

# **2019 IX Brazilian Symposium on Computing Systems Engineering (SBESC 2019)**

**Natal, Brazil  
19 – 22 November 2019**



**IEEE Catalog Number: CFP1997R-POD  
ISBN: 978-1-7281-6319-2**

**Copyright © 2019 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:	CFP1997R-POD
ISBN (Print-On-Demand):	978-1-7281-6319-2
ISBN (Online):	978-1-7281-6318-5
ISSN:	2324-7886

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## Table of Contents

Message from the General Chair  
Organizing Committee  
Technical Program Committee  
Acknowledgements

### Session: Networking and Wireless Sensor Network

Physical Layer Analysis of LoRa Protocol by Means of a Coexistence Case Study.....1  
Max Feldman (UFRGS), Gustavo Cainelli (UFRGS), Ivan Muller (UFRGS), Lucas Santolin (UFRGS)  
Analysis of Multi-Hop Strategies in LEACH Protocol.....9  
Diego Pinheiro (IFCE), Juliana Garça (IFCE), Otávio Júnior (IFCE), Corneli Júnior (IFCE)

### Session: Multiprocessor/Multicore/Manycore Systems

Application of an Adaptive Genetic Algorithm for Task Mapping Optimisation on a  
Wormhole-based Real-time Network-on-Chip.....17  
Jesse Barros (UnB), Carlos Llanos (UnB)  
Generating Optimized Multicore Accelerator Architectures.....24  
Alba Sandrya Bezerra Lopes (IFRN), Antonio Carlos Beck F. (UFRGS), Marcelo Brandalero  
(UFRGS), Monica Pereira (UFRN)  
On the Performance and Isolation of Asymmetric Microkernel Design for Lightweight Manycores.....32  
Pedro H Penna (UGA), João Souto (UFSC), Davidson F G Lima (PUC-MG), Márcio Castro (UFSC),  
François Broquedis (UGA), Henrique C Freitas (PUC-MG), Jean-François Méhaut (UGA)  
Communication Latency Evaluation on a Software-Defined Network-on-Chip.....40  
Raul Silveira Silva (UFRN), Patricia Cruz (UFRN), Márcio Kreutz (UFRN), Monica Pereira (UFRN)  
Anomaly Detection in Multicore Embedded Systems.....47  
José Luis Hoffmann (UFSC), Leonardo Passig Horstmann (UFSC), Antonio Augusto Frohlich (UFSC)  
On the influence of Data Migration in Dynamic Thread Management of Parallel Applications.....55  
Janaina Schwarzrock (UFRGS), Michael Jordan (UFRGS), Guilherme Korol (UFRGS), Charles  
Oliveira (UFRGS), Arthur Lorenzon (UniPampa), Antonio Carlos Beck F. (UFRGS)

### Session: Internet of Things, Mobile and Ubiquitous Computing

An Architecture for Delivering Graphical Web Applications in Constrained IoT Devices.....63  
Luiz Fernando Heidrich Duarte (UNIVALI), Cesar Zeferino (UNIVALI), Raimundo Teive (UNIVALI)  
A Deep Learning approach for Energy Disaggregation considering Embedded Devices.....71  
Eduardo Santos (UFAL), Cristopher Freitas (UFAL), Andre Aquino (UFAL)

### Session: Applications

Deep Learning applied to the Identification of Fruit Fly in Intelligent Traps.....79  
Valter Martins (UFPEL), Lucas Freitas (UFPEL), Lisane Brisolaro (UFPEL), Marilton Aguiar  
(UFPEL), Paulo Roberto Ferreira Jr (UFPEL)  
A Low Cost Hardware and Software Platform for Biomedical Signal Acquisition and Treatment.....87

Joao Victor Melquiades Satiro (ITP), Ianny Andrade Cruz (ITP), Fabio Prudente (IFS),  
Danyelle Santana (IFS), Edson Lisboa (IFS)

Evaluating the Effect of Audio Feedback on the Behavior of Automotive Fatigue and  
Distraction Detection System Users.....95

Ricardo Camara (UFOP), Mateus Silva (UFOP), Ricardo R. Oliveira (UFOP)

A Solution for Vegetation Analysis, Separation and Geo-location of Management Zones using  
Aerial Images by UAVs.....103

Suzane Santos (UFPB), Joanacelle Bandeira (UFPB), Renato Constantino (UFPB), Alisson Brito  
(UFPB)

Session: Scheduling and Schedulability Analysis

One-millisecond low-cost synchronization of wireless sensor network.....111

Robson Linhares, Carlos R E Lima, Douglas Renaux, Fabiana Pottker, Elder Oroski , Andre  
Lazzaretti, Bruna Mulinari, Hellen Ancelmo (UTFPR)

A Flexible Framework to Schedule Soft Aperiodic Tasks in Hard Real-Time Systems.....119

Flávia Nascimento (IFBA), George Lima (UFBA)

Improved task packing for shared resources in multiprocessor real-time systems scheduled by  
RUN under SBLP.....127

Ricardo Teixeira (UFBA), George Lima (UFBA)

Session: Security and Verification, Validation and Test of Systems

Applying Integrated Formal Methods on CPS Design.....135

Henrique Misson (UFSC), Fernando Gonçalves (IFSC), Leandro Buss Becker (UFSC)

Low-Cost, Practical Data Confidentiality Support for IoT Data Sources.....143

Viviane Tenório (UFCG), Leonardo Silva de Souza (UFCG), Maxwell Albuquerque (UFCG), Rodolfo  
Silva (UFCG), Matheus Silva (UFCG), Andrey Brito (UFCG)

Incremental Bounded Model Checking of Artificial Neural Networks in CUDA.....151

Luiz Henrique Sena (UFAM), Iury Bessa (UFAM), Lucas Cordeiro (University of Manchester),  
Edjard Mota (UFAM), Mikhail R. Gadelha (SIDIA)

A Multi-UAV Co-Simulation Environment for Safety and Performance Analysis.....159

Leydson Silva (UFPB), José de Sousa Barros (UFPB), Ewerton Salvador (UFPB), Vivek Nigam  
(UFPB), Alisson Brito (UFPB)

IoT Gateway Integrity Checking Protocol.....167

Mateus de Lucena (UFSC), Roberto Scheffel (UTFPR), Antonio Augusto Frohlich (UFSC)

Brazilian Mercosur License Plate Detection: a Deep Learning Approach Relying on Synthetic  
Imagery.....175

Vinicius Ribeiro (UFRN), Vitor Greati (UFRN), Aguinaldo Bezerra Batista Junior (UFRN),  
Gilles Silvano (UFRN), Ivanovitch Silva (UFRN), Patricia Endo (UPE), Theo Lynn (DCU)

Session: Fault Tolerance

An Empirical Exploratory Analysis of Failure Sequences in a Commodity Operating System.....183

Caio Augusto Rodrigues dos Santos (UFU), Rivalino Matias Jr. (UFU), Kishor Trivedi (Duke  
University)

A Resilient Interface for Approximate Data Access.....191

João Fabrício Filho (UTFPR), Isaias Felzmann (UNICAMP), Rodolfo Azevedo (UNICAMP), Lucas Wanner (UNICAMP)

Generation of Application Specific Fault Tolerant Irregular NoC Topologies Using Tabu Search.....199  
Gustavo Bezerra (UFRN), Patricia Cruz (UFRN), Monica Pereira (UFRN), Márcio Kreutz (UFRN)

Session: Development Methodologies, Languages, and Tools

MOSS based Methodology to Building an Operational System for MIPS Simulator.....207  
Silvio Fernandes (UFERSA), Leiva Oliveira (UFERSA), Antonio Costa (UFERSA)

A Linked Data-Based Semantic Information Model for Smart Cities.....214  
Bartira Rocha (UFRN), Everton Cavalcante (UFRN), Thais Vasconcelos Batista (UFRN), Jorge Pereira da Silva (UFRN)