2019 Winter Simulation Conference (WSC 2019)

National Harbor, Maryland, USA
8 – 11 December 2019

Pages 1-785

IEEE Catalog Number: CFP19WSC-POD
ISBN: 978-1-7281-2052-2

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:	CFP19WSC-POD
ISBN (Print-On-Demand):	978-1-7281-2052-2
ISBN (Online):	978-1-7281-3283-9
ISSN:	0891-7736

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

TABLE OF CONTENTS

SIMULATION TRUST AND THE INTERNET OF THINGS 2
Margaret L. Loper

TUTORIAL ON THE ENGINEERING PRINCIPLES OF COMBAT MODELING AND DISTRIBUTED SIMULATION 18
Andreas Tolk

TUTORIAL ON MEANS OF HYBRID SIMULATION 33
Tillal Eldabi ; Antuela A. Tako ; David Bell ; Andreas Tolk

BUILDING DEVS MODELS WITH THE CADMIUM TOOL 45
Laouen Belloli ; Damian Vicino ; Cristina Ruiz-Martin ; Gabriel Wainer

TOWARDS ADAPTIVE ENTERPRISES USING DIGITAL TWINS 60
Vinay Kulkarni ; Souvik Barat ; Tony Clark

MODEL-DRIVEN DISTRIBUTED SIMULATION ENGINEERING 75
Paolo Bocciarelli ; Andrea D'Ambrogio ; Andrea Giglio ; Emiliano Paglia

ENTERPRISE OPERATING SYSTEM (EOS) IN ACTION: DISTRIBUTED SIMULATION OF ENTERPRISE ACTIVITIES AND OPERATIONS 90
Joseph Youssef ; Gregory Zacharewicz

ADVANCED TUTORIAL: NETWORKING SIMULATIONS ACROSS PLATFORMS AND ENTERPRISES WITH VIRTUAL SIPS 105
Sam L Savage ; Shaun Doheney ; Colin Smith

CLINICAL TRIAL SIMULATION: MODELING AND PRACTICAL CONSIDERATIONS 118
Anh Ninh ; Michael Lefew ; Vladimir Anisimov

SIMULATION OF REAL-TIME AND OPPORTUNISTIC TRUCK PLATOONING AT THE PORT OF ROTTERDAM 133
Berry Gerrits ; Martijn Mes ; Peter Schuur

STATIC ZONING DIVISION ELEVATOR TRAFFIC SIMULATION USING AGENT-BASED MODELING 145
Angelika C. Batosalem ; Janelle Marie B. Gaba ; Jan Bertel O. Ngo ; Jonal Ray G. Ticug ; Courtney Anne M. Ngo

AN ACTOR BASED SIMULATION DRIVEN DIGITAL TWIN FOR ANALYZING COMPLEX BUSINESS SYSTEMS 157
Souvik Barat ; Vinay Kulkarni ; Tony Clark ; Balbir Barn

ON THE MODELING AND AGENT-BASED SIMULATION OF A COOPERATIVE GROUP ANAGRAM GAME 169
Zhihao Hu ; Xinwei Deng ; Brian J. Goode ; Naren Ramakrishnan ; Parang Saraf ; Nathan Self ; Abhijin Adiga ; Gizem Korkmaz ; Chris J. Kuhlman ; Dustin Machi ; Madhav V. Marathe ; S. S. Ravi ; Yihui Ren ; Vanessa Cedeno-Mieles ; Saliya Ekanayake

A SIMULATION ANALYSIS OF LARGE CONTESTS WITH THRESHOLDING AGENTS 181
Wen Shen ; Rohan Achar ; Cristina V. Lopes

FLASH CRASHES IN MULTI-AGENT SYSTEMS USING MINORITY GAMES AND REINFORCEMENT LEARNING TO TEST AI SAFETY 193
Lorenzo Barberis Canonico ; Nathan McNeese

ON CALIBRATING A MICROSIMULATION OF PATIENT MOVEMENT THROUGH A HEALTHCARE NETWORK 205
Kasey Jones ; Breda Munoz ; James Rineer ; Georgiy Bobashev ; Rainer Hilscher ; Sarah Rhea

DISEASE SPREAD SIMULATION TO ASSESS THE RISK OF EPIDEMICS DURING THE GLOBAL MASS GATHERING OF HAJJ PILGRIMAGE 215
Sultanah M. Alshammari ; Harsha Gwalani ; Joseph E. Helsing ; Armin R. Mikler

WHO GOES THERE? USING AN AGENT-BASED SIMULATION FOR TRACKING POPULATION MOVEMENT 227
Jordan Lueck ; Jason H. Rife ; Samarth Swarup ; Nasim Uddin

VALIDATION AND EVALUATION OF EMERGENCY RESPONSE PLANS THROUGH AGENT-BASED MODELING AND SIMULATION 239
Joseph E. Helsing ; Harsha Gwalani ; Armin R. Mikler ; Sultanah M. Alshammari

SEA BRIGHT, NEW JERSEY RECONSTRUCTED: AGENT-BASED PROTECTION THEORY MODEL RESPONSES TO HURRICANE SANDY 251
Kim McEligot ; Peggy Brouse ; Andrew Crooks

SIMULATION OF KNIFE ATTACK AND GUN ATTACK ON UNIVERSITY CAMPUS USING AGENT-BASED MODEL AND GIS 263
Jing Yang Sunny Xi ; Wai Kin Victor Chan
CREDIBLE AGENT-BASED SIMULATION – AN ILLUSION OR ONLY A STEP AWAY? 273
Bhakti Stephan Onggo ; Levent Yilmaz ; Franziska Klügl ; Takao Terano ; Charles M. Macal
ON THE EXTENSION OF SCHELLING'S SEGREGATION MODEL 285
Zeyu Liu ; Xueping Li ; Anahita Khojandi ; Sanja Lazarova-Molnar
TOWARDS MODELLING THE EFFECT OF EVOLVING VIOLENCE ON FORCED MIGRATION 297
Derek Groen ; David Bell ; Hamid Arabnejad ; Diana Suleimenova ; Simon J. E. Taylor ; Anastasia Anagnostou
SERVICE DESIGN SIMULATION USING FINE GRAINED AGENTS 308
Rishi Bubna ; Vivek Balaraman ; Suman Kumar ; Sylvan Lobo
RANDOM PERTURBATION AND BAGGING TO QUANTIFY INPUT UNCERTAINTY 320
Henry Lam ; Huajie Qian
THE ASYMPTOTIC VALIDITY OF SEQUENTIAL STOPPING RULES FOR CONFIDENCE INTERVAL CONSTRUCTION USING STANDARDIZED TIME SERIES 332
Jing Dong ; Peter W. Glynn
ON THE STABILITY OF KERNELIZED CONTROL FUNCTIONALS ON PARTIAL AND BIASED STOCHASTIC INPUTS 344
Henry Lam ; Haofeng Zhang
A SPLINE-BASED METHOD FOR MODELLING AND GENERATING A NONHOMOGENEOUS POISSON PROCESS 356
Lucy E. Morgan ; Barry L. Nelson ; Andrew C. Titman ; David J. Worthington
MISE-OPTIMAL INTERVALS FOR MNO–PQRS ESTIMATORS OF POISSON RATE FUNCTIONS 368
Huifen Chen ; Bruce W. Schmeiser
DISTRIBUTED VARIATIONAL INFERENCE-BASED HETEROSCEDASTIC GAUSSIAN PROCESS METAMODELING 380
Wenjing Wang ; Xi Chen
MINIMAX EFFICIENT FINITE-DIFFERENCE GRADIENT ESTIMATORS 392
Henry Lam ; Xuhui Zhang
UNBIASED ESTIMATION OF THE RECIPROCAL MEAN FOR NON-NEGATIVE RANDOM VARIABLES 404
Sarat Babu Moka ; Dirk P. Kroese ; Sandeep Juneja
EFFICIENT ESTIMATION OF THE MEAN HITTING TIME TO A SET OF A REGENERATIVE SYSTEM 416
Marvin K. Nakayama ; Bruno Tuffin
RANDOMIZED QUASI-MONTE CARLO FOR QUANTILE ESTIMATION 428
Zachary T. Kaplan ; Yajuan Li ; Marvin K. Nakayama ; Bruno Tuffin
ARRAY-RQMC FOR OPTION PRICING UNDER STOCHASTIC VOLATILITY MODELS 440
Amal Ben Abdellah ; Pierre L'Ecuyer ; Florian Puchhammer
METAMODEL-BASED QUANTILE ESTIMATION FOR HEDGING CONTROL OF MANUFACTURING SYSTEMS 452
Giulia Pedrielli ; Russell R. Barton
BUS FLEET SIZE DIMENSIONING IN AN INTERNATIONAL AIRPORT USING DISCRETE EVENT SIMULATION 464
Eduardo Carbajal López ; François Marmier ; Franck Fontanili
SYSTEM DYNAMICS FOR ESTIMATING SUAS OPERATIONS 476
Stephanie Glasser ; Catherine King
STTAR: A SIMHEURISTICS-ENABLED SCHEME FOR MULTI-STAKEHOLDER COORDINATION OF AIRCRAFT TURNAROUND OPERATIONS 488
Maurizio Tomasella ; Alexandra Clare ; Yagmur S. Gök ; Daniel Guimarans ; Cemalettin Ozturk
CLASSIFICATION OF WEATHER IMPACTS ON AIRPORT OPERATIONS 500
Michael Schultz ; Stefan Reitmann ; Sameer Alam
A GENERIC FRAMEWORK FOR MODELING AIRPORT OPERATIONS AT A MACROSCOPIC LEVEL 512
Paolo Scala ; Miguel Mujica ; Daniel Delahaye ; Ji Ma
AIRPORT PASSENGER SHOPPING MODELING AND SIMULATION: TARGETING DISTANCE IMPACTS 524
Yimeng Chen ; Cheng-Lung Wu ; Pong Lung Lau ; Nga Yung Agnes Tang ; Ngai Ki Ma ; Yi-Shih Chung
SIMULATING MULTIFRACTAL SIGNALS FOR RISK ASSESSMENT 536
Damon Frezza ; James Thompson ; David Slater ; Garry Jacyna

REAL-TIME SUPPLY CHAIN SIMULATION: A BIG DATA-DRIVEN APPROACH 548
António A. C. Vieira ; Luís M. S. Dias ; Maribel Y. Santos ; Guilherme A. B. Pereira ; José A. Oliveira
AGENT-BASED MODEL CHARACTERIZATION USING NATURAL LANGUAGE PROCESSING 560
Jose J Padilla ; David Shuttleworth ; Kevin O'Brien
SOLVING CHALLENGES AT THE INTERFACE OF SIMULATION AND BIG DATA USING MACHINE LEARNING 572
Philippe J. Giabbanelli
GENERATIVE ADVERSARIAL NETWORK FOR IMPROVING DEEP LEARNING BASED MALWARE CLASSIFICATION 584
Yan Lu ; Jiang Li
DATA-DRIVEN MODELING AND SIMULATION OF DAILY ACTIVITY PATTERNS OF ELDERLIES LIVING IN A SMART HOME 594
Cyriac Azefack ; Raksmey Phan ; Vincent Augusto ; Xiaolan Xie ; Guillaume Gardin ; Claude Montuy Coquard ; Remi Bouvier
LEARNING TO FORGET: DESIGN OF EXPERIMENTS FOR LINE-BASED BAYESIAN OPTIMIZATION IN DYNAMIC ENVIRONMENTS 656
Jens Jocqué ; Tom Van Steenkiste ; Pieter Stroobant ; Rémi Delanghe ; Dirk Deschrijver ; Tom Dhaene
IMPACTS OF BEHAVIORAL MODELING ASSUMPTIONS FOR COMPLEX ADAPTIVE SYSTEMS: AN EVALUATION OF AN ONLINE DATING MODEL 668
Andrew J. Turner ; Jennifer Kuczynski
TASK SELECTION BY AUTONOMOUS MOBILE ROBOTS IN A WAREHOUSE USING DEEP REINFORCEMENT LEARNING 680
Maojia P. Li ; Prashant Sankaran ; Michael E. Kuhl ; Raymond Ptucha ; Amlan Ganguly ; Andres Kwasinski
COMMUNICATION COLLECTIVE: AN ADAPTIVE MULTIAGENT COMMUNICATION PLATFORM 690
Alexis Pflaum ; Claudia Szabo ; Andrew Coyle
HARNESSING CONCURRENCY IN SYNCHRONOUS BLOCK DIAGRAMS TO PARALLELIZE SIMULATION ON MULTI-CORE HOSTS 702
Andreas Naderlinger
REDUCING RISKS DURING NATURAL DISASTERS WITH OPTIMAL RESOURCE ALLOCATION BY MULTI-AGENT OPTIMIZATION 714
Alina Vereshchaka ; Nathan Margaglio ; Wen Dong
SIMULATION FOR CYBER RISK MANAGEMENT – WHERE ARE WE, AND WHERE DO WE WANT TO GO? 726
Sachin Shetty ; Indrajit Ray ; Nurcin Ceilk ; Michael Mesham ; Nathaniel Bastian ; Quanyan Zhu
SOLVING THE ARMY'S CYBER WORKFORCE PLANNING PROBLEM USING STOCHASTIC OPTIMIZATION AND DISCRETE-EVENT SIMULATION MODELING 738
Nathaniel D. Bastian ; Christopher B. Fisher ; Andrew O. Hall ; Brian J. Lunday
AGENT BASED SIMULATION OF BOT DISINFORMATION MANEUVERS IN TWITTER 750
David M. Beskow ; Kathleen M. Carley
A STUDY OF LIGHTWEIGHT DDDAS ARCHITECTURE FOR REAL-TIME PUBLIC SAFETY APPLICATIONS THROUGH HYBRID SIMULATION 762
Erik Blasch ; Ronghua Xu ; Seyed Yahya Nikouei ; Yu Chen
DISCRETE EVENT SIMULATION OF CYBER MAINTENANCE POLICIES ACCORDING TO NESTED BIRTH AND DEATH PROCESSES 774
Akshay Krishna Murali ; Enhao Liu ; Theodore T. Allen
SIMULATION BASED EVALUATION AND TUNING OF DISTRIBUTED FRAUD DETECTION ALGORITHM 786
Janis Grabis ; Arturs Rasnacis
SIMULATION-BASED BLOCKCHAIN DESIGN TO SECURE BIOPHARMACEUTICAL SUPPLY CHAIN 797
Wei Xie ; Bo Wang ; Zehao Ye ; Wencen Wu ; Jie You ; Qi Zhou
AN OPTIMIZATION VIA AGENT-BASED SIMULATION FRAMEWORK TO INTEGRATE STOCHASTIC PROGRAMMING WITH HUMAN INTRODUCED UNCERTAINTY 809
Mohammad Ramshani ; Xueping Li ; Anahita Khojandi ; Lorna Treffert
A SIMULATION FRAMEWORK FOR THE REBALANCING AND MAINTENANCE OF BICYCLE-SHARING SYSTEMS 819
Yu Jin ; Cesar Ruiz ; Haitao Liao ; Harry Pierson
THE IMPACT OF GEOGRAPHIC SCALE ON IDENTIFYING DIFFERENT SOCIAL MEDIA BEHAVIOR EXTREMES IN CRISIS RESEARCH 830
Rachel Samuels ; John E. Taylor

EVALUATING THE PERFORMANCE OF MAINTENANCE STRATEGIES: A SIMULATION-BASED APPROACH FOR WIND TURBINES 842
Clemens Gutschi ; Nikolaus Furian ; Siegfried Voessner ; Moritz Graefe ; Athanasios Kolios
AN AGENT-BASED MODEL OF SURPLUS FOOD RESCUE USING CROWD-SHIPPING 854
Anuj Mittal ; Nilufer Oran Gibson ; Caroline C. Krejci
AVOIDING "DAY-ZERO": A TESTBED FOR EVALUATING INTEGRATED FOOD-ENERGY-WATER MANAGEMENT IN CAPE TOWN, SOUTH AFRICA 866
Ke Ding ; Jonathan M. Gilligan ; George M. Hornberger
LIMITING DISTRIBUTIONAL FIXED POINTS IN SYSTEMIC RISK GRAPH MODELS 878
Anand Deo ; Sandeep Juneja
UNBIASED SIMULATION ESTIMATORS FOR JUMP-DIFFUSIONS 890
Guanting Chen ; Alexander Shkolnik ; Kay Giesecke
ON THE ALMOST SURE CONVERGENCE RATE FOR A SERIES EXPANSION OF FRACTIONAL BROWNIAN MOTION 902
Yi Chen ; Jing Dong
AN UPPER CONFIDENCE BOUND APPROACH TO ESTIMATING COHERENT RISK MEASURES 914
Guangwu Liu ; Wen Shi ; Kun Zhang
PORTFOLIO OPTIMIZATION WITH EXPECTILE AND OMEGA FUNCTIONS 926
Alexander Wagner ; Stan Uryasev
EFFICIENT NESTED SIMULATION OF TAIL RISK MEASURES 938
Jessica O. Dang ; Ben M. Feng ; Mary R. Hardy
ON THE IMPACTS OF TAIL MODEL UNCERTAINTY IN RARE-EVENT ESTIMATION 950
Zhiyuan Huang ; Henry Lam
ESTIMATING QUANTILE SENSITIVITY FOR FINANCIAL MODELS WITH CORRELATIONS AND JUMPS 962
Yijie Peng ; Michael C. Fu ; Jian-Qiang Hu ; Lei Lei
HETEROGENEOUS ASSETS MARKET DESIGN 974
Yu An ; Zeyu Zheng
AN AGENT-BASED MODEL OF HEPATITIS C VIRUS TRANSMISSION DYNAMICS IN INDIA 984
Soham Das ; Diptangshu Sen ; Varun Ramamohan ; Ajit Sood
A SYSTEM APPROACH TO STUDY WAITING TIMES AT EMERGENCY DEPARTMENTS IN METROPOLITAN ENVIRONMENTS 996
Elhabib Moustaid ; Sebastiaan Meijer
MULTI-OBJECTIVE MODEL EXPLORATION OF HEPATITIS C ELIMINATION IN AN AGENT-BASED MODEL OF PEOPLE WHO INJECT DRUGS 1008
Eric Tatara ; Nicholson T. Collier ; Jonathan Ozik ; Alexander Gutfraind ; Scott J. Cotler ; Harel Dahari ; Marian Major ; Basmattee Boodram
A SIMULATION MODEL TO EVALUATE THE IMPLICATIONS OF GENETIC TESTING IN CHOLESTEROL TREATMENT PLANS 1020
Wesley J. Marrero ; Mariel S. Lavieri ; Jeremy B. Sussman
SEQUENTIAL, VALUE-BASED DESIGNS FOR CERTAIN CLINICAL TRIALS WITH MULTIPLE ARMS HAVING CORRELATED REWARDS 1032
Stephen E. Chick ; Noah Gans ; Ozge Yapar
THE EFFECT OF THE DISTRIBUTION OF THE INVERSE GROWTH RATE ON PANCREATIC CANCER PROGRESSION 1044
Lena Abu-El-Haija ; Julie S. Ivy ; Osman Ozaltin ; Walter Park
SENSITIVITY ANALYSIS OF POLICY OPTIONS FOR URBAN MENTAL HEALTH USING SYSTEM DYNAMICS AND FUZZY COGNITIVE MAPS 1055
Elhabib Moustaid ; Maksims Kornevs ; Sebastiaan Meijer
BUILDING GLOBAL RESEARCH CAPACITY IN PUBLIC HEALTH: THE CASE OF A SCIENCE GATEWAY FOR PHYSICAL ACTIVITY LIFELONG MODELLING AND SIMULATION 1067
Anastasia Anagnostou ; Simon J. E. Taylor ; Derek Groen ; Diana Suleimenova ; Nana Anokye ; Riccardo Bruno ; Roberto Barbera
A NEW SIMULATION MODEL FOR KIDNEY TRANSPLANTATION IN THE UNITED STATES 1079
Burhaneddin Sandikçi ; Sait Tunç ; Bekir Tanriover
A HYBRID PROCESS MINING FRAMEWORK FOR AUTOMATED SIMULATION MODELLING FOR HEALTHCARE 1091
Mohammed Mesabbah ; Waleed Abo-Hamad ; Susan McKeever
MIXED-MODE PANDEMIC MODELING 1103
Peter Bosch

COMBINING SIMULATION TECHNIQUES TO UNDERSTAND DEMOGRAPHIC DYNAMICS AND FORECAST HOSPITAL DEMANDS 1114
Bozena Mielczarek

PATIENT CARE MANAGEMENT FOR PHYSICIANS: REDUCING HANDOFFS IN THE ED 1126
Vishnunarayan Girishan Prabhu ; Kevin Taaffe ; Ronald Pirrallo

EVALUATING AN EMERGENCY DEPARTMENT CARE REDESIGN: A SIMULATION APPROACH 1137
Breanna Swan ; Osman Ozaltin ; Sonja Hilburn ; Elizabeth Gignac ; George McCammon

THE ACTIVITY-ENTITY-IMPACT METHOD: UNDERSTANDING BOTTLENECK BEHAVIOR OF SIMULATION MODELS DEMONSTRATED BY AN EMERGENCY DEPARTMENT MODEL 1148
Nikolaus Furian ; Clemens Gutschi ; Dietmar Neubacher ; Cameron Walker ; Michael O'Sullivan

SIMULATION SOLUTION VALIDATION FOR AN INTEGRATED EMERGENCY POST 1160
Martijn R. K. Mes ; Martijn Koot

CLINICAL PATHWAY ANALYSIS USING PROCESS MINING AND DISCRETE-EVENT SIMULATION: AN APPLICATION TO INCISIONAL HERNIA 1172
Raksmey Phan ; Vincent Augusto ; Damien Martin ; Marianne Sarazin

APPLICATION OF DISCRETE-EVENT SIMULATION FOR PLANNING AND OPERATIONS ISSUES IN MENTAL HEALTHCARE 1184
Sheema Noorain ; Kathy Kotiadis ; Maria Paola Scaparra

A MANAGEMENT FLIGHT SIMULATOR OF AN INTENSIVE CARE UNIT 1196
Daniel Garcia-Vicuña ; Fermin Mallor ; Laida Esparza ; Pedro Mateo

A HYBRID MODELLING APPROACH USING FORECASTING AND REAL-TIME SIMULATION TO PREVENT EMERGENCY DEPARTMENT OVERCROWDING 1208
Alison Harper ; Navonil Mustafee

EVALUATING COMMUNITY-BASED INTEGRATED HEALTH AND SOCIAL CARE SERVICES: THE SIMTEGR8 APPROACH 1220
Antuela A. Tako ; Stewart Robinson ; Anastasia Gogi ; Zoe Radnor ; Cheryl Davenport

USING SIMULATION TO EVALUATE PROVIDER SCHEDULING HEURISTICS IN SPECIALTY OUTPATIENT CLINICS 1232
Bjorn Berg ; Ashleigh Vandenbrink

USING DISCRETE-EVENT SIMULATION TO FIND WAYS TO REDUCE PATIENT WAIT TIME IN A GLAUCOMA CLINIC 1243
Junhong Guo ; Trevor Hoffman ; Amy Cohn ; Leslie Niziol ; Paula Anne Newman-Casey

ASSESSMENT OF THE IMPACT OF TELEDERMATOLOGY USING DISCRETE EVENT SIMULATION 1255
Afafe Zehrouni ; Vincent Augusto ; Xiaolan Xie ; Tu-Anh Duong

PANEL - TOWARDS CONCEPTUAL MODELING FOR HYBRID SIMULATION: SETTING THE SCENE 1267
Antuela A. Tako ; Tillal Eldabi ; Paul Fishwick ; Caroline C. Krejci ; Martin Kunc

STRATEGIC PLANNING: THE ROLE OF HYBRID MODELLING 1280
Martin Kunc

THE INTERSECTION OF AGENT BASED MODELS AND FUZZY COGNITIVE MAPS: A REVIEW OF AN EMERGING HYBRID MODELING PRACTICE 1292
Christopher W. H. Davis ; Philippe J. Giabbanelli ; Antonie J. Jetter

ENGAGING STAKEHOLDERS TO EXTEND THE LIFECYCLE OF HYBRID SIMULATION MODELS 1304
William Jones ; Kathy Kotiadis ; Jesse O'Hanley

BROADENING PARTICIPATION IN MODELLING 1316
Paul Fishwick ; Navonil Mustafee

COMBINING SIMULATION WITH A BIASED-RANDOMIZED HEURISTIC TO DEVELOP PARAMETRIC BONDS FOR INSURANCE COVERAGE AGAINST EARTHQUAKES 1328
Christopher Bayliss ; Alejandro Estrada-Moreno ; Angel A. Juan ; Guillermo Franco ; Roberto Guidotti

USE OF A COMBINED DISCRETE RATE AND POPULATION BALANCE SIMULATION FOR THE DESIGN AND OPTIMIZATION OF A HIGH SHEAR AGGLOMERATION PROCESS 1340
David Krahl ; David Milburn-Pyle

HYBRID SIMULATION DEVELOPMENT – IS IT JUST ANALYTICS? 1352
David Bell ; Derek Groen ; Navonil Mustafee ; Jonathan Ozik ; Steffen Strassburger

HYBRID SYSTEM MODELING APPROACH FOR THE DEPICTION OF THE ENERGY CONSUMPTION IN PRODUCTION SIMULATIONS 1366
Anna Carina Roemer ; Steffen Strassburger

COUPLED TRAFFIC SIMULATION BY DETACHED TRANSLATION FEDERATES: AN HLA-BASED APPROACH 1378
Moritz Gütlein ; Anatoli Djanatliev
HYBRID SIMULATION TO SUPPORT INTERDEPENDENCE MODELING OF A MULTIMODAL TRANSPORTATION NETWORK 1390
Tarana Bipasha ; Jose Azucena ; Basem Alkhaleel ; Haitao Liao ; Heather Nachtmann
HOW TO BUILD VALID AND CREDIBLE SIMULATION MODELS 1402
Averill M. Law
AN INTRODUCTION TO MODELING AND SIMULATION WITH (PYTHON(P))DEVS 1415
Yentl Van Tendeloo ; Hans Vangheluwe ; Romain Franceschini
AVOID FAILURES! TESTED SUCCESS TIPS FOR SIMULATION PROJECT EXCELLENCE 1430
David T. Sturrock
BPMN-BASED BUSINESS PROCESS MODELING AND SIMULATION 1439
Paolo Bocciarelli ; Andrea D'Ambrogio ; Andrea Giglio ; Emiliano Paglia
TIME WARP SIMULATION ON MULTI-CORE PLATFORMS 1454
Philip A. Wilsey
CO-SIMULATION OF CONTINUOUS SYSTEMS: A HANDS-ON APPROACH 1469
Cláudio Gomes ; Hans Vangheluwe
THE FUNDAMENTALS OF DOMAIN-SPECIFIC SIMULATION LANGUAGE ENGINEERING 1482
Simon Van Mierlo ; Hans Vangheluwe ; Joachim Denil
COMPLEX SYSTEMS MODELING AND ANALYSIS 1495
Claudia Szabo
INTRODUCTION TO STATECHARTS MODELING, SIMULATION, TESTING, AND DEPLOYMENT 1504
Simon Van Mierlo ; Hans Vangheluwe
FROM PETRI NETS TO COLORED PETRI NETS: A TUTORIAL INTRODUCTION TO NETS BASED FORMALISM FOR MODELING AND SIMULATION 1519
Vijay Gehlot
AN INTRODUCTION TO CELLULAR AUTOMATA MODELS WITH CELL-DEVS 1534
Gabriel A. Wainer
INTEGRATING MODEL-DRIVEN ENGINEERING AS THE NEXT CHALLENGE FOR ARTIFICIAL INTELLIGENCE – APPLICATION TO RISK AND CRISIS MANAGEMENT 1549
Frederick Benaben ; Matthieu Lauras ; Audrey Fertier ; Nicolas Salatgé
INTRODUCTION TO ITERATIVE SYSTEM COMPUTATIONAL FOUNDATIONS AND DEVS 1564
Bernard P. Zeigler
DOMAIN-SPECIFIC LANGUAGE FOR MODELING AND SIMULATING ACTIONS IN LOGISTICS NETWORKS 1579
Markus Rabe ; Dominik Schmitt
DEADLOCK AND COLLISION HANDLING FOR AUTOMATED RAIL-BASED STORAGE AND RETRIEVAL UNITS 1591
Marcel Müller ; Stephan Schmidt ; Tobias Reggelin
SIMULATION-BASED OPTIMIZATION OF SEQUENCING BUFFER ALLOCATION IN AUTOMATED STORAGE AND RETRIEVAL SYSTEMS FOR AUTOMOBILE PRODUCTION 1602
Christian Urnauer ; Eva Bosch ; Joachim Metternich
USING DISCRETE EVENT SIMULATION TO ANALYZE PRICING STRATEGIES FOR SAME-LOCATION CAR RENTALS 1625
Abdullah A. Alabdulkarim ; Ibrahim M. Al-Harkan ; David Goldsman
MODELING HOME GROCERY DELIVERY USING ELECTRIC VEHICLES: PRELIMINARY RESULTS OF AN AGENT-BASED SIMULATION STUDY 1637
Dhanan Sarwo Utomo ; Adam Gripton ; Philip Greening
ELECTRIC VEHICLE ROUTING PROBLEM WITH TIME WINDOWS AND STOCHASTIC WAITING TIMES AT RECHARGING STATIONS 1649
Merve Keskin ; Raha Akhavan-Tabatabaei ; Bülent Çatay
A RELIABLE DEPLOYMENT STRATEGY FOR PUBLIC ELECTRIC VEHICLE CHARGING STATIONS: A DISCRETE EVENT SIMULATION MODEL FOR POWER GRID AND TRAFFIC NETWORKS 1660
Yasmina Maïzi ; Emily Cheng Zhu ; Ting Wu ; Jianhao Zhou
OPTIMIZING COMPLEX INTERACTION DYNAMICS IN CRITICAL INFRASTRUCTURE WITH A STOCHASTIC KINETIC MODEL 1672
Fan Yang ; Alina Vereshchaka ; Wen Dong

SIMULATION-BASED OPTIMIZATION TOOL FOR FIELD SERVICE PLANNING 1684
Gabriel G. Castañé ; Helmut Simonis ; Kenneth N. Brown ; Yiqing Lin ; Cemalettin Ozturk ; Michele Garraffa ; Mark Antunes

EVALUATING MIXED INTEGER PROGRAMMING MODELS FOR SOLVING STOCHASTIC INVENTORY PROBLEMS 1696
Bas Bluemink ; A. G. De Kok ; Balan Srinivasan ; Reha Uzsoy

SIMULATING MARITIME CHOKEPOINT DISRUPTION IN THE GLOBAL FOOD SUPPLY 1708
Ryan Walton ; J. O. Miller ; Lance Champagne

SIMULATION AND OPTIMIZATION OF OPERATIONS FOR OFFSHORE INSTALLATIONS PLANNING USING A MODEL PREDICTIVE CONTROL SCHEME 1719
Daniel Rippel ; Nicolas Jathe ; Michael Lütjen ; Helena Szczerbicka ; Michael Freitag

ESTIMATING THE EFFECT OF PRODUCT VARIETY AT A BRAZILIAN BULK TERMINAL 1731
Pedro Piccolo Anauate ; João Ferreira Netto ; Rui Carlos Botter ; Daniel De Oliveira Mota

A SIMULATION MODEL TO DETERMINE STAFFING STRATEGY AND WAREHOUSE CAPACITY FOR A LOCAL DISTRIBUTION CENTER 1743
Rodrigo De La Fuente ; Juan Gatica ; Raymond L. Smith

PENALTY ENFORCEMENT OR COST REDUCTION – WHICH APPROACH BETTER IMPROVES SUPPLIER PROCESS YIELD? 1755
Chun-Miin Jimmy Chen

AN AGENT-BASED MODELLING FRAMEWORK FOR URBAN AGRICULTURE 1767
Adam Ghandar ; Georgios Theodoropoulos ; Miner Zhong ; Bowen Zhen ; Shijie Chen ; Yue Gong ; Ayyaz Ahmed

A COMPREHENSIVE CASE STUDY IN LAST-MILE DELIVERY CONCEPTS FOR PARCEL ROBOTS 1779
Moritz Poeting ; Stefan Schaudt ; Uwe Clausen

A POST-BREXIT TRANSPORTATION SCENARIO ANALYSIS FOR AN AGRI-FRESH PRODUCE SUPPLY CHAIN 1789
Amr Mahfouz ; Declan Allen ; Amr Arisha ; Ralf Elbert ; Michael Gleser

DISCRETE EVENT SIMULATION OF DRIVER'S ROUTING BEHAVIOR RULE AT A ROAD INTERSECTION 1801
Ben Benzaman ; Erfan Pakdamanian

ANALYZING PRE-POSITIONING WITHIN A DISRUPTED BULK PETROLEUM SUPPLY CHAIN 1813
Manuel D. Rossetti ; Julianna Bright

ROLLING HORIZON MODELS FOR INTER-DEPOT EMPTY CONTAINER REPOSITIONING 1825
Tejas Ghorpade ; Narayan Rangaraj

ANALYZING THE INFLUENCE OF COSTS AND DELAYS ON MODE CHOICE IN INTERMODAL TRANSPORTATION BY COMBINING SAMPLE AVERAGE APPROXIMATION AND DISCRETE EVENT SIMULATION 1837
Ralf Elbert ; Jan Philipp Müller

CONSIDERING ENERGY-RELATED FACTORS IN THE SIMULATION OF LOGISTICS SYSTEMS 1849
Moritz Poeting ; Bastian Prell ; Markus Rabe ; Tobias Uhlig ; Sigrid Wenzel

SIMULATING PROFIT LOSS IN BEHAVIORAL NEWSVENDOR PROBLEMS 1859
Andrea C. Hupman ; Juan Zhang

SIMULATION OF ALLOCATION POLICIES FOR A SERIAL INVENTORY SYSTEM UNDER ADVANCE DEMAND INFORMATION 1871
Bhoomica M. Nataraja ; Zümbül Atan

A SIMHEURISTIC FOR THE UNMANNED AERIAL VEHICLE SURVEILLANCE-ROUTING PROBLEM WITH STOCHASTIC TRAVEL TIMES AND RELIABILITY CONSIDERATIONS 1883
Javier Panadero ; Angel A. Juan ; Alfons Freixes ; Carles Serrat ; Manel Grifoll ; Mohammad Dehghanimohamamdabadi

COMBINING THE INTERNET OF THINGS WITH SIMULATION-BASED OPTIMIZATION TO ENHANCE LOGISTICS IN AN AGRI-FOOD SUPPLY CHAIN 1894
David Raba ; Angel A. Juan ; Javier Panadero ; Alejandro Estrada-Moreno ; Christopher Bayliss

SIMULATION-BASED OPTIMIZATION IN TRANSPORTATION AND LOGISTICS: COMPARING SAMPLE AVERAGE APPROXIMATION WITH SIMHEURISTICS 1906
Angel A. Juan ; Javier Panadero ; Lorena Reyes-Rubiano ; Javier Faulin ; Rocio De La Torre ; Ignacio Latorre

INVENTORY MANAGEMENT UNDER DISRUPTION RISK 1918
Bahar Biller ; Elliot Wolf ; Enver Yücesan

IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION DECISIONS 1930
Utku Serhatli ; André Du Pin Calmon ; Enver Yücesan

EVALUATION OF RISK AND EFFICIENCY IMPACTS ON OFFSHORE DIESEL LOGISTICS OF DIFFERENT OPERATIONAL PROCESSES THROUGH DISCRETE-EVENT SIMULATION 1941
Pedro Chaves Meurer Moreira ; Ricardo Penna Leite ; Victor Anselmo Silva

FROM OPENSTREETMAP AND CELL PHONE DATA TO ROAD NETWORK SIMULATION MODELS 1953
Kai Gutenschwager ; Robert D. McLeod ; Marcia R. Friesen

JAM TAIL ESTIMATION USING VEHICLE AND ROAD AGENTS 1965
Hideyuki Mizuta

AN INVENTORY-ROUTING PROBLEM WITH STOCHASTIC DEMAND AND STOCK-OUT: A SOLUTION AND RISK ANALYSIS USING SIMHEURISTICS 1977
Bhakti Stephan Onggo ; Angel A. Juan ; Javier Panadero ; Canan G. Corlu ; Alba Agustin

STOCHASTIC SIMULATION MODEL DEVELOPMENT FOR BIOPHARMACEUTICAL PRODUCTION PROCESS RISK ANALYSIS AND STABILITY CONTROL 1989
Bo Wang ; Wei Xie ; Tugce Martagan ; Alp Akcay ; Canan G. Corlu

SIMULATION-BASED PERFORMANCE EVALUATION OF A MANUFACTURING FACILITY WITH VERTICAL AS/RS 2001
Nitish Singh ; Koen Herps ; Tugce Martagan ; I. J. B. F. Adan

TRANSPARENCY AND TRAINING IN MANUFACTURING AND LOGISTICS PROCESSES IN TIMES OF INDUSTRY 4.0 FOR SMES 2013
Henning Strubelt ; Sebastian Trojahn ; Sebastian Lang

A LEGO® MANUFACTURING SYSTEM AS DEMONSTRATOR FOR A REAL-TIME SIMULATION PROOF OF CONCEPT 2025
Giovanni Lugaresi ; Davide Travaglini ; Andrea Matta

INFRASTRUCTURE FOR MODEL BASED ANALYTICS FOR MANUFACTURING 2037
Sanjay Jain ; Anantha Narayanan ; Yung-Tsun Tina Lee

COORDINATED CONTROL OF MULTI-ZONE AVS/RS, CONVEYORS AND PICK-UP OPERATIONS IN WAREHOUSE SYSTEM 2049
Donghuang Li ; Jeffrey S. Smith ; Yingde Li

SEMANTIC ENRICHMENT OF SPATIO-TEMPORAL PRODUCTION DATA TO DETERMINE LEAD TIMES FOR MANUFACTURING SIMULATION 2061
Carina Mieth

UTILIZING DISCRETE EVENT SIMULATION TO SUPPORT CONCEPTUAL DEVELOPMENT OF PRODUCTION SYSTEMS 2073
Hannes Andreasson ; John Weman ; Daniel Nåfors ; Jonatan Berglund ; Björn Johansson ; Karl Lihnell ; Thomas Lydhig

DIGITAL TWIN FOR SMART MANUFACTURING: THE SIMULATION ASPECT 2085
Guodong Shao ; Sanjay Jain ; Christoph Laroque ; Loo Hay Lee ; Peter Lendermann ; Oliver Rose

NESTED-SIMULATION-BASED APPROACH FOR REAL-TIME DISPATCHING IN JOB SHOPS 2099
Shufang Xie ; Tao Zhang ; Oliver Rose

AN EFFICIENT MULTI-OBJECTIVE HYBRID SIMHEURISTIC APPROACH FOR ADVANCED ROLLING HORIZON PRODUCTION PLANNING 2108
Felix Kamhuber ; Thomas Sobottka ; Bernhard Heinzl ; Wilfried Sihn

SIMULATION BASED FORECAST DATA GENERATION AND EVALUATION OF FORECAST ERROR MEASURES 2119
Sarah Zeiml ; Klaus Altendorfer ; Thomas Felberbauer ; Jamilya Nurgazina

THROUGHPUT CONTROL AND GIVEAWAY MINIMIZATION OF A POULTRY PRODUCT BATCHER 2131
Kay Peeters ; Ivo Adan ; Tugce Martagan

A HYBRID GENETIC ALGORITHM FOR THE K-BOUNDED SEMI-ONLINE BIN COVERING PROBLEM IN BATCHING MACHINES 2142
Bert H. H. Hundscheid ; Kay Peeters ; Jelle Adan ; Tugce Martagan ; Ivo J. B. F. Adan

APPLICATION OF THE NON-LINEAR OPTIMIZATION ALGORITHM DIFFERENTIAL EVOLUTION FOR OPTIMIZATION OF MANUFACTURING SYSTEMS REGARDING THEIR ENERGY EFFICIENCY 2154
Matthias Meißner ; Christian Rehtanz ; Johanna Myrzik

AUTOMATED MODEL DEVELOPMENT AND PARAMETRIZATION OF MATERIAL FLOW SIMULATIONS 2166
Michael Milde ; Gunther Reinhart

A SIMULATOR TESTBED FOR MT-CONNECT BASED MACHINES IN A SCALABLE AND FEDERATED MULTI-ENTERPRISE ENVIRONMENT 2178
Nabeel Mehdi ; Binil Starly

TRENDS IN AUTOMATIC COMPOSITION OF STRUCTURES FOR SIMULATION MODELS IN PRODUCTION AND LOGISTICS 2190
Sigrid Wenzel ; Jana Stolipin ; Jakob Rehof ; Jan Winkels
A SEQUENTIAL SEARCH FRAMEWORK FOR SELECTING WEIGHTS OF DISPATCHING RULES IN MANUFACTURING SYSTEMS 2201
Je-Hun Lee ; Young Kim ; Yun Bae Kim ; Hyun-Jung Kim ; Byung-Hee Kim ; Gu-Hwan Chung
A GLOBAL WIP ORIENTED DISPATCHING SCHEME: WORK-CENTER WORKLOAD BALANCE WITHOUT RELYING ON TARGET WIP 2212
Zhugen Zhou ; Oliver Rose
ON THE CONSEQUENCES OF UN-MODELED DYNAMICS TO THE OPTIMALITY OF SCHEDULES IN CLUSTERED PHOTOLITHOGRAPHY TOOLS 2224
Hyeong-Ook Kim ; Se-Hyeon Park ; Jung Yeon Park ; James R. Morrison
SIMULATION BASED MULTI-OBJECTIVE FAB SCHEDULING BY USING REINFORCEMENT LEARNING 2236
Won-Jun Lee ; Byung-Hee Kim ; Keyhoon Ko ; Hayong Shin
TRANSFER ROBOT TASK SCHEDULING IN SEMICONDUCTOR MANUFACTURING 2248
Andy Ham
WORK-IN-PROCESS BALANCING CONTROL IN GLOBAL FAB SCHEDULING FOR SEMICONDUCTOR MANUFACTURING 2257
Fèlicien Barhebwa-Mushamuka ; Stèphane Dauzère-Pèrès ; Claude Yugma
INFLUENCE OF SPARE PARTS SERVICE MEASURES ON THE PERFORMANCE OF FRONT-END WAFER PRODUCTION PROCESS 2269
Douniel Lamghari-Idrissi ; Daniel Soellaart ; Rob Basten ; Nico Dellaert
A NUMERICAL STUDY ON THE STRUCTURE OF OPTIMAL PREVENTIVE MAINTENANCE POLICIES IN PROTOTYPE TANDEM QUEUES 2281
Taehyung Kim ; James R. Morrison
OPTIMZING ENGINEERING AND PRODUCTION LOTS DURING PRODUCT TRANSITIONS IN SEMICONDUCTOR MANUFACTURING 2292
Atchyuta Bharadwaj Manda ; Reha Uzsoy
AN INTEGRATION OF STATIC AND DYNAMIC CAPACITY PLANNING FOR A RAMPING FAB 2304
Georg Seidel ; Patrick Preuss ; Cevahir Canbolat ; Soo Leen Low ; Chew Wye Chan ; Boon Ping Gan ; Ching Foong Lee ; Prakash Manogaran ; Aik Ying Tang
A ROBUST OPTIMIZATION APPROACH FOR PRODUCTION PLANNING UNDER EXOGENOUS PLANNED LEAD TIMES 2312
Erinç Albey ; Ihsan Yanikoglu ; Reha Uzsoy
INTEGRATED PLANNING OF PRODUCTION AND ENGINEERING ACTIVITIES IN SEMICONDUCTOR SUPPLY CHAINS: A SIMULATION STUDY 2324
Timm Ziarnetzky ; Lars Mönch ; Thomas Ponsignon ; Hans Ehm
EVALUATING THE IMPACT OF DYNAMIC QUALIFICATION MANAGEMENT IN SEMICONDUCTOR MANUFACTURING 2336
Antoine Perraudat ; Stéphane Dauzère-Pérès ; Philippe Vialletelle
FAST HEURISTICS FOR MAKING QUALIFICATION MANAGEMENT DECISIONS IN WAFER FABS 2348
Denny Kopp ; Lars Mönch
WAFER-TO-ORDER ALLOCATION IN SEMICONDUCTOR BACK-END PRODUCTION 2360
Patrick C. Deenen ; Jelle Adan ; Joep Stokkermans ; Ivo J. B. F. Adan ; Alp Akcay
USING DELAYS FOR PROCESS FLOW SIMPLIFICATION 2372
Igor Stogniy ; Wolfgang Scholl
APPLYING DIFFUSION MODELS TO SEMICONDUCTOR SUPPLY CHAINS: INCREASING DEMAND BY FUNDED PROJECTS 2384
Ines Gold ; Hans Ehm ; Thomas Ponsignon ; Muhammad Tariq Afridi
SIMULATION-BASED ANALYSIS OF THE NERVOUSNESS WITHIN SEMICONDUCTORS SUPPLY CHAIN PLANNING: INSIGHT FROM A CASE STUDY 2396
Behrouz Alizadeh Mousavi ; Radhia Azzouz ; Cathal Heavey ; Hans Ehm
ECSEL DIGITAL REFERENCE – A SEMANTIC WEB FOR SEMICONDUCTOR MANUFACTURING AND SUPPLY CHAINS CONTAINING SEMICONDUCTORS 2409
Hans Ehm ; Nour Ramzy ; Patrick Moder ; Christoph Summerer ; Simone Fetz ; Cédric Neau
A NEW HIGH-VOLUME/LOW-MIX SIMULATION TESTBED FOR SEMICONDUCTOR MANUFACTURING 2419
Michael Hassoun ; Denny Kopp ; Lars Mönch ; Adar Kalir

RESEARCH OPPORTUNITIES REGARDING TREE AND NETWORK PRODUCT STRUCTURE REPRESENTATIONS IN A SEMICONDUCTOR SUPPLY CHAIN 2429
Hans Ehm ; Cédric Neau ; Christian James Martens ; Tim Lauer ; Thomas Ponsignon ; Joaquin Garcia
A DATA FARMING ANALYSIS OF A SIMULATION OF ARMSTRONG'S STOCHASTIC SALVO MODEL 2443
Gökhan Kesler ; Thomas W. Lucas ; Paul J. Sanchez
DATA FARMING SERVICES: MICRO-SERVICES FOR FACILITATING DATA FARMING IN NATO 2455
Daniel Huber ; Gary Horne ; Daniel Kallfass ; Jan Hodicky ; Nico De Reus
IMPROVING RECORD LINKAGE FOR COUNTER-THREAT FINANCE INTELLIGENCE WITH DYNAMIC JARO-WINKLER THRESHOLDS 2467
Ian Kloo ; Matthew F. Dabkowski ; Samuel H. Huddleston
VERIFICATION METHODOLOGY FOR DISCRETE EVENT SIMULATION MODELS OF PERSONNEL IN THE CANADIAN ARMED FORCES 2479
Jillian Anne Henderson ; Robert M. Bryce
INSIGHTS INTO THE HEALTH OF DEFENCE SIMULATED WORKFORCE SYSTEMS USING DATA FARMING AND ANALYTICS 2491
Brendan Hill ; Damjan Vukcevic ; Terrence Caelli ; Ana Novak
A SIMULATION APPROACH TO ADDRESS MQ-9 FLYING TRAINING UNIT MANNING SHORTFALLS 2503
Thomas Talafuse ; Lance Champagne ; Erika Gilts
CLOSING THE GAP BETWEEN SIMULATIONS FOR TRAINING AND WARGAMING 2515
Jeffrey M. Erickson ; Garrett D. Heath
OPTIMAL TECHNOLOGY REFRESH STRATEGIES FOR STRATEGIC DMSMS MANAGEMENT USING RANKING AND SELECTION 2524
James K. Starling ; Youngjun Choe ; Christina Mastrangelo
SIMULATING A MARITIME ANTI-AIR WARFARE SCENARIO TO OPTIMIZE A SHIP'S DEFENSIVE SYSTEM 2536
Shane N. Hall ; Benjamin G. Thengvall ; Rachel L. Schauer
A DISTRIBUTED AGENT-BASED FRAMEWORK FOR A CONSTELLATION OF DRONES IN A MILITARY OPERATION 2548
Alem H. Fitwi ; Deeraj Nagothu ; Yu Chen ; Erik Blasch
SIMULATION OF ENERGY-EFFICIENT DEMAND RESPONSE FOR HIGH PERFORMANCE COMPUTING SYSTEMS 2560
Kishwar Ahmed ; Jason Liu
ENERGY CONSERVATION THROUGH CLONED EXECUTION OF SIMULATIONS 2572
Srikanth B. Yoginath ; Maksudul Alam ; Kalyan S. Perumalla
EVALUATION OF METAHEURISTIC ALGORITHMS FOR THE IMPROVEMENT OF SUSTAINABILITY IN THE CONSTRUCTION AREA 2583
Lluís Aunós I Chicón ; Pau Fonseca I Casas
USING SIMULATION TO STUDY THE LAST TO ENTER SERVICE DELAY ANNOUNCEMENT IN MULTISERVER QUEUES WITH ABANDONMENT 2595
Aditya Shah ; Anders Wikum ; Jamol Pender
SYSTEMS DYNAMIC MODELING: PLANNING BEYOND THE WORKER 2606
William J. Peck ; Daniel A. Finke
MODELING AND SIMULATION OF THE BOTTLENECKS OF AN ONLINE RESERVATION SYSTEM 2617
José C. Conti ; Edson L. Ursini ; Paulo S. Martins
FIRST STEPS IN CREATING A METHODOLOGY TO DEVELOP AND TEST SCHEDULING POLICIES FOR INTERNET OF THINGS 2629
Paula Verghelet ; Esteban Mocskos
INTERNET-BASED ADAPTIVE DISTRIBUTED SIMULATION OF MOBILE AD-HOC NETWORKS 2641
Gabriele D'Angelo ; Stefano Ferretti ; Gary S. H. Tan
DIGITAL TWIN MODELING, CO-SIMULATION AND CYBER USE-CASE INCLUSION METHODOLOGY FOR IOT SYSTEMS 2653
Saurabh Mittal ; Andreas Tolk ; Andrew Pyles ; Nicolas Van Balen ; Kevin Bergollo
BUILT-IN LEAN MANAGEMENT TOOLS IN SIMULATION MODELING 2665
Pawel Pawlewski
A MULTITHREADED SIMULATION EXECUTIVE IN SUPPORT OF DISCRETE EVENT SIMULATIONS 2677
Brandon Waddell ; James F. Leathrum

A DIGITAL TV-BASED DISTRIBUTED IMAGE PROCESSING PLATFORM FOR NATURAL DISASTERS 2689
Manuel Manriquez ; Fernando Loor ; Veronica Gil-Costa ; Mauricio Marin
INVESTIGATION OF VERSATILE DATATYPES FOR REPRESENTING TIME IN DISCRETE EVENT SIMULATION 2701
Damian Vicino ; Gabriel A. Wainer ; Guillermo G. Trabes
DEVELOPING AGENT-BASED MIGRATION MODELS IN PAIRS 2713
Oliver Reinhardt ; Adelinde M. Uhrmacher ; Martin Hinsch ; Jakub Bijak
TOWARDS ADAPTIVE ABSTRACTION IN AGENT BASED SIMULATION 2725
Romain Franceschini ; Simon Van Mierlo ; Hans Vangheluwe
ARCHITECTURE AND DESIGN OF A CLOUD-BASED VISUAL SIMULATION ENVIRONMENT 2737
Sait Tuna Önder ; Osman Balci
TOWARDS A DEADLINE-BASED SIMULATION EXPERIMENTATION FRAMEWORK USING MICRO-SERVICES AUTO-SCALING APPROACH 2749
Anastasia Anagnostou ; Simon J. E. Taylor ; Nura Tijjani Abubakar ; Tamas Kiss ; James Deslauriers ; Gregoire Gesmier ; Gabor Terstyanszky ; Peter Kacsuk ; Jozsef Kovacs
HARDWARE-ASSISTED INCREMENTAL CHECKPOINTING IN SPECULATIVE PARALLEL DISCRETE EVENT SIMULATION 2759
Stefano Carnà ; Serena Ferracci ; Emanuele De Santis ; Alessandro Pellegrini ; Francesco Quaglia
DERIVING SIMULATION MODELS FROM DATA: STEPS OF SIMULATION STUDIES REVISITED 2771
Sanja Lazarova-Molnar ; Xueping Li
SIMULATION EXPERIMENT SCHEMAS – BEYOND TOOLS AND SIMULATION APPROACHES 2783
Pia Wilsdorf ; Marcus Dombrowsky ; Adelinde M. Uhrmacher ; Julius Zimmermann ; Ursula Van Rienen
ENHANCING REALISM IN SIMULATION THROUGH DEEP LEARNING 2795
Muhammad Shalihin Bin Othman ; Gary Tan
VALIDATING AGENT-BASED MODELS OF LARGE NETWORKED SYSTEMS 2807
Abhijin Adiga ; Chris Barrett ; Stephen Eubank ; Chris J. Kuhlman ; Madhav V. Marathe ; Henning Mortveit ; S. S. Ravi ; Daniel J. Rosenkrantz ; Richard E. Stearns ; Samarth Swarup ; Anil Vullikanti
A PARALLEL SIMULATION PLATFORM FOR TRAIN COMMUNICATION NETWORKS 2819
Xin Liu ; Dong Jin ; Tairan Zhang
SDN RESILIENCY TO CONTROLLER FAILURE IN MOBILE CONTEXTS 2831
David M. Nicol ; Rakesh Kumar
DYNAMIC CONGESTION PRICING FOR RIDESOURCING TRAFFIC: A SIMULATION OPTIMIZATION APPROACH 2868
Qi Luo
OPTIMIZING EARTH MOVING OPERATIONS VIA REINFORCEMENT LEARNING 2954
Vivswan Shitole ; Joseph Louis ; Prasad Tadepalli
A GENERIC SIMULATION MODEL FOR SELECTING FLEET SIZE IN SNOW PLOWING OPERATIONS 2966
Yipeng Li ; Shuoyan Xu ; Lingzi Wu ; Simaan Abourizk ; Tae J. Kwon ; Zhen Lei
ENHANCED INPUT MODELING FOR CONSTRUCTION SIMULATION USING BAYESIAN DEEP NEURAL NETWORKS 2978
Yitong Li ; Wenying Ji
TEMPERATURE-INDUCED ERROR IN LONG-TERM CONTINUOUS MONITORING OF DISPLACEMENT WITH VIDEOGRAMMETRY 2986
Huafei Zhou ; Fei Dai ; Linjun Lu
DATA-DRIVEN SPATIOTEMPORAL SIMULATION OF GROUND MOVEMENTS OF AIRCRAFT FOR PREVENTIVE AIRPORT SAFETY 2992
Pingbo Tang ; Yanyu Wang ; Zhe Sun ; Yongming Liu
MULTI-CRITERIA-BASED SIMULATION MODEL TO ESTIMATE RESOURCES FOR BRIDGE INSPECTIONS 3001
Immanuel John Samuel ; Mostafa Tajic Hesarkuchak ; Ossama Salem
ON-SITE ASSEMBLY OF MODULAR BUILDING USING DISCRETE EVENT SIMULATION 3008
Shuai Liu ; Asif Mansoor ; Brent Kugyelka ; Ahmed Bouferguene ; Mohamed Al-Hussein
SIMULATION-BASED APPROACH TO SYSTEMATIC PROJECT PLANNING AND SCHEDULING AT A BRIDGE GIRDER FABRICATION SHOP 3019
Monjurul Hasan ; Ming Lu ; Chris Ritcey

SIMULATION OF SPATIAL MEMORY FOR HUMAN NAVIGATION BASED ON VISUAL ATTENTION IN FLOORPLAN REVIEW 3031
Yangming Shi ; Jing Du
USING COMBINED DISCRETE-EVENT/ CONTINUOUS MODELING FOR SIMULATION OF SAFETY INCIDENTS ON PROJECT NETWORKS 3041
Rana Ead ; Hady Elkholosy ; Amira Eltahan ; Stephen Hague ; Simaan Abourizk
A BAYESIAN-BASED APPROACH FOR PUBLIC SENTIMENT MODELING 3053
Yudi Chen ; Wenying Ji ; Qi Wang
A MULTI-DIMENSIONAL, COUNTER-BASED PSEUDO RANDOM NUMBER GENERATOR AS A STANDARD FOR MONTE CARLO SIMULATIONS 3064
Douglas W. Hubbard
THE METALOG DISTRIBUTIONS AND EXTREMELY ACCURATE SUMS OF LOGNORMALS IN CLOSED FORM 3074
Thomas W. Keelin ; Lonnie Chrisman ; Sam L Savage
VALIDATION RISK IN HIERARCHICAL MODELS 3086
John B. Young ; Barry Ezell
HOW TO SUPPLEMENT THE SAFETY REQUIREMENTS 3098
Stan Uryasev ; Giorgi Pertaia
PROBABILISTIC DESIGN OF SUSTAINABLE REINFORCED CONCRETE INFRASTRUCTURE REPAIRS USING SIPMATH 3104
Melissa Zirps ; Michael Lepech ; Sam Savage
ANALYZING EMERGENCY EVACUATION STRATEGIES FOR LARGE BUILDINGS USING CROWD SIMULATION FRAMEWORK 3116
Imran Mahmood ; Talha Nadeem ; Faiza Bibi ; Xiaolin Hu
STAKEHOLDER-CENTRIC ANALYSES OF SIMULATED SHIPPING PORT DISRUPTIONS 3128
Gabriel A. Weaver ; Mark Van Moer ; Glen R. Salo
DYNAMIC PRICING AS A MITIGATION STRATEGY AGAINST SUPPLY NETWORK DISRUPTIONS WITH PRICE-SENSITIVE DEMAND – AN AGENT-BASED MODEL 3140
Niels Bugert ; Rainer Lasch
RISK-AWARE BUSINESS PROCESS MODELING: A COMPARISON OF DISCRETE EVENT AND AGENT-BASED APPROACHES 3152
Emilio Sulis ; Ilaria Angela Amantea ; Giulio Fornero
AN AIRSPACE COLLISION RISK SIMULATOR FOR SAFETY ASSESSMENT 3160
Jiangjun Tang ; Hussein Abbass ; Sameer Alam
EVALUATING AIR TRAFFIC CONTROLLERS' WORKLOAD THROUGH COMPUTER SIMULATIONS 3172
Arman Izadi ; Nicolas Hinze ; Antonio A. Trani
SAFETY AND PERFORMANCE IMPLICATIONS OF WAKE VORTEX BUFFERS 3184
Frederick Wieland
ADVANCED ASSISTANCE SERVICES USING HYBRID AMBULANCE (AASHA) SYSTEM 3195
Parth Patel ; Yagnesh Bhadiyadra ; Ayush Panara ; Akash Rupapara ; Prashant Bajak ; Vivek Bhatt
A RISK MINIMIZING METHOD OF LARGE GROUP DECISION AND ITS APPLICATION IN ENGINEERING CONSTRUCTION ACCIDENT RESCUE 3207
Jing Cao ; Xuanhua Xu ; Bin Pan
THE EFFECT OF SYMMETRIC PERMUTATIONS ON THE CONVERGENCE OF A RESTARTED GMRES SOLVER WITH ILU-TYPE PRECONDITIONERS 3219
Sanderson L. Gonzaga De Oliveira ; Cláudio Carvalho ; Carla Osthoff
NUMERICAL SIMULATIONS OF THE 1-D MODIFIED BURGERS EQUATION 3231
Diogo T. Robaina ; Sanderson L. Gonzaga De Oliveira ; Mauricio Kischinhevsky ; Carla Osthoff ; Alexandre C. Sena
LARGE-SCALE MULTITHREADING SELF-GRAVITY SIMULATIONS FOR ASTRONOMICAL AGGLOMERATES 3243
Sergio Nesmachnow ; Néstor Rocchetti ; Gonzalo Tancredi
MITIGATING CUSTOMERS' DOWNSELL RISK FOR SINGLE-LEG REVENUE MANAGEMENT WITH DEMAND DEPENDENCIES 3255
Lin Li ; Yuan Zhou
USING SIMULATION TO QUANTIFY THE RELIABILITY OF CONTROL SOFTWARE 3267
James Nutaro ; Ozgur Ozmen
USING GPUS FOR DETERMINING THE ENERGY CONFIGURATION OF SUPERCONDUCTING VORTEX LATTICES WITH STOCHASTIC METHODS 3277
Noelia Molero-Puerto ; Rafael Mayo-García

SOFTWARE SKILLS REQUIRED BY M&S GRADUATES FOR DES DEVELOPMENT 3285
James F. Leathrum ; John A. Sokolowski ; Yuzhong Shen ; Michel Audette
MODELING & SIMULATION IN SYSTEMS ENGINEERING: A SURVEY COURSE 3295
Margaret L. Loper ; Marshall Bronston ; Brian Berenbach
ACTIVE LEARNING EXPERIENCE IN SIMULATION CLASS USING A LEGO®-BASED MANUFACTURING SYSTEM 3307
Giovanni Lugaresi ; Ziwei Lin ; Nicla Frigerio ; Mengyi Zhang ; Andrea Matta
AN EDUCATION OF SIMULATION DISCUSSION 3319
Andrew J. Collins ; Ying Thaviphoke ; James F. Leathrum ; David Sturrock
TOPICS IN DISCRETE EVENTS SIMULATION FOR BUSINESS STUDENTS 3332
Ingolf Stahl
SIMULATION EDUCATION: A SURVEY OF FACULTY AND PRACTITIONERS 3344
Marco Aurélio De Mesquita ; Bruna Carvalho Da Silva ; João Vitor Tomotani
MONTE CARLO SIMULATIONS TO TEACH THE EFFECT OF LEAN METHODS TO IMPROVE BUSINESS PROCESSES 3356
John Maleyeff ; Canan G. Corlu
BALANCING OPTIMAL LARGE DEVIATIONS IN RANKING AND SELECTION 3368
Ye Chen ; Ilya O. Ryzhov
LOOKAHEAD CONTRACTION POLICIES FOR BAYESIAN RANKING AND SELECTION WITH PAIRWISE COMPARISONS 3380
Laura Priekule ; Stephan Meisel
MULTIOBJECTIVE RANKING AND SELECTION WITH CORRELATION AND HETEROSCEDASTIC NOISE 3392
Sebastian Rojas-Gonzalez ; Juergen Branke ; Inneke Van Nieuwehuyse
A SPECTRAL INDEX FOR SELECTING THE BEST ALTERNATIVE 3404
Guowei Sun ; Yunchuan Li ; Michael Fu
UTILITY-BASED STATISTICAL SELECTION PROCEDURES 3416
Guowei Sun ; Yunchuan Li ; Michael C. Fu
USING SIMULATION TO APPROXIMATE THE MINIMUM COST OF A FINITE SET OF ALTERNATIVES 3428
Cuicui Zheng ; James Calvin
BAYESIAN SEQUENTIAL EXPERIMENTAL DESIGN FOR STOCHASTIC KRIGING WITH JACKKNIFE ERROR ESTIMATES 3436
Guowei Sun ; Yunchuan Li ; Michael C. Fu
COMPUTATIONAL OPERATIONS RESEARCH EXCHANGE (CORE): A CYBER-INFRASTRUCTURE FOR ANALYTICS 3447
Yunxiao Deng ; Carl Kesselman ; Suvrajeet Sen ; Jiajun Xu
REDESIGNING A TESTBED OF SIMULATION-OPTIMIZATION PROBLEMS AND SOLVERS FOR EXPERIMENTAL COMPARISONS 3457
David J. Eckman ; Shane G. Henderson ; Raghu Pasupathy
RATE ANALYSIS FOR OFFLINE SIMULATION ONLINE APPLICATION 3468
Siyang Gao ; Cheng Li ; Jianzhong Du
A NEW REWARD FUNCTION FOR BAYESIAN FEASIBILITY DETERMINATION 3480
Junying He ; Seong-Hee Kim
BAYESIAN SIMULATION OPTIMIZATION WITH COMMON RANDOM NUMBERS 3492
Michael Pearce ; Matthias Poloczek ; Juergen Branke
A NEW PARTITION-BASED RANDOM SEARCH METHOD FOR DETERMINISTIC OPTIMIZATION PROBLEMS 3504
Ziwei Lin ; Shichang Du ; Andrea Matta
R-MGSPLINE: RETROSPECTIVE MULTI-GRADIENT SEARCH FOR MULTI-OBJECTIVE SIMULATION OPTIMIZATION ON INTEGER LATTICES 3516
Eric A. Applegate ; Susan R. Hunter
SUBSPACE COMMUNICATION DRIVEN SEARCH FOR HIGH DIMENSIONAL OPTIMIZATION 3528
Logan Mathesen ; Kaushik Keezhnagar Chandrasekar ; Xinsheng Li ; Giulia Pedrielli ; K. Selçuk Candan
THE NUMBER OF RANDOM RESTARTS REQUIRED TO IDENTIFY ALL SOLUTIONS TO A NONLINEAR SYSTEM: APPLICATIONS TO GLOBAL STOCHASTIC OPTIMIZATION 3540
Raghu Pasupathy
A PROXIMAL-POINT ALGORITHM WITH VARIABLE SAMPLE-SIZES (PPAWSS) FOR MONOTONE STOCHASTIC VARIATIONAL INEQUALITY PROBLEMS 3551
Afrooz Jalilzadeh ; Uday V. Shanbhag

ASTRO FOR DERIVATIVE-BASED STOCHASTIC OPTIMIZATION: ALGORITHM DESCRIPTION & NUMERICAL EXPERIMENTS 3563
Daniel Vasquez ; Raghu Pasupathy ; Sara Shashaani
ROBUST DATA-DRIVEN OPTIMIZATION USING MACHINE LEARNING AND MONTE-CARLO SIMULATION 3575
Vincent Béchard
OPTIMAL COMPUTING BUDGET ALLOCATION FOR BINARY CLASSIFICATION WITH NOISY LABELS AND ITS APPLICATIONS ON SIMULATION ANALYTICS 3587
Weizhi Liu ; Haobin Li ; Loo Hay Lee ; Ek Peng Chew ; Hui Xiao
STOCHASTIC APPROXIMATION FOR SIMULATION OPTIMIZATION UNDER INPUT UNCERTAINTY WITH STREAMING DATA 3597
Eunhye Song ; Uday V. Shanbhag
WEAKLY COUPLED MARKOV DECISION PROCESSES WITH IMPERFECT INFORMATION 3609
Mahshid Salemi Parizi ; Archis Ghate
VALIDATING OPTIMIZATION WITH UNCERTAIN CONSTRAINTS 3621
Henry Lam ; Huajie Qian
FEASIBILITY CUT GENERATION BY SIMULATION: SERVER ALLOCATION IN SERIAL–PARALLEL MANUFACTURING SYSTEMS 3633
Mengyi Zhang ; Andrea Matta ; Arianna Alfieri ; Giulia Pedrielli
COORDINATED TRAFFIC SIGNAL CONTROL VIA BAYESIAN OPTIMIZATION FOR HIERARCHICAL CONDITIONAL SPACES 3645
Hidetaka Ito ; Kyota Tsutsumida ; Tatsushi Matsubayashi ; Takeshi Kurashima ; Hiroyuki Toda
A SIMPLE SOLUTION FOR OPTIMIZING WEEKLY AGENT SCHEDULING IN A MULTI-SKILL MULTI-CHANNEL CONTACT CENTER 3657
Siqiao Li ; Ger Koole ; Oualid Jouini
SIMULATION CASE STUDIES ON PERIOD OPTIMAL POWER FLOW 3669
Zongjie Wang ; Ge Guo ; Catherine Lindsay Anderson
METAMODEL-ASSISTED SENSITIVITY ANALYSIS FOR CONTROLLING THE IMPACT OF INPUT UNCERTAINTY 3681
Wei Xie ; Bo Wang ; Pu Zhang
EFFICIENT INPUT UNCERTAINTY QUANTIFICATION VIA GREEN SIMULATION USING SAMPLE PATH LIKELIHOOD RATIOS 3693
Ben M. Feng ; Eunhye Song
ESTIMATING SENSITIVITY TO INPUT MODEL VARIANCE 3705
Wendy Xi Jiang ; Barry L. Nelson ; L. Jeff Hong
FIXED CONFIDENCE RANKING AND SELECTION UNDER INPUT UNCERTAINTY 3717
Di Wu ; Enlu Zhou
A DISTRIBUTIONALLY ROBUST BOOSTING ALGORITHM 3728
Jose Blanchet ; Fan Zhang ; Yang Kang ; Zhangyi Hu
DATA-DRIVEN OPTIMAL TRANSPORT COST SELECTION FOR DISTRIBUTIONALLY ROBUST OPTIMIZATION 3740
Jose Blanchet ; Yang Kang ; Karthyek Murthy ; Fan Zhang
DYNAMIC SAMPLING PROCEDURE FOR DECOMPOSABLE RANDOM NETWORKS 3752
Haidong Li ; Yijie Peng ; Xiaoyun Xu ; Chun-Hung Chen ; Bernd F. Heidergott
ESTIMATION AND INFERENCE FOR NON-STATIONARY ARRIVAL MODELS WITH A LINEAR TREND 3764
Peter W. Glynn ; Zeyu Zheng
SEQUENTIAL ESTIMATION OF STEADY-STATE QUANTILES: SOME NEW DEVELOPMENTS IN METHODS AND SOFTWARE 3774
Christos Alexopoulos ; David Goldsman ; Anup C. Mokashi ; James R. Wilson
THE APPLICATION OF SIMIO SCHEDULING IN INDUSTRY 4.0 3793
Devdatta Deo ; Alex D. Molnar
INTRODUCTION TO SIMIO 3802
Daniel Houck ; Caleb Whitehead
Author Index