulling System for a Narrow-Band Signal with a Look Direction Constraint Using one or more Signal Subspace Eigenvectors <i>D. Madurasinghe, Defence Science and Technology Organisation, Australia</i>	885
A New Algorithm for Joint Blind Signal Separation and Acoustic Echo Canceling <i>D. W. E. Schobben, P. C. W. Sommen, Eindhoven University of Technology, The Netherlands</i>	889
Instability in DOA Manifold Ambiguity Resolution <i>Y. I. Abramovich, N. K. Spencer, Cooperative Research Centre for Sensor Signal and Information Processing, Australia</i> <i>V. G. Gaitsgory, University of South Australia, Australia</i>	893
Adaptive Control of a Broadband Array using Frequency-Independent Coefficients <i>J. S. Marciano, H. Mehrpour, University of New South Wales, Australia</i> <i>T. B. Vu, City University of Hong Kong Kowloon, Hong Kong</i>	897
Orthogonal Algorithm for Minor and Principal Subspace Extraction <i>A. Chkeif, K. Abed-Meraim, Telecom Paris, France</i> <i>Y. Hua, The University of Melbourne, Australia</i>	901
Detecting the Number of Signals Using Antenna Array: A Single Threshold Solution <i>O. Hu, F. Zheng, M. Faulkner, School of Communications & Informatics, Australia</i>	905
Performance Comparison of the Optimal and the Zero-forcing Beamforming algorithms Under Practical Conditions <i>O. Hu, F. Zheng, School of Communications & Informatics, Australia</i>	909
Multidimensional Extension of MMSE Linear Adaptive Receiver for DSSS Systems <i>J. E. Castro, J. P. LeBlanc, New Mexico State University, New Mexico</i> <i>P. Rapajic, The Australian National University, Australia</i>	915

WPO2 - Image Restoration Segmentation and Classification

Dynamic Retinal Image Reconstruction of the Human Eye

*C. Chao, D. R. Iskander, M. J. Collins, B. Davis, M. Bennamoun, Queensland University of Technology,**Australia..... 919*

Perceptual Grouping of Natural Images for CBIR

A. Wardhani, R. Gonzalez, Griffith University, Australia..... 923

A New Skeletonization Algorithm Based on Constrained Delaunay Triangulation

J. J. Zou, H. H. Chang, H. Yan, The University of Sydney, Australia..... 927

Adaptive Thresholding Method for Binarization Blueprint Images

M. Zhao, H. Yan, University of Sydney, Australia..... 931

Geophysical feature removal by multiscale edge suppression

F. Boschetti, P. Hornby, F. Horowitz, CSIRO, Australia..... 935

On the Use of a Multispectral Markov Random Field Model for Texture Analysis in Multitemporal SAR Imagery

G. Heene, University of Gent, Belgium..... 939

Personal Facial Expression Space based on Multidimensional Scaling for the Recognition Improvement

N. P. Chandrasiri, M. C. Park, T. Naemura, H. Harashima, The University of Tokyo, Japan. 943

Multi-Modal Person Verification System based on Face Profiles and Speech

*C. Sanderson, K. K. Paliwal, Griffith University, Australia..... 947***WPP4 - Digital Filter Design**

Optimal Envelope-Constrained FIR Filter Design: An LMI Approach

Z. Tan, Y. C. Soh, L. Xie, Nanyang Technological University, Singapore..... 951

Design of 1-D FIR Filters with Genetic Algorithms

A. Lee, M. Ahmadi, G. A. Jullien, R. S. Lashkari, W. C. Miller, University of Windsor, Canada..... 955

Adaptive Volterra Filtering Using M-Band Wavelet Transform

B-W. Kim, Y-M. Lee, S- K. Park, S-W. Nam, Hanyang University, Korea..... 959

Two Approaches for Fixed-Point Filter Design: "Bit-Flipping" Algorithm and Constrained Downhill Simplex Method

A. Krukowski, I. Kale, University of Westminster, UK..... 965

Almost Linear-Phase Polyphase IIR Lowpass/Highpass Filter Approach

A. Krukowski, I. Kale, University of Westminster, UK..... 969

Design of 3-D Recursive Digital Filters using Linear Programming

I. El-Feghi, M. A. Sid-Ahmed, M. Ahmadi, University of Windsor, Canada..... 973

A Design Method for a Recursive Discrete Filter Described by Difference Equation with Periodically Time-Varying Coefficients

*V. I. Sizov, Moscow Institute of Electronic Engineering, Moscow
L. Donskoi, M. Cherniakov, University of Queensland, Australia..... 977*

Biorthogonal Bases of Compactly Supported Matrix Valued Wavelets

K. Slavakis, I. Yamada, Tokyo Institute of Technology, Japan..... 981

Bounds on Capacity Improvements using Spatial Filtering <i>H. M. Jones, P. B. Rapajic, R. A. Kennedy, Australian National University, Australia.</i>	987
A Systolic Filter for Low-Level Processing of the Discrete Wavelet Transform <i>N. Dunstan, University of New England, Australia.</i>	993
A new algorithm for time-frequency spread coders using multirate filters <i>K. P. Chan, University of Hong Kong, Hong Kong</i> <i>L. Chen, Shantou University, P. R. China</i> <i>T. Q. Nguyen, Boston University, USA.</i>	997
Analysis of Stochastic Gradient Identification of Hermite Polynomial Systems with Memory <i>P. Celka, J. M. Vesin, Swiss Federal Institute of Technology, Switzerland</i> <i>N. J. Bershad, University of California, USA.</i>	1001
Incremental Design of High Complexity FIR Filters by Genetic Algorithms <i>M. Oner, M. Askar, Information Technologies and Electronics Research Institute, Turkey.</i>	1005
Psychoacoustical Excitation of the (N)LMS Algorithm for Acoustical System Identification <i>M. Peters, BMW AG,</i> <i>Germany</i>	1009