

2009 15th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications

(RTCSA 2009)

**Beijing, China
24 – 26 August 2009**



IEEE Catalog Number: CFP09066-PRT
ISBN: 978-1-4244-4931-6

2009 15th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications

RTCSA 2009

Table of Contents

Foreword

Organization Committee

External Reviewers

Sponsors

Session 1: Timing Analysis I

Branch Target Buffers: WCET Analysis Framework and Timing Predictability	3
<i>Daniel Grund, Jan Reineke, and Gernot Gebhard</i>	
An Efficient Algorithm for Parametric WCET Calculation	13
<i>Stefan Bygde, Andreas Ermedahl, and Björn Lisper</i>	
Flow Analysis on Intermediate Source Code for WCET Estimation of Compiler-Optimized Programs	22
<i>Zhonglei Wang and Andreas Herkersdorf</i>	

Session 2: Wireless Sensor Networks

Dynamic Hinting: Real-Time Resource Management in Wireless Sensor/Actor Networks	31
<i>Marcel Baunach</i>	
Multi-path Planning for Mobile Element to Prolong the Lifetime of Wireless Sensor Networks	41
<i>Dakai Zhu, Yifeng Guo, and Ali Şaman Tosun</i>	
PLL Based Time Synchronization in Wireless Sensor Networks	51
<i>Gang Zhou, Sachin Shetty, George Simms, and Min Song</i>	

Session 3: Architecture and Practice I

Efficient Service Allocation in Hardware Using Credit-Controlled Static-Priority Arbitration	59
<i>Benny Akesson, Liesbeth Steffens, and Kees Goossens</i>	
Zero-Buffer Inter-core Process Communication Protocol for Heterogeneous Multi-core Platforms	69
<i>Yu-Hsien Lin, Chiaheng Tu, Chi-Sheng Shih, and Shih-Hao Hung</i>	
On Component-Based Development and High-Integrity Real-Time Systems	79
<i>Marco Panunzio and Tullio Vardanega</i>	
Towards Hardware Support for Common Sensor Processing Tasks	85
<i>Adwait Gupte and Phillip Jones</i>	
F-Model: Model of Modular Robot Based on Functional Component	91
<i>Zou Ying, Wang Tianmiao, Wei Hongxing, Li Chengcheng, and Li Shiyi</i>	

Session 4: Analysis and Design

Component Replication Based on Failover Units	99
<i>Friedhelm Wolf, Jaiganesh Balasubramanian, Aniruddha Gokhale, and Douglas C. Schmidt</i>	
Optimal Assignment of Real-Time Systems into Multi-context Dynamically Reconfigurable Processors	109
<i>Tomoya Kitani, Ryo Nakahashi, Khaled El-Fakih, and Teruo Higashino</i>	
Efficient Processing of Real-Time Multi-item Requests with Network Coding in On-demand Broadcast Environments	119
<i>Jun Chen, Victor C. S. Lee, and Cheng Zhan</i>	
Towards Model-Based Optimisations of Real-Time Systems, an Application with the AADL	129
<i>Olivier Gilles and Jérôme Hugues</i>	
Periodic and Aperiodic Communication Techniques for Responsive Link	135
<i>Shinpei Kato, Yuji Fujita, and Nobuyuki Yamasaki</i>	

Session 5: Real-Time Scheduling I

QoS-Aware Scheduling for Mixed Real-Time Queries over Data Streams	145
<i>Xin Li, Zhiping Jia, Li Ma, Zhiwei Qin, and Haiyang Wang</i>	
Towards Real Multi-criticality Scheduling	155
<i>Stefan M. Petters, Martin Lawitzky, Ryan Heffernan, and Kevin Elphinstone</i>	
Integrating Preemption Threshold to Fixed Priority DVS Scheduling Algorithms	165
<i>Liu Yang, Man Lin, and Laurence T. Yang</i>	
Fairness and Interactivity of Three CPU Schedulers in Linux	172
<i>Shen Wang, Yu Chen, Wei Jiang, Peng Li, Ting Dai, and Yan Cui</i>	

Session 6: Power/Energy-Aware Design I

Managing Imprecise Worst Case Execution Times on DVFS Platforms	181
<i>Vandy Berten, Chi-Ju Chang, and Tei-Wei Kuo</i>	
Power-Aware Scheduling for Multiple Feasible Interval Jobs	191
<i>Jian (Denny) Lin and Albert M. K. Cheng</i>	
Energy-Efficient Speed Scheduling for Real-Time Tasks under Thermal Constraints	201
<i>Shengquan Wang, Jian-Jia Chen, Zhenjun Shi, and Lothar Thiele</i>	
MORA: An Energy-Aware Slack Reclamation Scheme for Scheduling Sporadic Real-Time Tasks upon Multiprocessor Platforms	210
<i>Vincent Nelis and Joël Goossens</i>	

Session 7: Memory Management

A Low-Memory Management for Log-Based File Systems on Flash Memory	219
<i>Shun-Fa Yang and Chin-Hsien Wu</i>	
Buffer Cache Management for Combined MLC and SLC Flash Memories Using both Volatile and Nonvolatile RAMs	228
<i>Junseok Park, Hyokyung Bahn, and Kern Koh</i>	
A Novel Adaptive Scratchpad Memory Management Strategy	236
<i>Ning Deng, Weixing Ji, Jiaxin Li, Feng Shi, and Yizhuo Wang</i>	

Session 8: Ubiquitous Computing I

A*-Based Task Assignment Algorithm for Context-Aware Mobile Patient Monitoring Systems	245
<i>Hailiang Mei, Bert-Jan van Beijnum, Pravin Pawar, Ing Widya, and Hermie Hermens</i>	
SDC: Secure Data Collection for Time Based Queries in Tiered Wireless Sensor Networks	255
<i>Yang Zhao, Zhiguang Qin, Youtao Zhang, and Taieb Znati</i>	
A Location-Determination Application in WirelessHART	263
<i>Xiuming Zhu, Wei Dong, Aloysius K. Mok, Song Han, Jianping Song, Deji Chen, and Mark Nixon</i>	

Session 9: Real-Time Multiprocessor Systems

Accounting for Interrupts in Multiprocessor Real-Time Systems	273
<i>Björn B. Brandenburg, Hennadiy Leontyev, and James H. Anderson</i>	
Supporting Sporadic Pipelined Tasks with Early-Releasing in Soft Real-Time Multiprocessor Systems	284
<i>Cong Liu and James H. Anderson</i>	
The Multi Supply Function Abstraction for Multiprocessors	294
<i>Enrico Bini, Giorgio Buttazzo, and Marko Bertogna</i>	

Session 10: Timing Analysis II

Response Time Analysis for the Abort-and-Restart Event Handlers of the Priority-Based Functional Reactive Programming (P-FRP) Paradigm	305
<i>J. Ras and Albert M. K. Cheng</i>	
Exact Response Time Analysis of Hierarchical Fixed-Priority Scheduling	315
<i>Patricia Balbastre, Ismael Ripoll, and Alfons Crespo</i>	
Simulation-Based Timing Analysis of Complex Real-Time Systems	321
<i>Markus Bohlin, Yue Lu, Johan Kraft, Per Kreuger, and Thomas Nolte</i>	

Session 11: Ubiquitous Computing II

Event-Based Location Dependent Data Services in Mobile WSNs	331
<i>Liang Hong, Yafeng Wu, Sang H. Son, and Yansheng Lu</i>	
A Probabilistic Approach to Mobile Location Estimation within Cellular Networks	341
<i>Junyang Zhou, Kenneth Man-Kin Chu, and Joseph Kee-Yin Ng</i>	

Session 12: Real-Time Scheduling II

Bounding the Maximum Length of Non-preemptive Regions under Fixed Priority Scheduling	351
<i>Gang Yao, Giorgio Buttazzo, and Marko Bertogna</i>	
Allocating Software with Improved Resource Usage and Scheduling for Vehicle Control System Development	361
<i>Shige Wang and Shengbing Jiang</i>	
A Compositional Scheduling Framework for Digital Avionics Systems	371
<i>Arvind Easwaran, Insup Lee, Oleg Sokolsky, and Steve Vestal</i>	

Session 13: Power/Energy-Aware Design II

Practical Energy-Aware Scheduling for Real-Time Multiprocessor Systems	383
<i>Gang Zeng, Tetsuo Yokoyama, Hiroyuki Tomiyama, and Hiroaki Takada</i>	
Task Partitioning and Platform Synthesis for Energy Efficiency	393
<i>Jian-Jia Chen and Lothar Thiele</i>	
Dynamic Thermal and Timeliness Guarantees for Distributed Real-Time Embedded Systems	403
<i>Xing Fu, Xiaorui Wang, and Eric Puster</i>	
Voltage Assignment for Soft Real-Time Embedded Systems with Continuous Probability Distribution	413
<i>Meikang Qiu, Jiande Wu, Fei Hu, Shaobo Liu, and Lingfeng Wang</i>	
ROBTIC: An On-chip Instruction Cache Design for Low Power Embedded Systems	419
<i>Ji Gu, Hui Guo, and Patrick Li</i>	

Session 14: Multi-core Platform

A Portable and Efficient User Dispatching Mechanism for Multicore Systems	427
<i>Tang-Hsun Tu, Chih-Wen Hsueh, and Rong-Guey Chang</i>	
Real-Time Performance and Middleware for Multiprocessor and Multicore Linux Platforms	437
<i>Yuanfang Zhang, Christopher Gill, and Chenyang Lu</i>	
Exploiting Multi-core Processors to Improve Time Predictability for Real-Time Java Computing	447
<i>Yu Sun and Wei Zhang</i>	
Accurately Estimating Worst-Case Execution Time for Multi-core Processors with Shared Direct-Mapped Instruction Caches	455
<i>Wei Zhang and Jun Yan</i>	

Session 15: Architecture and Practice II

A Cascading Redundancy Approach for Dependable Real-Time Systems	467
<i>Hüseyin Aysan, Radu Dobrin, and Sasikumar Punnekkat</i>	
Real-Time Support for Software Transactional Memory	477
<i>Toufik Sarni, Audrey Queudet, and Patrick Valduriez</i>	
Immune Genetic Algorithms for Optimization of Task Priorities and FlexRay Frame Identifiers	486
<i>Soheil Samii, Yanfei Yin, Zebo Peng, Petru Eles, and Yuanping Zhang</i>	
Instruction Cache Locking for Real-Time Embedded Systems with Multi-tasks	494
<i>Tiantian Liu, Minming Li, and Chun Jason Xue</i>	

Session 16: Real-Time Scheduling III

Integration of Preemption Threshold and Quantum-Based Scheduling for Schedulability Enhancement of Fixed Priority Tasks	503
<i>Moonju Park, Hong Jin Yoo, and Jinseok Chae</i>	
A Scheduling Algorithm for Execution-Instant Sensitive Real-Time Systems	511
<i>Leili Farzinvash and Mehdi Kargahi</i>	
Overrun and Skipping in Hierarchically Scheduled Real-Time Systems	519
<i>Moris Behnam, Thomas Nolte, Mikael Åsberg, and Reinder J. Bril</i>	
The Impact of Variability on Soft Real-Time System Scheduling	527
<i>Nilabja Roy, Nathan Hamm, Manish Madhukar, Douglas C. Schmidt, and Larry Dowdy</i>	

Author Index