

2024 World Conference on Complex Systems (WCCS 2024)

**Mohammedia, Morocco
11-14 November 2024**



IEEE Catalog Number: CFP2412U-POD
ISBN: 979-8-3315-1914-8

**Copyright © 2024 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:	CFP2412U-POD
ISBN (Print-On-Demand):	979-8-3315-1914-8
ISBN (Online):	979-8-3315-1913-1

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

CURRAN ASSOCIATES INC.
proceedings
.com

CONTENTS

Keynote Speeches

COMPLEXITY AND THE COMPUTATIONAL PARADIGM (1)

Doctor Stephen Wolfram..... N/A

EFFECTS OF FUNCTIONAL DIVERSITY ON SOCIAL DYNAMICS: SIMULATION AND EXPERIMENTAL STUDIES (2)

Professor Hiroki Sayama..... N/A

CHARACTERIZING DISRUPTIVE EVENTS BY MODELING DYNAMICS IN MULTIPLEX NETWORKS (4)

Professor Zoran Obradovic..... N/A

ENSEMBLE LEARNING FOR MEDICAL DECISION MAKING (6)

Professor Ali Idri..... N/A

COMPLEXITY. FROM THE LIMITS OF GROWTH TO THE GROWTH OF LIMITS (8)

Professor Reda Benkirane N/A

ON THE COMPLEXITY OF LIVING SYSTEMS AND THEIR BIOSIGNATURES (9)

Professor Hector Zenil..... N/A

SOCIETAL METAMORPHOSIS: ON GOVERNANCE AND TRANSFORMATION IN SOCIAL ECOSYSTEMS (11)

Doctor Louis Klein..... N/A

TOWARD SMART AND AUTONOMOUS LARGE-SCALE BLOCKCHAIN- BASED IOT SYSTEM (12)

Professor Mohamed Bakhouya..... N/A

SESSION: Modeling and Managing Complex Social and Ecological Systems

INTEGRATED STOCK AND FLOW DYNAMICS FOR COMPREHENSIVE CARBON OFFSET EVALUATION: A SYSTEM DYNAMICS ANALYSIS OF NATURAL AND FARMING ECOSYSTEMS (14)

Takahiro Sasaki¹, Godai Suzuki^{1,2,3}, Masatoshi Funabashi^{1,2,3} 1

AN EXPLORATION OF MARS SETTLEMENT WITH AGENT-BASED MODELING (15)

Cristina Grieg, Anamaria Berea, Edgar Arguello, Sam Carter, Chris Prather, Clark Petri, Michael Hammer 7

AGENT-BASED MODEL FOR MOROCCAN INBOUND TOURISM: SOCIAL INFLUENCE AND DESTINATION CHOICE (16)

Smahane JEBRAOUI, Mohamed NEMICHE 12

AGENT-BASED WATER MARKET MODEL: AN ANALYSIS THROUGH A CASE STUDY (17)

Alvaro Hernandez , Fabiola Lobos 18

FORMATION OF COMPLEX SOCIETIES: AN AGENT-BASED MODEL INSPIRED BY FREUDIAN THEORY (18)

Saida Hachimi El Idrissi , Mohamed Nemiche 26

DRLKHN: A SELF-LEARNING HETEROGENEOUS NETWORK KEY NODES IDENTIFICATION METHOD (19)

Luyao Wang, Libin Chen, Zhiwei Yang , Kewei Yang , Qingqing Yang 32

SCALE-FREE CORRECTION OF UNDER-/OVER-REPORTED BIASES IN GLOBAL BIOTIC INTERACTION NETWORK (20)

Masatoshi Funabashi^{1,2}, Kei Aria Nonaka¹, Tomoyuki Minami¹ 40

DESIGNING A DYNAMIC NETWORK OF KNOWLEDGE OF MICRO-LEARNING CONTENT (21)

Paolo J. Singh, Raluca Gera 46

NUMERICAL SOLUTION OF NONLINEAR STOCHASTIC PROCESSES UNDER GAUSSIAN WHITE NOISE (22)

Ihsane Salleh, Abdelaziz Ben Lahbib , Lahcen Azrar 54

A LOGISTIC MODEL OF IRREGULAR IMMIGRATION: THE COMPLEX CASE OF SPAIN (23)

Lucas Jódar, Sheila Torres , Rafael Company 59

MATHEMATICAL AND COMPUTATIONAL MODELLING OF THREE DIMENSIONAL PORE SPACE IN SOIL IMAGES (24)

BELGHALI Zakaria, ABDELWAHED El Hassan , MONGA Olivier 63

ANALYSIS OF INTER-PROVINCIAL MIGRATION DRIVERS IN BURKINA FASO USING MACHINE LEARNING APPROACH (25)

Mahamadou Belem, A. Rachid Compaore, Mehdi Saqalli , Idrissa Kabore 70

ISO/IEC 27001 CERTIFICATION IN MOROCCAN COMPANIES: TRENDS AND FUTURE RECOMMENDATIONS (26)

Jihad Laghniemi, Karima Moumane, Ahmed Zellou, Meryem Lamkimel, Zineb Kacimi , Yacine Wahi 77

INFORMATION ASYMMETRY IN THE SUPPLY CHAIN (27)

Othman Boulitama, Karim Sabri 83

A SYSTEMATIC REVIEW OF EDUCATION SYSTEM MODELLING (28)

Yacouba Ouedraogo, Mahamadou Belem, Théodore Tapsoba, Mehdi Saqalli 88

SESSION: Applications of AI Across Industries

ADVANCED MACHINE LEARNING FOR PREDICTING DRUG RESISTANCE IN CLINICAL ISOLATES OF MYCOBACTERIUM TUBERCULOSIS COMPLEX (30)

Sirri Naoufal, Christophe Guyeux, Christophe Sola 96

PERIODIC LINEAR KERNEL FOR CANCER CLASSIFICATION DATASETS (31)

Mohamed Oubraime, Rida El Abassi and Abderrahim Sabour 104

ADDRESSING THE SPREAD OF INFECTIOUS DISEASES IN THE ERA OF EXPLAINABLE AI (32)

Bouthayna Addaali, Rachid Latif, Amine Saddik 112

ASSESSING THE EFFECTIVENESS OF SYNTHETIC DATA GENERATION FOR MULTI-CLASS CYBER-ATTACKS DETECTION USING GENERATIVE ADVERSARIAL NETWORKS (33)

Houssam Zouhri, Ali Idri 118

COMPREHENSIVE EVALUATION OF FEDERATED LEARNING CONFIGURATIONS FOR INTRUSION DETECTION IN IOT CONTEXTS (34)

Abderahmane HAMDOUCHI, Ali Idri 124

EVALUATING VARIOUS TRAINING STRATEGIES AND DIFFERENT BACKBONES FOR U-NET IN BREAST MASS SEGMENTATION (35)

Younes Kabbadj, Noura Bentaher 130

ARE RANK AGGREGATION METHODS ROBUST TO COLLUSIVE DISTURBANCE? (36)

Dongmei Chen, Yu Xiao, Jun Wu 135

EVALUATING THE EFFICACY OF WRAPPERS IN PREDICTING SPECIES DISTRIBUTION (37)

Yousra CHERIF¹, Ali IDRI^{1,2} 139

AUTOMATING RECRUITMENT PROCESS USING NLP AND DEEP LEARNING: A NOVEL APPROACH FOR ACCURATE CANDIDATE SELECTION (38)

Zeidane Sidi Boubacar, Faissal Ouardi 145

SESSION:Complex Engineered Systems

A BLOCKCHAIN-BASED IOT PLATFORM FOR ENERGY SHARING IN COMMUNITY-DRIVEN FARMING MICROGRIDS (40)

A. Elamrani, H. Essardi, Y. Alidrissi, M. Najib, A. Rochd, K. Zine-dine, D. El ouadghiri, M. Bakhouya 153

OPTIMIZATION OF ENERGY COSTS USING DEEP REINFORCEMENT LEARNING IN SMART GRIDS (41)

Aissa Henni, Khadidja Henni, Boualem Boukezata, Jaafar Gaber, Pascal Lorenz 159

TOWARDS A BLOCKCHAIN-BASED IOT PLATFORM FOR BUILDINGS ENERGY MANAGEMENT INTEGRATING ELECTRIC VEHICLES IN HOME HEALTHCARE CONTEXT (42)

H.EL MIRI, R. NAJI EL IDRISSI, M. Najib , A. NAIT SIDI MOH, M. Bakhouya 165

DYNAMIC ENERGY OPTIMIZATION FOR ELECTRIC VEHICLE PROPULSION USING FUZZY LOGIC (43)

Salma Ariche, Zakaria Boulghasoul, Abdelhafid El Ouardi, Abdelhadi Elbacha, Abdelouahed Tajer , Stéphane Espié 170

ENERGY EFFICIENT LIGHTING SYSTEM CONTROL COMBINED WITH SHADING SYSTEM USING IOT AND AI TECHNOLOGIES (44)

Fadwa Lachhab , Mohamed Bakhouya 176

FROM NATURAL LANGUAGE TO CODE: AI AUTOMATION IN CYBER-PHYSICAL MANUFACTURING SYSTEMS (45)	
Abderrahmane Boudribila, Abdelouahed Tajer, Zakaria Boulghasoul	183
INTERVAL TYPE-3 ADAPTIVE FUZZY FIXED-TIME ROBUST ATTITUDE CONTROL FOR FIXED-WING UAVS (46)	
Abdessamad El Mobaraky, Khalid Benjelloun, Khalid Kouiss, Ahmed Chebak	189
GRAPHENE-BASED MORPHING SKIN: HARNESSING THERMOMECHANICAL PROPERTIES FOR AERODYNAMIC EFFICIENCY (47)	
Walid Abouzoul, Souad Tayane, Mohamed Ennaji, Jaafar Gaber	195
EXPLORING THE IMPACT OF INDUSTRY 4.0 TECHNOLOGIES ON LOGISTICS (48)	
Hmamou Yahya, Chafi Anas , Kammouri Alami Salaheddine.....	201
RESEARCH ON OPTIMIZATION OF EMERGENCY RESCUE MATERIALS SCHEDULING BASED ON MULTILAYER OPTIMIZATION STRATEGY (49)	
Shuoshuo Gong, Gang Chen, Zhiwei Yang, Qingqing Yang , Mengjun Li	206
DEVELOPMENT OF A JIRA PLUGIN FOR TRACKING AND MANAGING TIME ALLOCATIONS FOR TASKS AND PROJECTS (50)	
Fatiha El Aouni, Karima Moumane, Siham Bendaouya, Aymane Ait Laasri, Yacine Wahi	212
A SHORT REVIEW OF FPGA-ACCELERATED DEEP LEARNING FOR ECG SIGNAL CLASSIFICATION IN PRECISION HEALTHCARE (51)	
Hanane El Ferdaoussi, Wissam Jenkal, Mostafa Laaboubi, Bouchra Bendahane , Rachid Latif	219
STUDY AND EVALUATION OF NETWORK SECURITY STRATEGIES IN SDN NETWORKS (52)	
Jihad Kilani, Hamza Karmaoui Idrissi, Yassine El Yamani, Faycal Bensalah , Baddi Youssef	226
DETECTING MECHANICAL FAILURE WITH MMWAVE RADAR USING DEEP LEARNING (53)	
Mohamed LAMANE, Abdessamad KLILLOU, Mohamed TABAA.....	232
EMPLOYING MAMDANI INFERENCE IN THE DETECTION AND LOCALIZATION OF FAULTS WITHIN AN ELECTRIC LIGHTING NETWORK (54)	
Mohammed Amine Jouahri, Zakaria Boulghasoul, Abdelouahed Tajer	237
MOTION PLANNING PROBLEM FOR A 1-D WAVE EQUATION (55)	

Mustapha El Hassani¹, Abdelhadi Elharfi², Samir El Mourchid¹	243
PROGRAMMING OF CELLULAR AUTOMATA IN C AND C++ (56)	
Patrik Christen	249
SIMULATION-BASED MULTI-OBJECTIVE OPTIMIZATION OF PRODUCTION SYSTEMS WITH MULTIPLE REWORK PATHS (57)	
Zhu Xiang, Hailiang Chen, Zhiwei Yang, Qingqing Yang	254
INJECTION MOLDING ANALYSIS FOR BIRD-FEEDER BY OPTIMIZING THE SHRINKAGE AND WARPAGE DEFORMATION (58)	
Zineb Achor¹, Souad Tayane¹, Mohamed Ennaji¹, Yassine Zahraoui², Jaafar Gaber³ ..	260
PARALLEL IMPLEMENTATION OF GAUSSIAN MIXTURE MODEL BACKGROUND SUBTRACTION ON JETSON NANO (59)	
Smail Bariko, Abdessamad Klilou, Abdelouahed Abounada, Assia Arsalane	266
BACTERIAL PROPULSION IN CHALLENGING FLUIDS: A MULTIPHYSICS APPROACH TO SIMULATING E. COLI ACTIVE MATTER IN CONTAMINATED AQUATIC ENVIRONMENTS (60)	
Fatima-Ez-Zahra Grini, Abouzoul Walid, Souad Tayane, Mohamed Ennaji, Jaafar Gaber ...	272
COMPREHENSIVE REVIEW OF WATER RESOURCE MANAGEMENT AND EMBEDDED SYSTEMS APPLICATIONS IN MOROCCO (61)	
Khadija Jahid, Rachid Latif, Amine Saddik	278
DEEP LEARNING METHODS FOR NON-CONTACT HEART RATE MONITORING: A REVIEW (62)	
Hoda El boussaki, Rachid Latif, Amine Saddik	283
GENERATIVE DESIGN CASE STUDY FOR ECO-EFFICIENT VEHICLES: LOWER EMISSIONS AND GREATER RANGE (63)	
Hassan ROUANE, Souad TAYANE, Mohammed ENNAJI, Jaafar Gaber	289