## 22nd International Conference on Modeling and Applied Simulation (MAS 2023)

Held at the 20th International Multidisciplinary Modeling and Simulation Multiconference (I3M 2023)

Athens, Greece 18-20 September 2023

**Editors**:

Agostino G. Bruzzone Fabio De Felice Marina Massei Francesco Longo Adriano O. Solis

ISBN: 978-1-7138-8023-3

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 4.0 International License. License details: http://creativecommons.org/licenses/by-nc-nd/4.0/.

No changes have been made to the content of these proceedings. There may be changes to pagination, and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact CAL-TEK S.r.l. at the address below.

CAL-TEK S.r.l. Via Umberto Nobile 80 87036 Rende (CS) Italy

Phone: +39 333 7042 612 Fax: +39 0984 937849

info@cal-tek.eu

## 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 Email: curran@proceedings.com Web: www.proceedings.com

## <u>Index</u>

Exploring multi-modelling approaches in Hamburg, Germany's evolving digital urban twin infrastructure Rico Herzog		1
A simulation model to promote digital transition in the manufacturing context Fabio De Felice, Cristina De Luca, Anaiz Gul Fareed, Ilaria Baffo, Antonella Petrillo		10
Identifying Energy Efficiency Patterns in Sorting Algorithms via Abstract Syntax Tree Mining Oliver Krauss, Andreas Schuler		18
Determination of an optimal inventory system, and safety factor, in a MSME, through Monte Carlo simulation Miguel Angel Andoaga-Mejia, Susana Casy Téllez-Ballesteros and Hilda Reyna Solis- Vivanco		28
Combining TAPAS and SUMO towards crises management based on traffic data María López Díaz and Andrea Tundis		37
Simulation modelling for integrating economic and environmental performance assessment for autonomous delivery systems in last mile logistics Lorenzo Rubrichi, Maria Grazia Gnoni and Fabiana Tornese		45
Towards an advanced work packaging simulation-based approach for industrial construction projects Mohamed Elmenshawy, Rana Ead, Ulrich Hermann (Rick), Stephen Hague and Simaan Abourizk		54
<b>Dental Clinic Inventory Management with Monte Carlo Simulation</b> Nathaly Rojas González, César Eduardo Ortiz Ortiz, Jorge Antonio Velasco Peredo, Alitzel Anaid Gutiérrez Ramos and Ricardo Torres Mendoza		62
Simulation the customer service capacity in a dental clinic Alfredo Gomez O, Oriana Juan A, Georgi Tsvetanov, Laura Muñoz R and Ricardo Torres		75
A Framework for the Simulation-Based Selection of Social Models for Socio-Technical Models of Infrastructures Using Technical Requirements Analysis Bernhard Jonathan Sattler, Jannik Stadler, Andrea Tundis, John Friesen and Peter F. Pelz		86
Mobility simulation in Hamburg considering various capacities for the Elbe Tunnel Abtin Nourmohammadzadeh, Stefan Voß and Jingjing Yu		94
Pythagorean triples for linear approximations of probabilistic production streams Ivo Formánek, David Kruml, Jan Paseka and Jan Šťovíček		104
Modeling, Simulation and Intelligent Algorithms For Solving The Machine-Loading Problem: A Literature Review Giorgia Casella, Eleonora Bottani, Teresa Murino and Federico Solari		112
Designing a Digital Twin Prototype for an Addiction Treatments Clinic Yasmina Maïzi, Arcand Antoine and Ygal Bendavid		120
Simultaneous occurrence of intermittent and incipient faults Wolfgang Borutzky		128
Modeling the aeroacoustic noise of large wind energy systems for sound damping		136
Proc. of the Int. Conference on Modeling and Applied Simulation 2023	XI	

## control purposes

Andrea Rivarola and Adrian Gambier

Strategic Engineering: Transforming P&ID Documents into Digital Twins via Machine Learning and Cloud Computing Agostino G. Bruzzone, Antonio Giovannetti, Giacomo Genta, Dimos Kapetis	144
<b>Data Analytics and Machine Learning for Very Large Oil&amp;Gas Projects</b> Agostino G. Bruzzone, Marco Gotelli, Antonio Giovannetti, Edoardo Costa, Pietro Perlo, Filippo Monaci, Luca Pelizzoni	150
Innovative Machine Learning Solutions for Credit Classification of Commercial & Agricultural Vehicle Contracts Agostino G. Bruzzone, Michele Arduini, Francesco Pandolfelli, Letizia Monti, Federico Mini	156
Autonomous System Digital Twin to test Machine Vision Agostino G. Bruzzone, Marina Massei, Kirill Sinelshchikov, Marco Gotelli, Antonio Giovannetti, Alberto De Paoli, Roberto Ferrari, Bharath Gadupuri, Javier Pernas	162
Innovating Material Handling by Unmanned Technology in Logistics: Opportunities and Strategies Agostino G. Bruzzone, Kirill Sinelshchikov, Marco Gotelli, Daniele Cefaliello	167
Simulation-Driven Analyses of Performance of PCB Assembly Operations: A Case Study Karen A. Manfredi, Antonio Nervoso, Adriano O. Solis, and Francesco Longo	173
Synergistic Fusion of Simulation and Virtual Reality: A new proposed Approach for Collaborative Integration Joseph Jabbour, Jalal Possik, Charles Yaacoub, Adriano O. Solis, Danny Kieken, Thierry Sobanski and Gregory Zacharewicz	182