2018 IEEE 24th International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA 2018)

Hakodate, Japan
28 – 31 August 2018

IEEE Catalog Number: CFP18066-POD
ISBN: 978-1-5386-7760-5

Copyright © 2018 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 is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18066-POD
ISBN (Print-On-Demand):	978-1-5386-7760-5
ISBN (Online):	978-1-5386-7759-9
ISSN:	1533-2312

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

2018 IEEE 24th International Conference on Embedded and Real-Time Computing Systems and Applications

RTCSA 2018

Table of Contents

Message from the Program Chairs x
Conference Organization xi
Program Committee xii
External Reviewers xiii
Acknowledgements xiv

Session 1: Embedded Deep Neural Networks

DeepCounter: Using Deep Learning to Count Garbage Bags 1
Kazuhiro Mikami (Keio University), Yin Chen (Keio University), Jin Nakazawa (Keio University), Yasuhiro Iida (NTT Software Innovation Center), Yasunari Kishimoto (NTT Software Innovation Center), and Yu Oya (NTT Software Innovation Center)

DeepPicar: A Low-Cost Deep Neural Network-Based Autonomous Car 11
Michael G. Bechtel (University of Kansas), Elise Mcellhiney (University of Kansas), Minje Kim (Indiana University), and Heechul Yun (University of Kansas)

A Case Study of Cyber-Physical System Design: Autonomous Pick-and-Place Robot 22
Pei-Chi Huang (Department of Computer Science, University of Nebraska at Omaha) and Aloysius K. Mok (Department of Computer Science, University of Texas at Austin)

Session 2: Operating Systems

Write-Aware Data Allocation on Heterogeneous Memory Architecture with Minimum Cost 32
Yanbo Zhou (East China Normal Universisty), Shouzhen Gu (East China Normal Universisty), Lixia Zheng (East China Normal Universisty), Edwin H.-M. Sha (East China Normal Universisty), Qingfeng Zhuge (East China Normal Universisty), and Lin Wu (East China Normal Universisty)

Retention-Time Relaxation Scheme for MLC Flash-Memory Storage Systems 42
David Kuang-Hui Yu (National Taiwan University of Science and Technology) and Jen-Wei Hsieh (National Taiwan University of Science and Technology)

ROSCH:Real-Time Scheduling Framework for ROS .52.....
Yukihiro Saito (Graduate School of Information Science and Engineering, Ritsumeikan University), Futoshi Sato (Graduate School of Information Science and Engineering, Ritsumeikan University), Takuya Azumi (Graduate School of Science and Engineering, Saitama University), Shinpei Kato (Graduate School of Information Science and Technology, The University of Tokyo), and Nobuhiko Nishio (Graduate School of Information Science and Engineering, Ritsumeikan University)

TZDKS: A New TrustZone-Based Dual-Criticality System with Balanced Performance .59.....
Pan Dong (National University of Defense Technology), Alan Burns (University of York), Zhe Jiang (University of York), and Xiangke Liao (National University of Defense Technology)

Session 3: Wireless and IoT

AirTight: A Resilient Wireless Communication Protocol for Mixed-Criticality Systems .65.....
Alan Burns (University of York), James Harbin (University of York), Leandro Indrusiak (University of York), Iain Bate (University of York), Rob Davis (University of York), and David Griffin (University of York)

Parameterized Data Reduction Framework of Thermal Sensing for Gait Velocity Measurements .76.....
Jyun-Jhe Chou (National Taiwan University) and Chi-Sheng Shih (National Taiwan University)

An Adaptive Computation Framework of Distributed Deep Learning Models for Internet-of-Things Applications .85.....
Mu-Hsuan Cheng (National Cheng Kung University), Qihui Sun (National Cheng Kung University), and Chia-Heng Tu (National Cheng Kung University)

Session 4: Support for Predictability

EMPRESS: an Efficient and Effective Method for PREdictable Stack Sharing .92.....
Sebastian Altmeyer (University of Amsterdam), Reinder J. Bril (Technische Universiteit Eindhoven (TU/e)), and Paolo Gai (Evidence Srl)

Phase-Based Profiling and Performance Prediction with Timing Approximate Simulators .101.....
Chih-Wei Yeh (National Taiwan University), Chia-Heng Tu (National Cheng Kung University), Yi-Chuan Liang (National Taiwan University), and Shih-Hao Hung (National Taiwan University)

Mixed-Criticality Scheduling with Dynamic Memory Bandwidth Regulation .111.....
Muhammad Ali Awan (Cister Research Center), Konstantinos Bletsas (CISTER Research Center), Pedro F. Souto (University of Porto, Faculty of Engineering and CISTER Research Centre, Porto, Portugal), Benny Akesson (Embedded Systems Innovation, Eindhoven, the Netherlands), and Eduardo Tovar (CISTER Research Center)

Energy Characterization of Real-Time Partitioned Systems .118.....
Ana Guasque (UPV), Patricia Balbastre (UPV), Alfons Crespo (UPV), and Gerhard Fohler (TU Kaiserslautern)

Session 5: Networking

Supporting Dynamic Voltage and Frequency Scaling in Networks-On-Chip for Hard Real-Time Systems .125.
Adam Kostrzewa (TU Braunschweig), Thawra Kadeed (TU Braunschweig), Borislav Nikoli (TU Braunschweig), and Rolf Ernst (TU Braunschweig)

Exploring Practical Limitations of Joint Routing and Scheduling for TSN with ILP .136.....
Jonathan Falk (University of Stuttgart), Frank Dürr (University of Stuttgart), and Kurt Rothermel (University of Stuttgart)

Schedule Reparability: Enhancing Time-Triggered Network Recovery Upon Link Failures .147.....
Francisco Pozo (Mälardalen University), Guillermo Rodriguez-Navas (Mälardalen University), and Hans Hansson (Mälardalen University)

Session 6: Scheduling

Schedulability Analysis and Priority Assignment for Segmented Self-Suspending Tasks .157.....
Lea Schönberger (TU Dortmund University), Wen-Hung Huang (TU Dortmund University), Georg Von Der Brüggen (TU Dortmund University), Kuan-Hsun Chen (TU Dortmund University), and Jian-Jia Chen (TU Dortmund University)

Analysis of Deadline Miss Rates for Uniprocessor Fixed-Priority Scheduling .168.....
Kuan-Hsun Chen (TU Dortmund University), Georg Von Der Brüggen (TU Dortmund University), and Jian-Jia Chen (TU Dortmund University)

Predictability in Mixed-Criticality Systems .179.....
Rany Kahil (Université Grenoble Alpes (UGA), VERIMAG), Peter Poplavko (Mentor. A Siemens Business), Dario Socci (Mentor. A Siemens Business), and Saddek Bensalem (Université Grenoble Alpes (UGA), VERIMAG)

Refining Task Specifications using Model Checking .185.....
Anand Yeolekar (TCS), Ravindra Metta (TCS), Venkatesh R (TCS), and Samarjit Chakraborty (TU Munich)

Session 7: Cyber Physical Systems

Scheduling Real-Time HiL Co-Simulation of Cyber-Physical Systems on Multi-Core Architectures .192.....
Salah Eddine Saidi (IFP Energies nouvelles), Nicolas Pernet (IFP Energies nouvelles), and Yves Sorel (Inria)

Damaged Lane Markings Detection Method with Label Propagation .203.....
Tetsuo Nukita (NTT Software Innovation Center), Yasunari Kishimoto (NTT Software Innovation Center), Yasuhiro Iida (NTT Software Innovation Center), Makoto Kawano (Graduate School of Media and Governance, Keio University), Takuro Yonezawa (Graduate School of Media and Governance, Keio University), and Jin Nakazawa (Graduate School of Media and Governance, Keio University)

Exploring Augmented Reality Interaction for Everyday Multipurpose Wearable Robots 209
Jaryd Urbani (Waseda University), Mohammed Al-Sada (Waseda University), Tatsuo Nakajima (Waseda University), and Thomas Höglund (University of Vaasa)

uavEE: A Modular, Power-Aware Emulation Environment for Rapid Prototyping and Testing of UAVs 217
Mirco Theile (University of Illinois at Urbana–Champaign), Or D. Dantsker (University of Illinois at Urbana–Champaign), Richard Nai (University of Illinois at Urbana–Champaign), and Marco Caccamo (University of Illinois at Urbana–Champaign)

Hierarchical Attention-Based Anomaly Detection Model for Embedded Operating Systems 225
Mellitus O. Ezeme (Department of Electrical, Computer and Software Engineering University of Ontario Institute of Technology Oshawa, Ontario, Canada), Qusay H. Mahmoud (Department of Electrical, Computer and Software Engineering University of Ontario Institute of Technology Oshawa, Ontario, Canada), and Akramul Azim (Mellitus O. Ezeme, Qusay H. Mahmoud and Akramul Azim Department of Electrical, Computer and Software Engineering University of Ontario Institute of Technology Oshawa, Ontario, Canada)

Demo/Poster Session

Improving Security for Time-Triggered Real-Time Systems with Task Replication 232
Kristin Krüger (Technische Universität Kaiserslautern), Gerhard Fohler (Technische Universität Kaiserslautern), Marcus Völp (Université du Luxembourg), and Paulo Esteves-Veríssimo (Université du Luxembourg)

Measurement of Cache-Related Preemption Delay for Spacecraft Computers 234
Cheol Hea Koo (Korea Aerospace Research Institute) and Hyungshin Kim (Chungnam National University)

OpenCL Runtime for OS-Driven Task Pipelining on Heterogeneous Accelerators 236
Atsushi Koshiba (Tokyo University of Agriculture and Technology), Ryuichi Sakamoto (The University of Tokyo), and Mitaro Namiki (Tokyo University of Agriculture and Technology)

Practical Challenges for FSLM 238
S. Muthu N. Balasubramanian (Technische Universiteit Eindhoven (TU/e), Eindhoven, The Netherlands), Sara Afshar (Malardalen University, Vasteras, Sweden), Paolo Gai (Evidence Srl, Pisa, Italy), Moris Behnam (Malardalen University, Vasteras, Sweden), and Reinder J. Bril (Technische Universiteit Eindhoven (TU/e), Eindhoven, The Netherlands)

CPS-MT: A Real-Time Cyber-Physical System Monitoring Tool for Security Research 240
Martín Barrère (Imperial College London, UK), Chris Hankin (Imperial College London, UK), Angelo Barboni (Imperial College London, UK), Giulio Zizzo (Imperial College London, UK), Francesca Boem (University College London, UK), Sergio Maffeis (Imperial College London, UK), and Thomas Parisini (Imperial College London, UK)

Psychological Effects on Positional Relationships Between a Person and a Human-Following Robot 242
Keita Maehara (Tokyo University of Agriculture and Technology) and Kaori Fujinami (Tokyo University of Agriculture and Technology)

Reduction of Communication Cost for Edge-Heavy Sensor using Divided CNN 244
Yoshihiro Ikeda (Ritsumeikan University), Yutaka Yanagisawa (NTT Communication Science Laboratories), Yasue Kishino (NTT Communication Science Laboratories), Shin Mizutani (NTT Communication Science Laboratories), Yoshinari Shirai (NTT Communication Science Laboratories), Takayuki Suyama (NTT Communication Science Laboratories), Kohei Matsumura (Ritsumeikan University), and Haruo Noma (Ritsumeikan University)

Dynamic Binding a Proper DDS Implementation for Optimizing Inter-Node Communication in ROS2 246
Ren Morita (Future University Hakodate) and Katsuya Matsubara (Future University Hakodate)

A Path-Planning Algorithm for UAV Position-Estimation Systems at Disaster Sites 248
Yusuke Tatsumi (Doshisha University), Hiroki Kawanaka (Doshisha University), and Takahiro Koita (Doshisha University)

Author Index 251