



# Proceedings of the 12th International Conference on Systems Science

Volume III

Computer Systems – Information Systems  
Knowledge Engineering – Expert Systems  
Technical & Nontechnical Applications

*Editor: Zdzisław Bubnicki*

12–15 September 1995, Wrocław, Poland



UB/TIB Hannover 89  
113 797 427



Oficina Wydawnicza Politechniki Wrocławskiej  
Wrocław 1995

# CONTENTS

## ***COMPUTER SYSTEMS – INFORMATION SYSTEMS***

Jerzy BALICKI, Zygmunt KITOWSKI <b>MULTICRITERIA OPTIMIZATION OF COMPUTER RESOURCE ALLOCATIONS WITH USING GENETIC ALGORITHMS AND ARTIFICIAL NEURAL NETWORKS .....</b>	11
Emmanuel BOUTLEUX, Bernard DUBUISSON <b>DETECTION AND SUPERVISION OF STATE EVOLUTION ON THE FRENCH TELEPHONE NETWORK .....</b>	19
Klaus BUCHENRIEDER <b>SYSTEM MODELING FOR HARDWARE/SOFTWARE CO-DESIGN: THE PRAM MODEL .....</b>	27
Wende CHEN, Jing XU <b>NON-BLOCKING OPTIMAL CONTROL FOR FLOW SHOPS WITH BUFFERS .....</b>	33
Dimo T. DIMOV, Chavdar S. TODOROV <b>COMPUTER AIDED SYSTEM FOR KEEPING THE NATIONAL STANDARD OF BULGARIA .....</b>	46
Virgil DOBROTA, Costin MIRON, Daniel ZINCA, Mihai COSMA, Florin CRISTUREAN <b>SIMULATOR FOR BANDWIDTH MANAGEMENT IN ISDN .....</b>	52
Adam GRZECH <b>NETWORK PERFORMANCE IN HIERARCHICAL ARCHITECTURES OF COMPUTER COMMUNICATION SUBSYSTEMS .....</b>	57
F. KALBOUSSI, Z.A. SKHIRI <b>MULTIMEDIA ENVIRONMENT FOR COMPUTER AIDED LEARNING SYSTEMS (CAL) .....</b>	64
Jerzy KONORSKI <b>ACCESS TO A HIGH-SPEED REGISTER-INSERTION RING BASED ON A LOCAL/RING PRIORITY TOGGLE .....</b>	69
Vladimir KOVAČEVIĆ, Slavko SVIRČEVIĆ, Miroslav POPOVIĆ <b>THE DESIGN METHOD FOR DIGITAL TELEPHONE EXCHANGE .....</b>	74
Jadwiga KOZŁOWSKA <b>EVALUATION OF THE MEAN CENTRAL NODE TRAFFIC IN CENTRALIZED FAILURE-PRONE NETWORKS .....</b>	81
Vladimir MARUNA, Branislav ATLAGIĆ, Branislav ADANSKI <b>A REALIZATION OF INTELLIGENT REMOTE TELEMETRY UNIT .....</b>	86

Marko POPOVIĆ, Vladimir KOVAČEVIĆ, Slavko SVIRČEVIĆ, Dragomir VLATKOVIĆ <b>OPTIMIZATION MODEL OF TRANSMISSION NETWORK AND SWITCHING NODE MANAGEMENT SYSTEM BASED ON LOGICAL FILTERING OF ATTRIBUTES</b> .....	91
Miroslav POPOVIĆ, Slavko SVIRČEVIĆ, Vladimir KOVAČEVIĆ <b>ON SYNCHRONIZATION AND UPDATING IN TANDEM COMPUTER SYSTEM ARCHITECTURE</b> .....	96
Emil ŠEĆEROV, Miroslav POPOVIĆ, Slavko SVIRČEVIĆ <b>MIDDLE LEVEL OF CONTROL FOR CALL PROCESSING PROTOCOL IN TELEPHONE EXCHANGES</b> .....	104
Emil ŠEĆEROV, Nicola TESLIĆ, Miroslav POPOVIĆ <b>EFFICIENT KERNEL FOR REAL-TIME SYSTEMS OPERATING IN NON-DETERMINISTIC ENVIRONMENT</b> .....	112
Janusz STOKŁOSA <b>INTEGRITY OF DATA: FSR-HASH</b> .....	120
Elżbieta STOPA <b>PERFORMANCE OF THE INTELLIGENT NETWORK SERVICES</b> .....	126
Shirin TAHZIB, Anthony N. GODWIN <b>REQUIREMENTS FOR A MODEL OF DATA INTEGRATION METHODS</b> .....	130
Roman TROBEC, Viktor AVBELJ, Bostjan SLIVNIK <b>SIMULATION AND OPTIMISATION OF DATA MULTIPLEX SYSTEM</b> .....	138
Darko VESELINOVIĆ, Zoran KRAJAČEVIĆ, Zdravko MANOJLOVIĆ <b>A SOLUTION OF DIGITAL TERMINAL EQUIPMENT IN DIGITAL TELEPHONE EXCHANGE</b> .....	144
Dragomir VLATKOVIĆ, Miša ŠIPIČKI, Istvan TORDA <b>SOFTWARE PACKAGE FOR THE OPERATIONAL ADMINISTRATION AND MAINTENANCE FOR THE DIGITAL TELEPHONE EXCHANGE</b> .....	150
Józef WOŹNIAK <b>SIMULATION OF RESERVATION TYPE MAC SUBLAYER PROTOCOLS FOR INTEGRATED SERVICES WIRELESS NETWORKS</b> .....	155
Svetlana YANUSHKEVICH, Andrzej KACZMAREK, Vladimir SHMERKO, Vasilij CHEUSHEV <b>NEURAL-BASED COMPUTING OF LOGIC FUNCTIONS SYSTEMS</b> .....	163
 <b><i>KNOWLEDGE ENGINEERING – EXPERT SYSTEMS</i></b> 	
Michał BIAŁKO, Paweł DOBRYCHŁOP, Miron KŁOSOWSKI, Dieter A. MLYNSKI <b>PROTOTYPE HYBRID EXPERT SYSTEM FOR ANALOG FILTER DESIGN</b> .....	171
Michał BIAŁKO, Dieter A. MLYNSKI, Marek WÓJCIKOWSKI <b>OBJECT-ORIENTED DATABASE AND PREDICATE CIRCUIT REPRESENTATION IN THE CMOS CIRCUIT DESIGN EXPERT SYSTEM</b> .....	182

Gordana BOJKOVIĆ, Vera BAJOVIĆ, Vladimir KOVAČEVIĆ <b>KNOWLEDGE BASED DIAGNOSTICS IN NOT WELL INSTRUMENTED NATURAL GAS DISTRIBUTION NETWORK</b> .....	189
Sylvie CALABRETTO, Guy CAPLAT <b>AN ANALOGY FOR KNOWLEDGE ACQUISITION METHODS COMPARISON AND EVALUATION</b> .....	197
Eric F.J. COOLEN, Chris J. BLAND <b>A TASK PLANNER WRITTEN IN PROLOG FOR THE PUMA ROBOT</b> .....	205
Barbara DĘBSKA, Barbara GUZOWSKA-ŚWIDER <b>AUTOMATIC KNOWLEDGE TRANSLATION FROM DATABASE TO THE PRODUCTION RULE KNOWLEDGEBASE</b> .....	213
Mohammad FARSI, K.Z. KARAM, H.H. ABDALLA, B. JANECEK <b>A KNOWLEDGE-BASED APPROACH FOR A PARALLEL CONTROL STRUCTURE</b> .....	218
Pilar FUSTER-PARRA, Antoni LIGEŻA <b>DIAGNOSTIC KNOWLEDGE REPRESENTATION AND REASONING WITH USE OF AND/OR/NOT CAUSAL GRAPHS</b> .....	223
Richard GATWARD, Anne JAMES <b>A KNOWLEDGE BASED DECISION SUPPORT FRAMEWORK FOR ENVIRONMENTAL PLANNING INITIATIVES</b> .....	231
Zdzisław S. HIPPE <b>MULTIPLE TYPE REASONING EXPERT SYSTEM OF OPEN ARCHITECTURE</b> .....	239
Jerzy HOLUBIEC, Grażyna PETRICZEK, Eulalia SZMIDT <b>EXPERT SYSTEM FOR DEVELOPMENT FORECASTING UNDER UNCERTAINTY</b> .....	247
Mieczysław A. KŁOPOTEK <b>TANDEM BELIEF FUNCTIONS - A MEANS OF COMBINED MODELING OF BELIEFS AND DISBELIEFS</b> .....	254
Józef KORBICZ, Janusz KUŚ <b>KNOWLEDGE-BASED FAULT DETECTION SYSTEM USING GENETIC OBSERVER APPROACH</b> .....	262
Zbigniew KOWALKOWSKI, Janusz BŁACHOWICZ <b>ESTA AS AN ENVIRONMENT FOR CREATING EXPERT SYSTEM FOR SUPPORT SOS-3M DECK DEVICE DIAGNOSING PROCESS</b> .....	271
Antoni LIGEŻA <b>A LOGICAL SUPPORT FOR DESIGN OF COMPLETE RULE-BASED SYSTEMS</b> .....	276
Marian A. PARTYKA <b>LOGIC OF MULTIPLE-VALUED DECISION PROCESSES AND ITS APPLICATION TO KNOWLEDGE ENGINEERING</b> .....	284
Iwona POZNIAK <b>APPLICATION OF BUBNICKI METHOD TO KNOWLEDGE-BASED COMPUTER LOAD SHARING</b> .....	290

Wiesław TRACZYK <b>EVALUATION OF KNOWLEDGE QUALITY</b> .....	298
Svetla VASILEVA <b>A KNOWLEDGE-BASED SYSTEM FOR INDIRECT MEASURING OF PROCESS VARIABLES</b> .....	308
Charles WAINWRIGHT, David HARRISON, Janusz SZPYTKO <b>THE DEVELOPMENT OF A KNOWLEDGE BASED DECISION SUPPORT SYSTEM WITH A GRAI FUNCTION</b> .....	313

## ***TECHNICAL & NONTECHNICAL APPLICATIONS***

Bassel ALKHATIB, Ali REKMANI, Michel AL-MAQDISSI <b>ALISAR: AN AUTO LEARNING INTELLIGENT SYSTEM FOR ARCHAEOLOGICAL RECOGNITION</b> .....	323
E. BAILLY, S. HAYAT, Daniel JOLLY, Anne-Marie DESODT <b>SUBWAY LINE ONE OF LILLE SIMULATION AND REGULATION BASED ON FUZZY LOGIC</b> .....	331
Gloria BUENO, Mark FISHER, James CUBILLO, Keith BURNHAM <b>ORGAN IDENTIFICATION FOR CONFORMAL RADIOTHERAPY TREATMENT PLANNING - A REVIEW</b> .....	339
K. J. BURNHAM, A. GRZECH, D.J.G. JAMES, P.J. KING, L. KOSZAŁKA, I. POZNIAK, J. ŚWIĄTEK <b>AN INTERACTIVE APPROACH TO INTRODUCING DISCRETE-TIME ADAPTIVE CONTROL TO UNDERGRADUATE COURSES IN ENGINEERING</b> .....	347
E.F.J. COOLEN, M.J. WEST <b>FURTHER DEVELOPMENT OF A NEW FORM OF PNEUMOTACHOGRAPH</b> .....	351
Patrick DEBAY, Said HAYAT, Michel EDEL <b>IMMATERIAL LATERAL GUIDANCE OF A BUS IN BOARDING PHASE: MODELLING AND SIMULATION</b> .....	359
D. DUBOIS, J.P. BRIENNE, H. BAUSSART <b>COMPARING DIFFERENT MODELS FOR THE SIMULATION OF THE INTRA-CELLULAR VOLUME RESPONSE OF A YEAST CELL TO AN UNIT STEP OF OSMOTIC PRESSURE</b> .....	367
R. David GREGG, F.P. LOCKETT, Keith J. BURNHAM, D. BANSE <b>MODELLING OF AN ELECTRIC POWER ASSISTED STEERING SYSTEM</b> .....	375
Michel HAPPIETTE, François BOUSSU, Besoa RABENASOLO, Franck GODARD, Christian VASSEUR <b>CONCEPTION OF INTEGRATED SYSTEMS LOGISTIC INTO TEXTILE DISTRIBUTION NETWORK</b> .....	382
Jiankun HU, Zhengfan TAN, Guobin LI, Dianpu LI, Zaosho JIANG <b>H<sup>∞</sup> DESIGN FOR HYDROFOIL CONTROL SYSTEM</b> .....	390

Petya IVANOVA <b>FEATURE SELECTION FOR NEURAL NETWORK FORECASTER BY GENETIC ALGORITHMS</b> .....	402
Waldemar ŁABUDA <b>ENTROPY, GRAVITY AND REGIONAL SOCIO-ECONOMIC SYSTEMS</b> .....	409
Karel MÁŠLO, Svatopluk VNOUČEK, Josef FANTÍK <b>OBJECT ORIENTED PROGRAMMING IN THE POWER SYSTEM MODELLING</b> .....	414
Barbara MAŽBIC-KULMA, Anna POGORZELEC, Ewa KOMOROWSKA <b>LINEAR LOCATION AND SOME REAL APPLICATIONS</b> .....	420
B. MEHRDADI, S. LOCKWOOD <b>AN AGV NAVIGATION SYSTEM USING PROJECTED LIGHT PATTERNS</b> .....	425
Aziz NAKRACHI, Philippe HUS, Lotfi BELKOURA, Isabelle SOUCHON, Andrée VOILLEY <b>MODELLING AND SIMULATION OF A MEMBRANE SEPARATION PROCESS. CASE STUDY: THE PERVAPORATION</b> .....	433
David NEWLANDS, Phil SOUTHEY <b>BUSINESS RESOURCE DEVELOPMENT: TOWARDS AN INTEGRATED METHODOLOGY</b> .....	440
Beata Anna OSTROWSKA, Robert OSTROWSKI, Andrzej KURNATOWSKI, Marian DANILEWICZ <b>COMPUTER-AIDED MANAGEMENT OF PATHOMORPHOLOGICAL DEPARTMENT RECORDS</b> .....	445
M. PÁDUA, R. FARIAS, R. ELIAS, G.R. MATEUS, W.P. PAULA FILHO <b>OBJECT ORIENTED MODELING OF ELECTRIC POWER SYSTEMS: A LOAD-FLOW CASE</b> .....	450
Alessandro PITRONE, Nicola PITRONE <b>ON-LINE CONTROL OF HYBRID POWER PLANT</b> .....	458
Jerzy J. PLOCINSKI <b>A FUZZY LOGIC CONTROLLER FOR INFLATION PROCESS CONTROL</b> .....	470
Ivan POPCHEV, Rainichka TSONEVA <b>OPTIMAL CONTROL OF CONTINUOUS FERMENTATION PROCESSES START-UP UNDER TWO CRITERIONS</b> .....	475
K. PRADANOVA <b>A SYSTEMS DYNAMIC MODEL IN PHARMACOKINETICS</b> .....	487
Milan RAKIĆ, Radoljub TONIĆ, Bogdan VEŠOVIĆ, Gordana NEŠKOVIĆ <b>LARGE SCALE POWER SYSTEM OPERATION PLANNING</b> .....	493
Adam RANDALL <b>FEEDFORWARD ADAPTIVE CONTROL OF A HOT STRIP ROLLING MILL</b> .....	504
K. RATCLIFF, Mohammad FARSI, K.Z. KARAM <b>ENHANCEMENT OF THE CLEANING EFFECTIVENESS ON WINDOW SURFACES</b> .....	513

Li SHURONG, Lu QIANG, Sun YUANZHANG <b>ON THE DESIGN OF NONLINEAR OPTIMAL EXCITATION CONTROLLERS FOR POWER SYSTEMS</b> .....	518
Richard I. STEPHENS, Keith J. BURNHAM, Peter J. REEVE <b>A RETROSPECTIVE SELF-TUNING CONTROLLER FOR DYNAMIC SHIP POSITIONING</b> .....	524
Ron SUMMERS, Richard DYBOWSKI, Peter WELLER, Vanya GANT <b>DECISION SUPPORT FOR THE PREDICTION OF SURVIVAL OF CRITICALLY ILL PATIENTS</b> .....	533
Hideyuki TANAKA <b>THE EXISTENCE OF A SUCCESSFUL FORECASTING THEORY IN A SOCIETY</b> .....	540
Dingli YU, G. PRESTON, D.N. SHIELDS <b>APPLICATION OF PARAMETER IDENTIFICATION TO FAULT DIAGNOSIS FOR A HYDRAULIC SYSTEM</b> .....	545
YiMin ZHANG, Kang Min CHEN <b>THE CONTROL OF CURRENT CAPITAL IN THE OPTIMIZATION OF INDUSTRIAL STRUCTURE IN SHANGHAI</b> .....	553
YiMin ZHANG, Yun He SHI <b>THE DEVELOPMENT OF LOAN RISK EVALUATION DECISION SUPPORT SYSTEM FOR INDUSTRIAL AND COMMERCIAL BANK OF CHINA</b> .....	561
Plamena ZLATEVA, Maia IGNATOVA <b>TRANSFORMATION METHOD OF NONLINEAR FERMENTATION PROCESSES MODELS FOR SLIDING MODE CONTROL DESIGN</b> .....	569