## CONTENTS

### KEYNOTE PAPER

Towards Constructive Modelling and Control with Neural Networks  
K. HUNT  

### INTELLIGENT CONTROL

Parallel Off-Line Training of Multilayer Perceptrons  
S. McLOONE, G. IRWIN  

GA Approach to Multiple Objective Optimization for Active Noise Control  
K.S. TANG, K.F. MAN, C.Y. CHAN, S. KWONG, P.J. FLEMING  

Oscillation-Resisting in the Learning of Backpropagation Neural Networks  
X.S. DENG, D. POPOVIC, G. SCHULZ-EKLOFF  

Parallel Genetic Algorithms in Spectral Estimation of Doppler Signals  
J. SOLANO GONZALEZ, D.F. GARCIA NOCETTI, K. RODRIGUEZ VAZQUEZ  

The Application and High Speed Real Time Implementation of Continually Online Trained Artificial Neural Networks for Adaptive System Identification and Control  
B. BURTON, J.L. RODGERSON, R.G. HARLEY  

### ROBOTICS

Parallel Computation of a Control Algorithm for a Robot Manipulator  
R. CARELLI, C. GINIS, E. ZAVALLA, D.I. JONES  

Signal Processing and Parallel Processing in the Real-Time Simulation of a Flexible Manipulator System  
M.O. TOKHI, M.A. HOSSAIN, A.K.M. AZAD  

Distributed Parallel Algorithms for the Inverse Dynamics Control of Robot Manipulators  
L. PENALVER, J.C. FERNANDEZ, V. HERNANDEZ, J. TORNERO  

A Methodology of Robot Controller Development Using the SA-RT-Method  
H. JORDAN, G. ABBA, E. OSTERTAG, A. MATSUMOTO  

COMRADE: Compliant Motion Research and Development Environment  
W. WITVROUW, P. VAN DE POEL, J. DE SCHUTTER  

An Algorithm for the Inverse Kinematics Problem of a Calibrated Robot  
A. KORZUN, J. RONING  

Implementation of Sliding Mode Control for SCARA Robot  
M.C. LEE, J.M. LEE, K. SON, D.S. AHN, S.H. HAN, M.H. LEE  

Transputer Based Real-Time System for Multisensor Robotics  
T. RUTSCHKE, G. ABBA, H. JORDAN, M. DE MATHELIN
SOFTWARE DESIGN

Methods and Standards in the Design of Control Information Systems
N. BAKER, W. HARRIS, R. McCLATCHEY, J.-M. LE GOFF, C. WALLACE  
99

Abstract Object State in Real-Time Control
J. BOSCH  
111

Using Object-Oriented Programming Standards for Developing Distributed Real-Time Control Applications
R. KROEGER  
131

A Co-Design Methodology for Dependable Real-Time Systems
C.W. CHAU, S. KWONG, K.F. MAN, W.A. HALANG  
139

A Real-Time Kernel Integrated with an Off-Line Scheduler
C. ERIKSSON, K.-L. LUNDBACK, H. LAWSON  
145

Automated Generation of Hard Real-Time Control for a CSI-fed Induction Machine
M.C. RANDELHOFF, C.E. KLEINHANS, R.G. HARLEY, D.C. LEVY  
153

Issues in Development Models of Real-Time Process-Control Software
G. FRENSEL, P.M. BRUIJN  
159

Implementing Real-Time Scheduling in a Time-Sharing Operating System
G.A. WAINER  
165

Time Requirement Specification in Graphical Design of Real-Time Software
J.J. SKUBICH, J.J. SCHWARZ, M. MARANZANA, T. SZMUC  
173

ADAPTIVE CONTROL

Sensitivity Minimisation for the Class of Self-Tuning Control Systems
A. TARCZYNSKI  
181

A Simple Autonomous Adaptive Controller
Y. TAN, A.R. VAN CAUWENBERGHE  
189

A New Algorithm for Real Time Adaptive State Estimation
L. BOILLEREAUX, J.M. FLAUS  
195

PLC's

State Machine Based Deadline Analysis of a Programmable Controller for Real-Time Sequential Control Systems
NAEHYUCK CHANG, SEUNGKWEON JEONG, WOOK HYUN KWON  
201

Using a Real-Time Framework to Verify the Properties of Grafcet
J. ZAYTOON, P. DE LOOR, G. VILLERMAIN-LECOLLIER  
209

Modeling Distributed PLC Control
T. KOUTHON, G. NOUBIR, P. RAJA, C.P. FUHRMAN, J.D. DECOTIGNIE  
215

SCHEDULING

Development of a Multiprocessor Scheduling Toolbox
D.I. JONES, C. GINIS  
223
On-Line Scheduling Algorithms for Over-Loaded Real-Time System 229
P. MARTINEAU, M. SILLY

Preemption characterization in Real-Time Multimedia Scheduling 235
J. ECHAGUE, I. RIPOLL, J.J. SERRANO, A. CRESPO

Automated Hard Real-Time Scheduling 241
A.R. BROWNE, J.M. BASS, P.R. CROLL, P.J. FLEMING

A Dynamic Scheduling Algorithm for Sporadic Tasks under Resource and Timing Constraints 247
M. SILLY

Scheduling Intelligent Tasks with Optional Parts in Real-Time Environments 253
H. HASSAN, A. CRESPO

Scheduling I/O Requests and Periodic Tasks with Random Execution Time 259
H. CHETTO

An Approach for Scheduling Tasks with Precedence Constraints Based on Similarity Relations 267
E. POLI

Schedulability-Driven Implementation Selection 273
J.R. NAWROCKI

SOFTWARE PACKAGES

TCE: A Software Environment for Real-Time Control 279
J. BANENS, B. DE JAGER

PC-Based CAE Platform for Fuzzy Control System Design 285
QINQIN JIANG, SHAOHUA TAN, XUQIANG LIAO, CHANG-CHIEH HANG, HO-CHUNG LUI, LOONIN TEOW, MINGKUN GU

MatDSP: A DSP-Based Matlab Toolbox for Rapid Prototyping of Digital Control Systems 293
S. CARABELLI, C. GRECO, F. MANNINO

A General Instrument for Real-Time Control and Data Acquisition 299
F. ALTPETER, C. SALZMANN, D. GILLET, R. LONGCHAMP