

2016 IEEE Real-Time Systems Symposium (RTSS 2016)

**Porto, Portugal
29 November – 2 December 2016**



**IEEE Catalog Number: CFP16092-POD
ISBN: 978-1-5090-5304-9**

**Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

******This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP16092-POD
ISBN (Print-On-Demand):	978-1-5090-5304-9
ISBN (Online):	978-1-5090-5303-2
ISSN:	1052-8725

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2016 IEEE Real-Time Systems Symposium

RTSS 2016

Table of Contents

Message from the Chairs.....	x
Conference Committee.....	xi
Program Committee.....	xiii

Session 1: System Design Models

A Framework for Supporting Real-Time Applications on Dynamic Reconfigurable FPGAs	1
<i>Alessandro Biondi, Alessio Balsini, Marco Pagani, Enrico Rossi, Mauro Marinoni, and Giorgio Buttazzo</i>	
Decomposed Reachability Analysis for Nonlinear Systems	13
<i>Xin Chen and Sriram Sankaranarayanan</i>	

Session 2: Mixed Criticality

Schedulability Analysis for a General Model of Mixed-Criticality Recurrent Real-Time Tasks	25
<i>Sanjoy Baruah</i>	
EDF-VD Scheduling of Mixed-Criticality Systems with Degraded Quality Guarantees	35
<i>Di Liu, Jelena Spasic, Nan Guan, Gang Chen, Songran Liu, Todor Stefanov, and Wang Yi</i>	
Dynamic Budget Management with Service Guarantees for Mixed-Criticality Systems	47
<i>Xiaozhe Gu and Arvind Easwaran</i>	
Reconciling the Tension Between Hardware Isolation and Data Sharing in Mixed-Criticality, Multicore Systems	57
<i>Micaiah Chisholm, Namhoon Kim, Bryan C. Ward, Nathan Otterness, James H. Anderson, and F. Donelson Smith</i>	

Session 3: Power in the Grid

On-Line Event-Driven Scheduling for Electric Vehicle Charging via Park-and-Charge	69
<i>Fanxin Kong, Qiao Xiang, Linghe Kong, and Xue Liu</i>	
Real-Time Data and Energy Management in Microgrids	79
<i>Zhichuan Huang and Ting Zhu</i>	
Offline Guarantee and Online Management of Power Demand and Supply in Cyber-Physical Systems	89
<i>Eugene Kim, Jinkyu Lee, Liang He, Youngmoon Lee, and Kang G. Shin</i>	

Session 4: Outstanding Papers

Global Scheduling Not Required: Simple, Near-Optimal Multiprocessor Real-Time Scheduling with Semi-Partitioned Reservations	99
<i>Björn B. Brandenburg and Mahircan Güл</i>	
Resource-Oriented Partitioned Scheduling in Multiprocessor Systems: How to Partition and How to Share?	111
<i>Wen-Hung Huang, Maolin Yang, and Jian-Jia Chen</i>	
Exploring Opportunistic Execution for Integrating Security into Legacy Hard Real-Time Systems	123
<i>Monowar Hasan, Sibin Mohan, Rakesh B. Bobba, and Rodolfo Pellizzoni</i>	

Session 5: IoT and Networking

Sporadic Decision-Centric Data Scheduling with Normally-off Sensors	135
<i>Jung-Eun Kim, Tarek Abdelzaher, Lui Sha, Amotz Bar-Noy, and Reginald Hobbs</i>	
Exploiting Power Grid for Accurate and Secure Clock Synchronization in Industrial IoT	146
<i>Sreejaya Viswanathan, Rui Tan, and David K. Y. Yau</i>	
Enabling Predictable Wireless Data Collection in Severe Energy Harvesting Environments	157
<i>Zheng Dong, Yu Gu, Jiming Chen, Shaojie Tang, Tian He, and Cong Liu</i>	
End-to-End Real-Time Guarantees in Wireless Cyber-Physical Systems	167
<i>Romain Jacob, Marco Zimmerling, Pengcheng Huang, Jan Beutel, and Lothar Thiele</i>	

Session 6: Operating and Runtime Systems

MARACAS: A Real-Time Multicore VCPU Scheduling Framework	179
<i>Ying Ye, Richard West, Jingyi Zhang, and Zuoqun Cheng</i>	

Timeline: An Operating System Abstraction for Time-Aware Applications	191
<i>Fatima Anwar, Sandeep D'Souza, Andrew Symington, Adwait Dongare, Ragunathan (Raj) Rajkumar, Anthony Rowe, and Mani Srivastava</i>	
Randomized Work Stealing for Large Scale Soft Real-Time Systems	203
<i>Jing Li, Son Dinh, Kevin Kieselbach, Kunal Agrawal, Christopher Gill, and Chenyang Lu</i>	

Session 7: Multicore Scheduling

On the Dominance of Minimum-Parallelism Multiprocessor Supply	215
<i>Kecheng Yang and James H. Anderson</i>	
The Federated Scheduling of Systems of Mixed-Criticality Sporadic DAG Tasks	227
<i>Sanjoy Baruah</i>	
On the Decomposition-Based Global EDF Scheduling of Parallel Real-Time Tasks	237
<i>Xu Jiang, Xiang Long, Nan Guan, and Han Wan</i>	

Session 8: Power-Aware Scheduling

Value-Based Task Scheduling for Nonvolatile Processor-Based Embedded Devices	247
<i>Wei-Ming Chen, Tai-Sheng Cheng, Pi-Cheng Hsiu, and Tei-Wei Kuo</i>	
Reducing Deadline Misses and Power Consumption in Real-Time Databases	257
<i>Kyoung-Don Kang</i>	
Energy-Aware Real-Time Task Scheduling on Local/Shared Memory Systems	269
<i>Chenchen Fu, Gruia Calinescu, Kai Wang, Minming Li, and Chun Jason Xue</i>	

Session 9: Handling Contention and Faults

BUNDLE: Real-Time Multi-threaded Scheduling to Reduce Cache Contention	279
<i>Corey Tessler and Nathan Fisher</i>	
A Blocking Bound for Nested FIFO Spin Locks	291
<i>Alessandro Biondi, Björn B. Brandenburg, and Alexander Wieder</i>	
Systems with Dynamic Real-Time Guarantees in Uncertain and Faulty Execution Environments	303
<i>Georg von der Brüggen, Kuan-Hsun Chen, Wen-Hung Huang, and Jian-Jia Chen</i>	
Right On Time Distributed Shared Memory	315
<i>Rachid Guerraoui, David Kozhaya, and Yvonne-Anne Pignolet</i>	

Session 10: Scheduling and Analysis

Computational Complexity and Speedup Factors Analyses for Self-Suspending Tasks	327
<i>Jian-Jia Chen</i>	
Closing the Loop for the Selective Conversion Approach: A Utilization-Based Test for Hard Real-Time Suspending Task Systems	339
<i>Zheng Dong and Cong Liu</i>	
k2Q: A Quadratic-Form Response Time and Schedulability Analysis Framework for Utilization-Based Analysis	351
<i>Jian-Jia Chen, Wen-Hung Huang, and Cong Liu</i>	

Work in Progress

Closing the Loop: Towards Control-Aware Design of Adaptive Real-Time Systems	363
<i>Tobias Klaus, Florian Franzmann, Maximilian Gaukler, Andreas Michalka, and Peter Ulbrich</i>	
Real-Time Capabilities of HSA Compliant COTS Platforms	364
<i>Nandinbaatar Tsog, Matthias Becker, Marcus Larsson, Fredrik Bruhn, Moris Behnam, and Mikael Sjödin</i>	
REVERT: Runtime Verification for Real-Time Systems	365
<i>Sangeeth Kochanthara, Geoffrey Nelissen, David Pereira, and Rahul Purandare</i>	
Integrating the Calculation of Preemption and Persistence Related Cache Overhead	366
<i>Syed Aftab Rashid, Geoffrey Nelissen, and Eduardo Tovar</i>	
Average Probabilistic Response Time Analysis of Tasks with Multiple Probabilistic Parameters	367
<i>Antoine Bertout, Dorin Maxim, and Liliana Cucu-Grosjean</i>	
Preemptive Uniprocessor EDF Schedulability Analysis with Preemption Costs Considered	368
<i>Calvin Deutschbein and Sanjoy Baruah</i>	
Towards Code Metrics for Benchmarking Timing Analysis	369
<i>Peter Wägemann, Tobias Distler, Phillip Raffeck, and Wolfgang Schröder-Preikschat</i>	
Fast and Accurate Cycle Estimation through Hybrid Instruction Set Simulation for Embedded Systems	370
<i>Kilho Lee, Wookhyun Han, Jaewoo Lee, Hoon Sung Chwa, and Insik Shin</i>	
Timing-Anomaly Free Dynamic Scheduling of Task-Based Parallel Applications	371
<i>Petros Voudouris, Per Stenström, and Risat Pathan</i>	

Time-Accurate ASM as a Refinement Scheme for Worst-Case Execution Time Estimation in Hard Real-Time Systems	372
<i>Achraf Mguidich, Vladimir-Alexandru Paun, Bruno Monsuez, and Philippe Baufreton</i>	
Author Index	373