

**2023 IEEE/ACM 27th
International Symposium on
Distributed Simulation and Real
Time Applications (DS-RT 2023)**

**Singapore
4-5 October 2023**



**IEEE Catalog Number: CFP23186-POD
ISBN: 979-8-3503-3785-3**

**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:	CFP23186-POD
ISBN (Print-On-Demand):	979-8-3503-3785-3
ISBN (Online):	979-8-3503-3784-6
ISSN:	1550-6525

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

2023 IEEE/ACM 27th International Symposium on Distributed Simulation and Real Time Applications (DS-RT) **DS-RT 2023**

Table of Contents

Message from the Chairs	viii
Organizing Committee	ix
Program Committee	x
Steering Committee	xi
Sponsors	xii

Full Papers

TILDE: Topic-Tracking Infrastructure for Dynamic Message Latency and Deadline Evaluator for ROS 2 Application	1
<i>Xuankeng He (Saitama University, Japan), Hiromi Sato (Saitama University, Japan), Yoshikazu Okumura (Research Institute of Systems Planning, Inc), and Takuya Azumi (Saitama University, Japan)</i>	
Optimizing the Response Time for ROS Tasks in Multi-Core Processors	10
<i>Sunho Kim (Seoul National University, Korea), Hajeon Park (Seoul National University, Korea), and Chang-Gun Lee (Seoul National University, Korea)</i>	
Estimation of Deadline Miss Rate for DAG Mixed Timer-Driven and Event-Driven Nodes	20
<i>Daichi Yamazaki (Saitama University, Japan) and Takuya Azumi (Saitama University, Japan)</i>	
Benefits of Optimistic Parallel Discrete Event Simulation for Network-on-Chip Simulation	30
<i>Maximilian Bremer (Lawrence Berkeley National Laboratory, USA), Nirmalendu Patra (Lawrence Berkeley National Laboratory, USA), Tan Nguyen (Lawrence Berkeley National Laboratory, USA), Dilip Vasudevan (Lawrence Berkeley National Laboratory, USA), and Cy Chan (Lawrence Berkeley National Laboratory, USA)</i>	

Incremental Checkpointing of Large State Simulation Models with Write-Intensive Events via Memory Update Correlation on Buddy Pages	40
<i>Romolo Marotta (Tor Vergata University of Rome; Centro Nazionale di Ricerca in High Performance Computing, Big Data e Quantum Computing), Federica Montesano (Tor Vergata University of Rome), Alessandro Pellegrini (Tor Vergata University of Rome), and Francesco Quaglia (Tor Vergata University of Rome; Centro Nazionale di Ricerca in High Performance Computing, Big Data e Quantum Computing)</i>	
Design Patterns for Multilevel Modeling and Simulation	48
<i>Luca Serena (University of Bologna, Italy), Moreno Marzolla (University of Bologna, Italy), Gabriele D'Angelo (University of Bologna, Italy), and Stefano Ferretti (University of Urbino Carlo Bo, Italy)</i>	
Exploring Server-Centric Scalability for Social VR	56
<i>Sebastian Friston (University College London, UK), Otto Olkkonen (University College London, UK), Ben Congdon (University College London, UK), and Anthony Steed (University College London, UK)</i>	
Opinion Formation Forecasts in Social Networks A Graph Convolutional Neural Network Approach	66
<i>Lizhen Ou (National University of Defense Technology, China), Yiping Yao (National University of Defense Technology, China), Wenjie Tang (National University of Defense Technology, China), Haozhe Yuan (National University of Defense Technology, China), and Li-li Chen (Artificial Intelligence Research Center, National Innovation Institute of Defense, China)</i>	
Practical Tie-Breaking for Parallel/Distributed Simulations	74
<i>Andrea Piccione (Huawei Munich Research Center) and Alessandro Pellegrini (Tor Vergata University of Rome)</i>	
Real-Time Simulation Framework with Traffic Incident Prediction: A Singapore Case Study	84
<i>Muhammad Shalihin Othman (National University of Singapore, Singapore), Remya K. Padinjarapat (National University of Singapore, Singapore), Chengxin Wang (National University of Singapore, Singapore), Nimal R. Arunachalam (National University of Singapore, Singapore), and Gary Tan (National University of Singapore, Singapore)</i>	
Integrating Parallel, Tensor-Based Computing in Agent-Based Simulators	91
<i>Nikitas M. Sgouros (University of Piraeus, Greece)</i>	

Short Papers

An Efficient Algorithm for Clustering Sets	97
<i>Libero Nigro (University of Calabria, Italy) and Franco Cicirelli (CNR - National Research Council of Italy - Institute for High Performance Computing and Networking (ICAR), Italy)</i>	
DAG Scheduling for Clustered Many-Core Processor Considering Execution-Time-Reduction Effectiveness	101
<i>Yutaro Nozaki (Saitama University, Japan) and Takuya Azumi (Saitama University, Japan)</i>	

Distributed Dynamic Data Driven Simulations: Basic Idea and an Illustration Example	105
<i>Xu Xie (National University of Defense Technology, China) and Kai Xu (National University of Defense Technology, China)</i>	

Doctoral Colloquium

Spatio-Temporal Forecasting for Traffic Simulation Framework	109
<i>Chengxin Wang (National University of Singapore) and Gary Tan (National University of Singapore)</i>	

Methodological Aspects of Multilevel Modeling and Simulation	111
<i>Luca Serena (University of Bologna, Italy)</i>	

Dynamic Blockchain Reconfiguration: Balancing the Trilemma Trade-off Using Digital Twins	113
<i>Georgios Diamantopoulos (University of Birmingham, UK), Nikos Tziritas (University of Thessaly, Greece), Rami Bahsoon (University of Birmingham, UK), and Georgios Theodoropoulos (Southern University of Science and Technology, China)</i>	

Federated Digital Twin	115
<i>Christian Vergara (University of Birmingham, UK), Rami Bahsoon (University of Birmingham, UK), Georgios Theodoropoulos (Southern University of Science and Technology, China), Wendy Yanez (University of Birmingham, UK), and Nikos Tziritas (University of Thessaly, Greece)</i>	

Multi-Agent Reinforcement Learning for Improving Supply Chain Visibility in Inventory Management	117
<i>Bo Zhang (Nanyang Technological University, Singapore), Wen Jun Tan (Nanyang Technological University, Singapore), Wentong Cai (Nanyang Technological University, Singapore), and Allan N Zhang (Singapore Institute of Manufacturing Technology, Singapore)</i>	

Author Index	119
---------------------------	------------