

Symposium on Simulation for Architecture and Urban Design (SimAUD 2017)

Simulation Series Volume 49 Number 11

Toronto, Canada
22 – 24 May 2017

Editors:

**Michela Turrin
Brady Peters
Timur Dogan**

**William O'Brien
Rudi Stouffs**

ISBN: 978-1-5108-7018-5

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.

© 2017 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 by Curran Associates, Inc. (2018)

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
2598 Fortune Way, Ste I
Vista, CA 92081 USA
www.scs.org

ISBN: 978-1-5108-7018-5
PRINTED IN THE UNITED STATES

TABLE OF CONTENTS

INVESTIGATING THE EFFECTS OF THE GEOMETRY ON SPEECH PRIVACY OF SEMI-ENCLOSED MEETING SPACES	1
<i>P. Alambeigi, J. Burry, E. Cheng</i>	
REQUIREMENTS FOR BIM-BASED THERMAL COMFORT ANALYSIS	9
<i>F. Alshehri, P. Kenny, J. O'Donnell</i>	
A SIMULATION-BASED WORKFLOW TO ASSESS HUMAN-CENTRIC DAYLIGHT PERFORMANCE	17
<i>S. Rockcastle, M. Amundadottir, M. Andersen</i>	
A COMPUTATIONAL DESIGN EXPLORATION PLATFORM SUPPORTING THE FORMULATION OF DESIGN CONCEPTS	25
<i>D. Yang, Y. Sun, D. Stefano, M. Turrin</i>	
AN INTERACTIVE APPROACH FOR EVOLVING PARETO OPTIMAL ARCHITECTURAL FORM	33
<i>C. Cruz, M. Kirley, J. Karakiewicz</i>	
ARE GENETIC ALGORITHMS REALLY THE BEST CHOICE IN BUILDING ENERGY OPTIMIZATION?	41
<i>T. Wortmann, C. Waibel, G. Nannicini, R. Evins, T. Schroepfer, J. Carmeliet</i>	
PROJECT DISCOVER: AN APPLICATION OF GENERATIVE DESIGN FOR ARCHITECTURAL SPACE PLANNING	49
<i>D. Nagy, D. Lau, J. Locke, J. Stoddart, L. Villaggi, R. Wang, D. Zhao, D. Benjamin</i>	
EVALUATING ARCHITECTURAL LAYOUTS WITH NEURAL NETWORKS	57
<i>N. Phelan, D. Davis, C. Anderson</i>	
ROBOT-AIDED FABRICATION OF INTERWOVEN REINFORCED CONCRETE STRUCTURES	64
<i>E. Erdine, A. Kallegias, A. Moreira, P. Devadass, A. Sungur</i>	
PULSE: INTEGRATED PARAMETRIC MODELING FOR A SHADING SYSTEM - FROM DAYLIGHT OPTIMIZATION TO ADDITIVE MANUFACTURING	72
<i>M. Teeling, M. Turrin, P. Ruitter</i>	
SIMULATION IN COMPLEX MODELLING	80
<i>M. Thomsen, M. Tamke, P. Nicholas, A. Deleuran, P. Ayres, R. Magna, C. Gengnagel</i>	
3D-PRINTING, TOPOLOGY OPTIMIZATION AND STATISTICAL LEARNING: A CASE STUDY	88
<i>V. Bhooshan, M. Fuchs, S. Bhooshan</i>	
MATRIX ARCHITECTURE: 3D-PRINTED AND SIMULATED KIRIGAMI MATRICES & AUXETIC MATERIALS	96
<i>M. Eggers, J. Liu, J. Liu, B. Norman, J. Sabin</i>	
A PERFORMANCE BASED COMPUTATIONAL METHOD FOR ASSEMBLY DESIGN OF RECIPROCAL ARCHITECTURAL SYSTEMS WITH 2D ELEMENTS	103
<i>O. Torghabehi, P. Buelow, A. Seyedahmadian</i>	
AUGMENTED ASSEMBLY FOR TESSELLATED STRUCTURES	110
<i>P. Bhatt, N. Bencini, S. Efthymiou, A. Stoitsova</i>	
VISUALIZATION OF BUILDING PERFORMANCE USING SANKEY DIAGRAMS TO ENHANCE THE DECISION-MAKING PROCESS	118
<i>A. Abdelalim, W. O'Brien</i>	
BUILDING PERFORMANCE DATABASE TO FACILITATE THE INTEGRATED DESIGN PROCESS FOR NET ZERO ENERGY BUILDINGS	126
<i>N. Pourmousavian, S. Yip, B. Lee, A. Athienitis</i>	
AN INVESTIGATION OF GENERATIVE DESIGN FOR HEATING, VENTILATION, AND AIR-CONDITIONING	132
<i>J. Berquist, A. Tessier, W. O'Brien, R. Attar, A. Khan</i>	
CONTEXT-SENSITIVE PERSONAL SPACE FOR DENSE CROWD SIMULATION	140
<i>O. Hesham, G. Wainer</i>	
MODELING SPACE TO SUPPORT USE-PATTERN SIMULATION IN BUILDINGS	148
<i>K. Date, D. Schaumann, Y. Kalay</i>	
AN EVENT MODELING LANGUAGE (EML) TO SIMULATE USE PATTERNS IN BUILT ENVIRONMENTS	156
<i>D. Schaumann, K. Date, Y. Kalay</i>	

DOUBLE-SKIN FACADES AND DAYLIGHT SIMULATIONS: COMPARATIVE STUDY OF FACADE TYPOLOGIES AND EFFECTS ON NATURAL LIGHT IN DIFFERENT CLIMATES	164
<i>A. Aksamija</i>	
GEOMETRY-MATERIAL COORDINATION FOR PASSIVE ADAPTIVE SOLAR MORPHING ENVELOPES	172
<i>S. Mokhtar, C. Leung, A. Chronis</i>	
A METHODOLOGY TO ANALYZE BUILDING ENVELOPES BASED ON DISCOMFORT GLARE	180
<i>N. Hatefinia, M. Ghobad</i>	
HYBRID WORKSTATIONS: ESTABLISHING INTERACTIVE AND RESPONSIVE USER-INTERFACES FOR DAYLIGHT APPLICATIONS	186
<i>E. Al-Qattan, L. Beltran, W. Yan</i>	
ESTIMATING THE COOLING POWER THROUGH TRANSPIRATION OF VINING GREEN WALLS IN VARIOUS CLIMATES	194
<i>A. Yazdanseta</i>	
ASSISTING THE DEVELOPMENT OF INNOVATIVE RESPONSIVE FAÇADE ELEMENTS USING BUILDING PERFORMANCE SIMULATION	202
<i>M. Klijn-Chevalerias, R. Loonen, A. Zarzycka, D. Witte, M. Sarakinioti, J. Hensen</i>	
UNIFYING VISUALIZATION OF HYDROLOGIC, THERMAL AND PLANT GROWTH PERFORMANCE IN GREEN ROOFS	210
<i>L. Margolis, A. Hooke, V. Javet</i>	
PARAMETRIC MODELLING IN FORM-BASED URBAN DESIGN CODE FOR HIGH-DENSE CITIES	217
<i>Y. Zhang, M. Schnabel</i>	
VOLATILE DATA MINING: A PROOF OF CONCEPT FOR PERFORMANCE EVALUATION OF THE BUILT ENVIRONMENT USING DRONES	225
<i>R. Heijden, A. Tai, G. Fagerstrom</i>	
A CASE STUDY ON THE RELATIONSHIP BETWEEN URBAN MORPHOLOGY AND TRAFFIC NOISE DISTRIBUTION IN HIGH-DENSITY URBAN CONTEXT	233
<i>J. Zhang, S. Lau, C. Heng, S. Lau, H. Lai</i>	
MULTIMODAL TRANSPORTATION PERFORMANCE CERTIFICATE (MTPC) FOR BUILDINGS AND NEIGHBORHOODS – A MODEL FOR BENCHMARKING THE EFFECT OF THE BUILT ENVIRONMENT ON THE MODAL SPLIT IN GEOGRAPHIC INFORMATION SYSTEMS (GIS)	240
<i>T. Stojanovski</i>	
THE MOBILITY TOPOGRAPHY MODEL FOR SUBSTANTIALIZING AND PROJECTING TRANSPORTATION IN CITIES	248
<i>Z. Trattner, A. Chronis, A. Munoz</i>	
A PEDESTRIAN-CENTRIC DESIGN STRATEGY: MELDING REACTIVE SCRIPTING WITH MULTI-AGENT SIMULATION	257
<i>X. Huang, M. White, M. Burry</i>	
THE USE OF CFD AND WIND TUNNEL TESTING IN WIND MICROCLIMATE ASSESSMENTS	265
<i>K. Jayyaratnam, R. Shilston, D. Hackett</i>	
THE THERMAL PERFORMANCE EXPLORATION OF OUTDOOR AND INDOOR SPACES USING IES & ENVI-MET	273
<i>A. Ghaffarianhoseini, U. Berardi, K. Raahemifar, A. Ghaffarianhoseini, K. Al-Obaidi</i>	
COMPUTATIONAL METHOD FOR VARIABLE OBJECTIVES AND CONTEXT AWARE SOLAR ENVELOPES GENERATION	281
<i>F. Luca, H. Voll</i>	
SIMULATION-BASED SENSITIVITY ANALYSIS OF FUTURE CLIMATE SCENARIO IMPACT ON RESIDENTIAL WEATHERIZATION INITIATIVES IN THE US MIDWEST	289
<i>C. Jagani, U. Passe</i>	
ENERGY PERFORMANCE OF RESIDENTIAL BUILDINGS AT DISTRICT LEVEL FROM DATA PERSPECTIVE	297
<i>Y. Liu, R. Stouffs</i>	
Author Index	