

Proceedings of

The Fifth IEEE International Symposium on Embedded Computing

October 6-8, 2008

Beijing, China



Los Alamitos, California

Washington • Tokyo



Fifth IEEE International Symposium on Embedded Computing

SEC 2008

Table of Contents

Message from the SEC 2008 Conference Chairs	x
---	---

Session A1: Algorithm and Modeling

A Dynamic Window-Constrained Scheduling Algorithm for Multiprocessor Real-Time Systems	3
<i>Zhu Xiangbin</i>	
An Extended Petri Net EPRES for Embedded System Modeling	9
<i>Liu Sen and Chundi Mu</i>	
Improving the Performance of Heuristic Searches with Judicious Initial Point Selection	14
<i>S.A. Tahaei, A.H. Jahangir, and H. Habibi-Masouleh</i>	
On-Line Placement of Real-Time Tasks on 2D Partially Run-Time Reconfigurable FPGAs	20
<i>Qingxu Deng, Fanxin Kong, Nan Guan, Mingsong Lv, and Wang Yi</i>	
Optimization Research of PSO-PID Algorithm for the Design of Brushless Permanent Magnet Machines	26
<i>Yu Ren and Xiaobai Xu</i>	
Recognizing Geometric Path from Polygon-Based Integrated Circuit Layout	31
<i>Zhaohui Yuan, Shilei Sun, and Gaofeng Wang</i>	
Slack-Conserving Based Scheduling of Periodic Real-Time Tasks	37
<i>Muhammad Farooq, Fabrice Muller, and Michel Auguin</i>	
The Hardware/Software Partitioning in Embedded System by Improved Particle Swarm Optimization Algorithm	43
<i>Qiaoling Tong, Xuecheng Zou, Qiao Zhang, Fei Gao, and Hengqing Tong</i>	
Research on Embedded Surveillance Platform in Severe Environment	47
<i>Ma Sen, Shang Yuan-yuan, Jie Yi, and Bai Meng</i>	

Session A2: Information Security

A Rapid Secret Sharing Scheme for Resource Constrained Environments	55
<i>Zheng Chen, Xiao-Jing Wang, Sheng Cao, and Dan Tang</i>	
A Secure Data Aggregation Algorithm Based on Behavior Trust in Wireless Sensor Networks	61
<i>Ming-Zheng Zhou, Jin-Sheng Xu, and Cheng Zhu</i>	
Dual OS Support Peripheral Device Encapsulation	67
<i>Shi Qingsong, Feng Degui, Jijun Ma, Nan Zhang, and Tianzhou Chen</i>	
LUT-based FPGA Implementation of SMS4/AES/Camellia	73
<i>Xianwei Gao, Erhong Lu, Li Li, and Kun Lang</i>	
Network Security Middleware Based on USB Key	77
<i>Dawei Zhang</i>	
SPMOS-Based Intrusion Detection Architecture	82
<i>Shi Qingsong, Chen Du, Nan Zhang, Jijun Ma, and Tianzhou Chen</i>	
Validation of ASIP Architecture Description	88
<i>Yan-yan Gao, Xi Li, and Jie Yu</i>	
A Lightweight Video Encryption Algorithm for Wireless Application	94
<i>Wang Li-feng, Niu Jian-wei, Ma Jian, Wang Wen-dong, and Xiao Chen</i>	

Session A3: Multimedia Computing

A Novel Security Scheme for Video Conference System with Wireless Terminals	101
<i>Chen Xiao, Shilong Ma, Jianwei Niu, Lifeng Wang, Baosong Shan, and Tan Chen</i>	
Deeply Pipelined DSP Solution to Key Modules in H. 264	107
<i>Jinxiu Zhu, Ning Cao, Yushan Chen, and Guoxuan Li</i>	
Design and Implementation of Embedded Digital Album	113
<i>Chen Liang, Hao Weidong, and Long Fei</i>	
Design of Single Chip VDR Based on Nios II	119
<i>Huabiao Jin, Jilin Ma, Heming Li, and Fangping Yu</i>	
Embedded Multi-Channel Video Encoder Based on DSP	124
<i>Yao Chunlian, Li Wei, Meng Qinglei, and Gao Lihua</i>	
Rate-Distortion Optimized Frame Dropping Based on Dynamic Frame Concealment	129
<i>Jinfeng Zhang, Jianwei Niu, Rui He, and Jianping Hu</i>	
Research on Service Robot Vision Alignment Algorithm Based on the SIFT Characteristic	135
<i>Wang Dianjun, Wei Hongxing, Wang Xiaohui, Shen Aiming, and Ren Fujun</i>	
Visual Location System for Placement Machine Based on Machine Vision	141
<i>Luosi Wei and Zongxia Jiao</i>	

Session B1: Wireless Sensor Network

A Precise Coverage Control Protocol with Limited Communication in Wireless Sensor Networks	149
<i>Hanmei Luo and Huanzhao Wang</i>	
A Novel Protocol in Intermittent Connected Mobile Networks	155
<i>Niu Jianwei, Zhou Hang, Xiong Yongping, Sun Limin, and Ma Jian</i>	
Design of ARM-Based Inverter Electrostatic Dehydrator for Crude Oil Emulsions	163
<i>Jun Xu, Hailong Yu, Feijian Zhang, Bo You, and Ruijie Li</i>	
Development of Remote-Controlled Home Automation System with Wireless Sensor Network	169
<i>Jian-she Jin, Jing Jin, Yong-hui Wang, Ke Zhao, and Jia-jun Hu</i>	
Environmental Monitoring System with Wireless Mesh Network Based on Embedded System	174
<i>Meijuan Gao, Fan Zhang, and Jingwen Tian</i>	
Fuzzy Dynamic Programming Based Trusted Routing Decision in Mobile Ad Hoc Networks	180
<i>Zhiwei Qin, Zhiping Jia, and Xihui Chen</i>	
Real-Time Implementation of Multiple Sub-array Beam-Space MUSIC Based on FPGA and DSP Array	186
<i>Bin Yao, Haisen Li, Tian Zhou, Baowei Chen, and Haixin Yu</i>	
Remote Wireless Automatic Meter Reading System Based on Wireless Mesh Networks and Embedded Technology	192
<i>Liting Cao, Jingwen Tian, and Yanxia Liu</i>	

Session B2: Robot and Automation

Research of Embedded Motion Controller for Construction Machinery	201
<i>Min Jin, Xiang Zhou, and Jihui Zhou</i>	
Design and Realization of Omni-directional Mobile Robot Body Based on Zigbee Technology	207
<i>Ding Ru, Zheng Tong, Zhao Li, and Li Gang</i>	
Design and Simulation of Artificial Reverberator Based on Simulink	212
<i>Liu Yongmei, Guan Yong, and Mao Chunjing</i>	
Design of a Reconfigurable Robot Controller Based on FPGA	216
<i>Min Xu, Wenzhang Zhu, and Ying Zou</i>	
Design of Heterogeneous Adders Based on Power-Delay Tradeoffs	223
<i>Sanghoon Kwak, Dongsoo Har, Jeong-Gun Lee, and Jeong-A Lee</i>	
Designation and Realization of Ship Navigation System Embedded Platform Based on ARM	227
<i>Jianqi Liu, Bi Zeng, Xiuwen Yin, Biliang Zhong, and Xiuzhang Zheng</i>	

Dynamically Reconfigurable Embedded Virtual Instrument	233
<i>Huasong Min, Na Wang, and Huanghe Zhou</i>	
On Driving Micro Motors for MEMS with a Micro Driver Based on Three-Phase Sinusoidal Signals	237
<i>Zhizong Ren, Yongxin Zhu, Zhijun Li, Tingting Mo, Xiaoyi Ding, and Jie Zhong</i>	
Real-Time Speaker Verification Based on GMM-UBM for PDA	243
<i>Yan Chen, Qingyang Hong, XiaoYang Chen, and Caihong Zhang</i>	
Session B3: CPU and Memory Architecture	
A Redundancy Mechanism under Single Chip Multiprocessor Architecture	249
<i>Qingsong Shi, Chen Jian, Nan Zhang, Mingteng Cao, and Tianzhou Chen</i>	
A Static Trigger Wear-Leveling Strategy for Flash Memory In Embedded System	255
<i>Song-He Liu, Xiang-Mo Zhao, Jun Zhang, and Ya-Nan Huang</i>	
A Wear-Leveling Algorithm for Nandflash in Embedded System	260
<i>Wang Xinhua and Wang Jianfen</i>	
An Accurate Multi-processing Simulator Based on ADL	266
<i>Chao Wang, Stefan Maier, Xiaoning Nie, Xuehai Zhou, and Jinsong Ji</i>	
Design and Implementation of a Single-Chip ARM-Based USB Interface JTAG Emulator	272
<i>Xuhui Chen, Dengyi Zhang, and Hongyun Yang</i>	
Research of NC Program Processor in Embedded Control System	276
<i>Qikui Wang, Wei Li, Youdong Chen, Hongxing Wei, and Yong Zou</i>	
The Design of a Cycle Accurate Multi-core Architecture Performance Simulator	282
<i>Gang Wang, Zhang Tiefei, Like Yan, Xie Bin, and Tianzhou Chen</i>	
The Hardware-Software Co-design and Co-verification of SoC for an Embedded Home Gateway	288
<i>Bing Guo, Yan Shen, and ChuanWu Zhang</i>	
Session C1: Network Computing	
A New Routing Protocol of Structured Peer-to-Peer Overlay Networks	297
<i>Zhenhua Tan, Guiran Chang, Wei Cheng, Xiaoxing Gao, He Wang, and Li Li</i>	
Adaptive Multiple-Copy Multiple-Hop Forwarding in Intermittently Connected Mobile Networks	303
<i>Jianwei Niu, Hang Zhou, Linmin Sun, and Yongping Xiong</i>	
A New Secure Architecture of Network Computer Based on Single CPU and Dual Bus	309
<i>Fengjing Shao, Rencheng Sun, Kegang Diao, and Xiaopeng Wang</i>	
A Scheduling Algorithm for MAC Protocol in Wireless Sensor Networks	315
<i>Cheng Ye and Yi Mei Kang</i>	

Research on the Scale-Free Feature of the Embedded Component System	320
<i>Han Yanni, Li Deyi, Wu Wenchen, and Chen Guisheng</i>	
Self-Adaptive Seismic Signal Collection Recording System Based on ARM	326
<i>Meijuan Gao, Jin Xu, and Jingwen Tian</i>	
Some New Aggregation Operators and Their Application in Group Decision-Making Based on Fuzzy Preference Relations	332
<i>Xueqing Wang, Xingguo Bing, and Haili Li</i>	
A Video-Coding Quantization Scheme for an Embedded System	338
<i>Shimei Su, Bing Zhou, and Xingjing Zhang</i>	
Session C2: Distributed Computing	
Communication Analysis and Synthesis of Distributed Embedded Network System	345
<i>Jindong Zhang, Guihe Qin, Yang Xun, Yue Cui, Tao Chen, and Jian Jin</i>	
H/S Co-design of Embedded DBMS with High Speed Buffer Support	350
<i>Jiang GuanJun, Ma JiJun, Zheng ZhenWei, and Chen TianZhou</i>	
Performance Comparison of Decentralized Workload Control through Code Migration in Distributed Desktop Computing Grids	356
<i>Makoto Yoshida and Kenji Sakamoto</i>	
Research of Open CNC System Based on CORBA	364
<i>Wei Hongxing, Duan Xinming, Chen Youdong, and Zhang Xiaoliang</i>	
System-Level Early Power Estimation for Memory Subsystem in Embedded Systems	370
<i>Jinsong Ji, Chao Wang, and Xuehai Zhou</i>	
The Design and Implementation of MPI Based on Link DMA	376
<i>Yuan Li, Li Hai, and Duan Chunxia</i>	
The Design of a Wireless Power Transmission Mechanism for Locomotion in Active Medical Inspection MEMS	382
<i>Bin Chen, Yongxin Zhu, Kai Zhu, Tingting Mo, Zhiqiang Que, Zhijun Li, Xiaoyi Ding, and Jie Zhong</i>	
Review on Spacecraft Formal System Design Verification	388
<i>Huamao Wang and Yan Wang</i>	
Shadow Stack Scratch-Pad-Memory for Low Power SoC	394
<i>Ling Ming, Shi Xianqiang, and Zhang Yu</i>	
Author Index	402