

# **2023 Forum on Specification & Design Languages (FDL 2023)**

**Turin, Italy  
13-15 September 2023**



**IEEE Catalog Number: CFP2326E-POD  
ISBN: 979-8-3503-0738-2**

**Copyright © 2023 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:	CFP2326E-POD
ISBN (Print-On-Demand):	979-8-3503-0738-2
ISBN (Online):	979-8-3503-0737-5
ISSN:	1636-9874

**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



13-15 September 2023, Turin, Italy.

## Table of Contents

### RISC-V Simulation, Verification, and Optimization

- Minimally Invasive Generation of RISC-V Instruction Set Simulators from Formal ISA Models.....1  
Sören Tempel, Tobias Brandt, Christoph Lüth, Rolf Drechsler
- Identification of ISA-Level Mutation-Classes for Qualification of RISC-V Formal Verification.....9  
Milan Funck, Sallar Ahmadi-Pour, Vladimir Herdt, Rolf Drechsler
- Virtual Prototype driven Application Specific Hardware Optimization.....17  
Jan Zielasko, Rolf Drechsler

### Security and Machine Learning on the Edge

- PLINIO: A User-Friendly Library of Gradient-based Methods for Complexity-aware DNN Optimization.....25  
Daniele Jahier Pagliari, Matteo Rizzo, Beatrice Alessandra Motetti, Alessio Burrello
- WILD'n'CRAZY - Neuro-symbolic Empowered Denoising Diffusion Probabilistic Models for Real-time Anomaly Detection in Industry 4.0.....33  
Luigi Capogrosso, Alessio Mascolini, Federico Girella, Geri Skenderi, Sebastiano Gaiardelli, Nicola Dall'Ora, Francesco Ponzio, Enrico Fraccaroli, Santa Di Cataldo, Sara Vinco, Enrico Macii, Franco Fummi, Marco Cristani
- WILD'n'CRAZY - Secure Programming Platform for Edge-Based IoT.....37  
Hokeun Kim



13-15 September 2023, Turin, Italy.

## Compilation and Optimization

- A Flexible Graph Language for a Model-Based Semi-Automatic CGRA Compilation Flow.....41  
Felix Bösel, Jörg Walter
- Formal Methods Based Optimization of Data-Flow Models With Translation Into Synchronous Models.....49  
Marcel Christian Werner, Klaus Schneider
- Enhancing Compiler-Driven HDL Design with Automatic Waveform Analysis.....57  
Frans Skarman, Lucas Klemmer, Oscar Gustafsson, Daniel Grosse

## Designing, Modeling, and Analyzing Instructions and Hardware

- Instruction-Level Modeling and Evaluation of a Cache-less Grid of Processing Cells.....65  
Vivek Govindasamy, Rainer Doemer
- Bifröst: Creating Hardware With Building Blocks.....73  
Jeremy Pope, Carl-Johan Seger
- Hybrid PTX Analysis for GPU accelerated CNN inferencing aiding Computer Architecture Design.....81  
Christopher A. Metz, Christina Plump, Bernhard J. Berger, Rolf Drechsler

## Project Dissemination

- VIR2EM: VIRTualization and Remotization for Resilient and Efficient Manufacturing.....89  
Alessandro Beghi, Nicola Dall'Ora, Davide Dalle Pezze, Franco Fummi, Chiara Masiero, Stefano Spellini, Gian Antonio Susto, Francesco Tosoni
- Satellite Payload Design for Optimized Thermal Management using a Distributed Processor System.....97  
Markus Plattner, Philipp Radecker