

Annual Modeling and Simulation Conference (ANNSIM 2023)

Simulation Series Volume 55 Number 1

Ontario, Canada
23 – 26 May 2023

ISBN: 978-1-7138-7328-0

Printed from e-media with permission by:

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



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

© 2023 SIMULATION COUNCILS, INC.

Responsibility for the accuracy of all statement in each paper rests solely with the author(s). Statements are not necessarily representative of, nor endorsed by, The Society for Modeling and Simulation International.

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

Permission is granted to photocopy portions of this publication for personal use and for the use of students provided credit is given to the conference and publication. Permission does not extend to other types of reproduction nor to copying for incorporation into commercial advertising nor for any other profit-making purpose. Other publications are encouraged to include 300- to 500-word abstracts or excerpts from any paper contained in this book, provided credits are given to the author and the conference. For permission to publish a complete paper write: The Society for Modeling and Simulation International (SCS), 2598 Fortune Way, Suite I, San Diego, CA 92081, USA.

Additional copies of the Proceedings are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
curran@proceedings.com
www.proceedings.com/0128.html

or

The Society for Modeling
and Simulation International
11315 Rancho Bernardo Road, Suite 139
San Diego, CA 92127 USA
www.scs.org

ISBN: 978-1-7138-7328-0
PRINTED IN THE UNITED STATES

TABLE OF CONTENTS

ANSS

A GENERIC MODELING APPROACH TOWARDS SIMULATING AN URBAN PRIMARY AND SECONDARY HEALTHCARE FACILITY NETWORK.....	1
<i>N. Fatma, V. Ramamohan</i>	
A SURVEY OF VISUALIZATION CAPABILITIES FOR SIMULATION ENVIRONMENTS	13
<i>B. St-Aubin, G. Wainer, F. Loor</i>	
AGENT-BASED MODEL OUTPUT ANALYSIS – A COMPREHENSIVE STATISTICAL FRAMEWORK.....	25
<i>J. Venugopalan, G. Deshkar, J. Kshirsagar, D. Singh, J. Jose, H. Hayatnagarkar</i>	
COSYS-AIRSIM: A REAL-TIME SIMULATION FRAMEWORK EXPANDED FOR COMPLEX INDUSTRIAL APPLICATIONS.....	37
<i>W. Jansen, E. Verreycken, A. Schenck, N. Huebel, J. Steckel, J. Blanquart, C. Verhulst</i>	
DECISION SUPPORT FRAMEWORK FOR AUTOMATING THE OPTIMIZATION OF EDGE COMPUTING FEDERATIONS.....	49
<i>A. Rodriguez-Liria, R. Cardenas, P. Arroba, J. Moya, J. Risco-Martin, G. Wainer</i>	
DEVs-BASED MODELING AND SIMULATION OF DATA-DRIVEN EXPLORATION ALGORITHMS OF LENTICWATER BODIES WITH AN ASV.....	61
<i>S. Ferrero-Losada, E. Besada-Portas, J. Risco-Martin, J. Lopez-Orozco</i>	
ERROR ESTIMATORS FOR ADAPTIVE SCHEDULING ALGORITHM FOR SERIAL CO-SIMULATION.....	73
<i>E. Inci, W. Desmet, C. Gomes, J. Croes</i>	
HYBRID AGENT-BASED AND DISCRETE EVENT SIMULATION IN MASON	84
<i>G. D'Ambrosio, S. Luke</i>	
MODEL-BASED SYSTEMS ENGINEERING AND SIMULATION OF A MOLTEN SALT REACTOR POWER PLANT FOR REQUIREMENTS ANALYSIS	95
<i>S. Pair, M. Jones</i>	
MODELING FORCED MIGRATION: A SYSTEM DYNAMIC APPROACH.....	110
<i>T. Curry, A. Croitoru, A. Crooks</i>	
PREDICTIVE MODELING AND SIMULATION SYSTEM FOR THE MANAGEMENT OF HARMFUL CYANOBACTERIA BLOOMS.....	122
<i>B. Herguedas-Pinedo, J. Risco-Martin, S. Esteban, J. Lopez-Orozco, E. Besada-Portas</i>	
SIMULATION AND OPTIMIZATION TECHNIQUES FOR THE MITIGATION OF DISRUPTIONS TO SUPPLY CHAINS.....	134
<i>R. Patel, A. Rana, S. Luke, C. Domeniconi, H. Kavak, J. Jones, A. Crooks</i>	

CNSSPECTS

MACHINE LEARNING MODELS FOR CHANNEL STATUS CLASSIFICATION IN M-MIMO SYSTEMS USING LIMITED CSI FEEDBACK	146
<i>B. Earle, X. Li, A. Al-Habashna, G. Wainer, G. Xue</i>	
PO-MAC : A SOFTWARE DEFINED PERFORMANCE-OPTIMIZED MAC STRATEGY FOR OPTICAL DATA CENTER NETWORKS.....	158
<i>D. Georgantas, P. Baziana</i>	

CPS

A STATECHART TEMPLATE LIBRARY FOR IOT SYSTEM MODELLING.....	169
<i>C. Rempillo, S. Mustafiz</i>	
FORMALIZING CYBER-PHYSICAL SYSTEM INTERFACES USING DEVS.....	182
<i>R. Jiresal, G. Wainer</i>	
PID CONTROL USING QUANTIZED STATE SYSTEMS IN RT-DEVS FRAMEWORKS	194
<i>M. Shahmohammadimehrjadi, G. Wainer, M. Wu, X. Zhang</i>	
SYNTHESIZING ORCHESTRATION ALGORITHMS FOR FMI 3.0	207
<i>S. Hansen, C. Gomes, Z. Kazemi</i>	

ET-DT

BUILDING A DIGITAL TWIN OF AN AUTOMATED ROBOT WORKCELL	219
<i>D. Kibira, G. Shao, R. Venketesh</i>	
DIGITAL TWIN AND AGENT-BASED SIMULATION: CO-SIMULATION TO SUPPORT INTELLIGENT NAVIGATION OF HEALTHCARE MOBILE ROBOT	231
<i>G. Anyene, A. Nepomuceno, I. Kim, C. Schultz</i>	
EXAMINING MODEL QUALITIES AND THEIR IMPACT ON DIGITAL TWINS	243
<i>B. Oakes, C. Gomes, P. Larsen, J. Denil, J. Cambeiro, J. Deantoni, J. Fitzgerald</i>	
FORMAL APPROACH TO DIGITAL TWIN SPECIFICATION.....	256
<i>M. Diakite</i>	
MODELING AND SYNCHRONIZING DIGITAL TWIN ENVIRONMENTS	268
<i>J. Llopis, J. Criado, L. Iribarne, P. Munoz, J. Troya, A. Vallecillo</i>	

HSAA

AN AGENT-BASED MODEL OF MOBS USING THEORETICAL CONSTRUCTS OF COLLECTIVE ACTION.....	281
<i>S. Al-khateeb, J. Burright, R. Murray, N. Agarwal</i>	
BINARY OPINION DYNAMICS WITH MESOPHILIC AGENTS	293
<i>P. Shepherd, A. Ngo, S. Maalim, I. Gray</i>	

DEVELOPING A LARGE-SCALE AGENT-BASED MODEL USING THE SPIRAL SOFTWARE DEVELOPMENT PROCESS	305
<i>M. Malikov, F. Aloraini, H. Kavak, W. Kennedy, A. Crooks</i>	

FIRM-LEVEL PROPAGATION OF THE EFFECT OF DISRUPTION OF INTERNATIONAL TRADE THROUGH DOMESTIC SUPPLY CHAINS	317
<i>H. Inoue, Y. Todo</i>	

IDENTIFYING THE BUILDING BLOCKS OF SOCIAL SIMULATION MODELS: A QUALITATIVE ANALYSIS USING OPEN-SOURCE CODES IN NETLOGO.....	329
<i>S. Cheng, P. Giabbanelli, Z. Kuang</i>	

THE EFFECT OF EMPATHY ON HAPPINESS IN SOCIAL NETWORKS: AN AGENT-BASED SIMULATION STUDY	341
<i>N. Bishop, H. Kavak</i>	

MLS

A SIMULATION ENVIRONMENT FOR REDUCING FOOD WASTE VIA REINFORCEMENT LEARNING.....	355
<i>S. Pilarski, A. Sidhu, D. Varro</i>	

PRESERVING SIMULATION INSIGHT WHILE REMOVING DATA: VERIFICATION OF COMPRESSED SIMULATION TRACES VIA MACHINE LEARNING.....	368
<i>M. Nguyen, D. Vu, A. Vo, L. Liang, P. Giabbanelli</i>	

MSCS

GREENTHREAD— BLOCKCHAIN, NON-FUNGIBLE TOKEN(NFT), MODEL CARDS, SELF-SOVEREIGN IDENTITY AND IPFS ENABLED SUSTAINABLE CIRCULAR FASHION PLATFORM	380
<i>N. Sahabandu, E. Bandara, P. Foytik, S. Shetty, R. Mukkamala, X. Liang, A. Rahman</i>	

MODELING AND SIMULATION OF THE HUMAN FIREWALL AGAINST PHISHING ATTACKS IN SMALL AND MEDIUM-SIZED BUSINESSES	392
<i>J. Shin, L. Carley, G. Dobson, K. Carley</i>	

MSM

DESIGN AND IMPLEMENTATION OF A GENERIC CIRCUIT SOLVER FOR PHYSIOLOGICAL LUMPED-PARAMETER MODELING.....	404
<i>J. Webb, A. Bray, R. Clipp</i>	

ELUCIDATING THE ROLE OF THE HIS-PURKINJE SYSTEM DURING LONG QT MEDIATED ARRHYTHMIAS.....	416
<i>A. Owusu-Mensah, O. Berenfeld, M. Audette</i>	

MULTI-MATERIAL, APPROACH-GUIDED, CONTROLLED-RESOLUTION BREAST MESHING FOR FE-BASED INTERACTIVE SURGERY SIMULATION	425
<i>M. Alqaoud, E. Feliberti, G. Fichtinger, J. Plemmons, K. Kaia, Y. Xiao, T. Rashid, M. Audette</i>	

ON THE NECESSITY OF HUMAN DECISION-MAKING ERRORS TO EXPLAIN VACCINATION RATES FOR COVID-19: AN AGENT-BASED MODELING STUDY	436
<i>J. Beerman, G. Beaumont, P. Giabbanelli</i>	

STUDY ON MILD COGNITIVE IMPAIRMENT AND ALZHEIMER'S DISEASE CLASSIFICATION USING A NEW ONTOGENIC NEURAL ARCHITECTURE, THE SUPERVISED RECONFIGURABLE GROWING NEURAL GAS	448
<i>Y. Cabrera-Leon, P. Fernandez-Lopez, C. Suarez-Araujo, P. Baez</i>	

TOWARDS A PATIENT-SPECIFIC OBSTETRIC SIMULATOR THROUGH OPENSIM MUSCULOSKELETAL MODELING.....	460
<i>B. Dodge, H. Bennett, O. Kravchenko, V. Jamora, M. Parente, R. Jorge, D. Oliveira, M. Nitschke, A. Koelewijn, A. Moore, M. Miodovnik, M. Audette</i>	

VACCINATION ACCESSIBILITY ANALYSIS: MODELING HISTORICAL PATTERNS OF REDLINING AND ACCESS TO HEALTHCARE SERVICES	471
<i>S. Milosevic, A. Aksamija</i>	

SIMAUD

A CASE STUDY ON GENERATING ECO-CONSCIOUS OFFICE BUILDING DESIGNS USING A DATA-INFORMED OPTIMIZATION FRAMEWORK	485
<i>G. Karoji</i>	

AESTHETICS AS A CRITERION: NAVIGATING SOLUTION SPACES UTILIZING COMPUTER VISION, THE AESTHETIC MEASURE, AND ARTIFICIAL NEURAL NETWORKS.....	497
<i>V. Sardenberg, M. Becker</i>	

ALGORITHMS FOR VOXEL-BASED ARCHITECTURAL SPACE ANALYSIS.....	509
<i>R. Goldstein, K. Walmsley, N. Morris, A. Tessier</i>	

COMPARING APARTMENT BALCONY DESIGN OPTIONS IN TORONTO FOR USEABILITY, HEALTHY LIGHTING AND DAYLIGHT AVAILABILITY	521
<i>F. Ouyang, T. Peters, A. Jakubiec, T. Kesik</i>	

GAME ENGINES AS A PERFORMANCE-AWARE PARTICIPATORY AND INTERACTIVE DESIGN PLATFORM: A PROTOTYPICAL WORKFLOW	533
<i>A. Khameneh, A. Vazquez</i>	

HOW INDOOR POSITIONING TECHNOLOGY CAN ENHANCE OUR UNDERSTANDING OF COMMUNICATION PATTERNS IN OFFICE ENVIRONMENTS	548
<i>S. Aziz, F. Deiters, M. Jacobi, I. Inokhosa, G. Betti</i>	

INTEGRATING CONDITIONAL SHAPE EMBEDDING WITH GENERATIVE ADVERSARIAL NETWORK -TO ASSESS RASTER FORMAT ARCHITECTURAL SKETCH	561
<i>H. Tu, M. Xu, Y. Shi</i>	

MODELING AND CALIBRATING DIGITAL TWIN OF AUTOMATIC GARBAGE COLLECTION SYSTEM IN SEJONG CITY	573
<i>T. Yun, M. Park, I. Moon</i>	

SENSING BEHAVIOUR FRAMEWORK: ACQUISITION AND COMMUNICATION OF OCCUPANCY BEHAVIOUR DATA.....	585
<i>P. Poulidou, K. Poulsgaard, M. Tamke, P. Nicholas</i>	

STOCHASTIC ASSESSMENT FOR MODEL PREDICTIVE CONTROL OF A VARIABLE REFRIGERANT FLOW SYSTEM.....	598
<i>S. Choi, S. Cho, C. Park</i>	

UNCERTAINTY QUANTIFICATION OF OVERALL HEAT TRANSFER COEFFICIENT(U-VALUE) FOR A GLAZING SYSTEM WITH EXTERNAL VENETIAN BLIND	608
<i>J. Lee, C. Park</i>	

URBAN DESIGN OPTIMIZER: A COMPARATIVE USER INTERFACE STUDY FOR A WEB-EMBEDDED TOOL	617
<i>F. Ortner, A. Yenardi, T. Zhi</i>	

URBANFLOW: DESIGNING COMFORTABLE OUTDOOR AREAS	629
<i>D. Liu, F. Rist, D. Michels</i>	

SIMED

PROJECT-BASED APPROACH FOR TEACHING NUMERICAL INTEGRATION IN CONTINUOUS SIMULATION	646
<i>Y. Shen, M. Sosonkina</i>	

AN OPEN SOURCE VIDEO ANALYTICS TOOL FOR ANALYZING LEARNER NAVIGATION IN IMMERSIVE SIMULATED ENVIRONMENTS.....	656
<i>N. Soriano, S. Ozden, A. Negahban, O. Ashour</i>	

TMS

A NEW FAMILY OF XDEVS SIMULATORS FOR ENHANCED PERFORMANCE.....	668
<i>R. Cardenas, P. Arroba, J. Risco-Martin</i>	

A TUTORIAL ON BAYESIAN SEQUENTIAL DATA ASSIMILATION FOR DYNAMIC DATA DRIVEN SIMULATION.....	680
<i>X. Hu</i>	

ENERGY AND POWER EVALUATION OF PARALLEL DEVS SIMULATIONS ON MULTICORE ARCHITECTURES.....	696
<i>G. Trabes, G. Wainer, V. Gil-Costa</i>	

FACILITATING THE INTEROPERABILITY AND REUSE OF EXTENSIONS OF FUZZY COGNITIVE MAPS	708
<i>R. Schuerkamp, P. Giabannelili, N. Daclin</i>	

Author Index