

# **10th International Conference on Smart Cities and Green ICT Systems (SMARTGREENS 2021)**

Online  
28 – 30 April 2021

## **Editors:**

**Cornel Klein  
Matthias Jarke  
Markus Helfert**

ISBN: 978-1-7138-3991-0

**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.**

Copyright© (2021) by SCITEPRESS – Science and Technology Publications, Lda.  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda.  
at the address below.

SCITEPRESS – Science and Technology Publications, Lda.  
Avenida de S. Francisco Xavier, Lote 7 Cv. C,  
2900-616 Setúbal, Portugal

Phone: +351 265 520 185

Fax: +351 265520 186

[info@scitepress.org](mailto:info@scitepress.org)

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# CONTENTS

---

## INVITED SPEAKERS

### KEYNOTE SPEAKERS

- Nationwide Digital Twin: Innovation for Resilience and Sustainability 5  
*Markus Eisenhauer*
- Driving Automated Vehicles in Complex Conditions 7  
*Bart van Arem*
- Optimization, Modeling and Assessment of Smart City Transportation Systems 9  
*Hesham Rakha*

### PAPERS

#### FULL PAPERS

- An Artificial Neural Network-based Real Time DSS to Manage the Discharges of a Wastewater Treatment Plant and Reduce the Flooding Risk 15  
*Loris Francesco Termitte, Emanuele Bonamente, Alberto Garinei, Daniele Bolpagni, Lorenzo Menculini, Marcello Marconi, Lorenzo Biondi, Andrea Chini and Massimo Crespi*
- Energy Saving Potential in Building Envelopes through Energy Conservation Building Code and Design Alternatives in Warm and Humid Climate 27  
*Anuthama Mahesh, Pradeep Kini and Pranav Kishore*
- Role of Citizens in the Development of Smart Cities: Benefit of Citizen's Feedback for Improving Quality of Service 35  
*Priyanka Singh, Fiona Lynch and Markus Helfert*
- Building Indoor Point Cloud Datasets with Object Annotation for Public Safety 45  
*Mazharul Hossain, Tianxing Ma, Thomas Watson, Brandon Simmers, Junaid Ahmed Khan, Eddie Jacobs and Lan Wang*
- Energy Optimal Control of a Multivalent Building Energy System using Machine Learning 57  
*Chenzi Huang, Stephan Seidel, Xuehua Jia, Fabian Paschke and Jan Bräunig*
- An Automated Clustering Process for Helping Practitioners to Identify Similar EV Charging Patterns across Multiple Temporal Granularities 67  
*René Richard, Hung Cao and Monica Wachowicz*

## SHORT PAPERS

Thermal Model of a House using Electric Circuits Analogy <i>Xhilda Merkaj, Darjon Dharmo and Eglantina Kalluçi</i>	81
Synchronised Power Scheduling of Widely Distributed Refrigerators using IoT <i>M. R. Zavvar Sabegh and C. M. Bingham</i>	89
Design of an Urban Monitoring System for Air Quality in Smart Cities <i>Andrea Marini, Patrizia Mariani, Alberto Garinei, Stefania Proietti, Paolo Sdringola, Massimiliano Proietti, Lorenzo Menculini and Marcello Marconi</i>	94
Condition Monitoring for Air Filters in HVAC Systems with Variable Volume Flow <i>Oliver Gnepper and Olaf Enge-Rosenblatt</i>	102
A Multi-Scale, Web-based Application for Strategic Assessment of PV Potentials in City Quarters <i>Sally Köhler, Rosanny Sihombing, Eric Duminil, Volker Coors and Bastian Schröter</i>	110
Insights with Big Data Analysis for Commercial Buildings Flexibility in the Context of Smart Cities <i>Simona-Vasilica Oprea, Adela Bâra, Cătălin Ceaparu, Anca Alexandra Ducman, Vlad Diaconița and Gabriela Dobrița Ene</i>	118
Toward Sustainable Energy Communities <i>Giuseppe Anastasi and Marco Raugi</i>	125
Hybrid Energy Production Analysis and Modelling for Radio Access Network Supply <i>Greta Vallero and Michela Meo</i>	131
The Study of Transition to the Isolated Operation of Power Supply Systems with Distributed Generation Plants and High Power Energy Storage Units <i>Yuri N. Bulatov, Andrey V. Kryukov and Konstantin V. Suslov</i>	142
Assessment of Building Integrated Photovoltaic Panels on Facades of Commercial Buildings with Respect to Energy Conservation Building Code <i>Achinta N. Shetty, Pradeep G. Kini, Pranav Kishore and Vipin Tandon</i>	148
Designing Green Infrastructure Guidelines: A Methodological Approach <i>Andrea De Montis, Giovanna Calia, Valentina Puddu and Antonio Ledda</i>	156
GREECOPE: Green Computing with Piezoelectric Effect <i>Meghana Kshirsagar, Rutuja Lahoti, Tanishq More and Conor Ryan</i>	164
Detection and Prevention of Denial-of-Service in Cloud-based Smart Grid <i>Abdul Razaq, Muhammad Majid Hussain, Waqas Javed, Tasmiyah Javed and Zulfiqar A. Memon</i>	172
Edge Intelligence with Deep Learning in Greenhouse Management <i>Massimiliano Proietti, Federico Bianchi, Andrea Marini, Lorenzo Menculini, Loris Francesco Termite, Alberto Garinei, Lorenzo Biondi and Marcello Marconi</i>	180
Energy Efficiency of Low Voltage Direct Current Supplies Including PV Sources <i>Anis Ammous, Ammar Assaidi, Abdulrahman Alahdal and Kaiçar Ammous</i>	188
Design of a Very Low Frequency Test Device for Faults Diagnosis in Underground Cable <i>Anis Ammous, Mohamed Ali Zdiri, Ammar Assaidi, Abdulrahman Alahdal and Kaiçar Ammous</i>	196

Model-based Systems Design for Green IoT Systems <i>Kristin Majetta, Jan Bräunig, Christoph Sohrmann, Roland Jancke and Dirk Mayer</i>	204
A Comparative Analysis of Smart Cities Frameworks based on Data Lifecycle Requirements <i>Claudia Roessing and Markus Helfert</i>	212
Hazard Analysis for Decentralized Charging Management of Electric Vehicles <i>Stylios Karatzas, Panagiotis Farmakis, Athanasios Chassiakos and Zoi Christoforou</i>	220
Application of Pretopological Hierarchical Clustering for Buildings Portfolio <i>Loup-Noé Lévy, Jérémie Bosom, Guillaume Guerard, Soufian Ben Amor, Marc Bui and Hai Tran</i>	228
AUTHOR INDEX	237