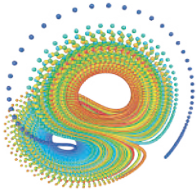




MOROCCAN SOCIETY OF
**INTERDISCIPLINARY
SCIENCES**



WCCS

5th World Conference on
**COMPLEX
SYSTEMS**
November 11-14, 2024
Mohammedia, Morocco

CONFERENCE PROGRAM



www.mscomplexsystems.org/wccs24



5th World Conference on
**COMPLEX
SYSTEMS**
November 11-14, 2024
Mohammedia, Morocco

Sponsors :



WOLFRAM



Chair of Complexities
Humanities

جامعة الحسن الثاني بالدار البيضاء
UNIVERSITÉ HASSAN II DE CASABLANCA



PROGRAM OVERVIEW

MONDAY, NOVEMBER 11, 2024

8:00 AM – 9:00 AM	REGISTRATION		
9:00 AM – 9:30 AM	WELCOME SESSION		
9:30 AM – 10:00 AM	KEYNOTE 1 : REDA BENKIRANE		
10:00 AM – 10:45 AM	KEYNOTE 2 : HIROKI SAYAMA		
10:45 AM – 11:15 AM	COFFEE BREAK		
11:15 AM – 1:05 PM	PARALLEL SESSIONS		
	MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS (ROOM1)	COMPLEX ENGINEERED SYSTEMS (ROOM2)	APPLICATIONS OF AI ACROSS INDUSTRIES (ROOM3)
1:05 PM – 2:30 PM	LUNCH		
2:30 PM – 3:15 PM	KEYNOTE 3 : ALI IDRI		
3:15 PM – 4:15 PM	PARALLEL SESSIONS		
	MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS (ROOM1)	COMPLEX ENGINEERED SYSTEMS (ROOM2)	APPLICATIONS OF AI ACROSS INDUSTRIES (ROOM3)
4:15 PM – 4:45 PM	COFFEE BREAK		
4:45 PM – 6:00 PM	PARALLEL SESSIONS		
	MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS (ROOM1)	COMPLEX ENGINEERED SYSTEMS (ROOM2)	
6:00 PM – 6:45 PM	KEYNOTE 4 : STEPHEN WOLFRAM		

PROGRAM OVERVIEW

TUESDAY, NOVEMBER 12, 2024	8:00 AM – 9:00 AM	REGISTRATION		
	9:00 AM – 9:45 AM	KEYNOTE 5 : ZORAN OBRADOVIC		
	9:45 AM – 10:15 AM	COFFEE BREAK		
	10:15 AM – 1:30 PM	PARALLEL SESSIONS		
		MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS (ROOM1)	CHAIR OF COMPLEXITIES ∞ HUMANITIES (MOHAMMED VI POLYTECHNIC UNIVERSITY) SESSION (ROOM2)	COMPLEX ENGINEERED SYSTEMS (ROOM3)
	1:30 PM – 2:30 PM	LUNCH		
	2:30 PM – 2:45 PM	WOLFRAM BEST PAPER AWARDS (ROOM1)		
	2:45 PM – 3:00 PM	CLOSING SESSION (ROOM1)		

PRESENTATION GUIDELINES

1. All presentations must be in English.
2. The time allocated for oral presentations is 20 minutes (15 minutes for the presentation and 5 minutes for discussion).
3. Speakers should give their slides to the session chair before the beginning of each session.

KEYNOTE SPEAKERS



STEPHEN WOLFRAM

FOUNDER & CEO OF WOLFRAM RESEARCH, USA

• **Complexity and the Computational Paradigm**



HIROKI SAYAMA

DIRECTOR, BINGHAMTON CENTER OF COMPLEX SYSTEMS (COCO), BINGHAMTON UNIVERSITY, SUNY, USA

• **Effects of Functional Diversity on Social Dynamics: Simulation and Experimental Studies**



ZORAN OBRADOVIC

DIRECTOR, CENTER FOR DATA ANALYTICS AND BIOMEDICAL INFORMATICS, TEMPLE UNIVERSITY USA

• **Characterizing Disruptive Events by Modeling Dynamics in Multiplex Networks**



ALI IDRI

MOHAMMED VI POLYTECHNIC UNIVERSITY, MOROCCO

• **Ensemble Learning for Medical Decision Making**

INVITED SPEAKERS



REDA BENKIRANE

CHAIR OF COMPLEXITIES ∞ HUMANITIES,
ABS, MOHAMMED VI POLYTECHNIC
UNIVERSITY, MOROCCO

• **Complexity. From the Limits of Growth to the Growth of Limits**



HECTOR ZENIL

KING'S COLLEGE, UNIVERSITY OF LONDON,
UNITED KINGDOM

• **On the Complexity of Living Systems and their Biosignatures**



LOUIS KLEIN

SECRETARY GENERAL AT INTERNATIONAL
FEDERATION FOR SYSTEMS RESEARCH (IFSR),
GERMANY

• **Societal Metamorphosis:
On Governance and Transformation
in Social Ecosystems**



MOHAMED BAKHOUYA

INTERNATIONAL UNIVERSITY OF RABAT,
MOROCCO

• **Toward Smart and Autonomous
Large-scale Blockchain-based IoT
Systems**

DETAILED CONFERENCE PROGRAM

MONDAY, NOVEMBER 11, 2024

8:00 AM – 9:00 AM	REGISTRATION
9:00 AM – 9:30 AM	WELCOME SESSION
9:30 AM – 10:00 AM (Plenary)	KEYNOTE SPEAKER 1: REDA BENKIRANE COMPLEXITY. FROM THE LIMITS OF GROWTH TO THE GROWTH OF LIMITS
10:00 AM – 10:45 AM (Plenary)	KEYNOTE SPEAKER 1: HIROKI SAYAMA EFFECTS OF FUNCTIONAL DIVERSITY ON SOCIAL DYNAMICS: SIMULATION AND EXPERIMENTAL STUDIES SESSION CHAIR: MOHAMED ESSAAIDI
10:45 AM – 11:15 AM	COFFEE BREAK
11:15 AM – 1:05 PM	PARALLEL SESSIONS
	ROOM 1: MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS SESSION CHAIR: HECTOR ZENIL
11:15 AM – 11:45 AM	INVITED TALK : LOUIS KLEIN AND KARIMA KADAOU SOCIETAL METAMORPHOSIS: ON GOVERNANCE AND TRANSFORMATION IN SOCIAL ECOSYSTEMS
	<ul style="list-style-type: none"> • TAKAHIRO SASAKI, GODAI SUZUKI AND MASATOSHI FUNABASHI Integrated Stock and Flow Dynamics for Comprehensive Carbon Offset Evaluation: A System Dynamics analysis of natural and farming ecosystems • CRISTINA GRIEG, ANAMARIA BERE, EDGAR ARGUELLO, SAM CARTER, CHRIS PRATHER, CLARK PETRI AND MICHAEL HAMMER An Exploration of Mars Settlement with Agent-Based Modeling • SMAHANE JEBRAOUI AND MOHAMED NEMICHE Agent-Based Model for Moroccan Inbound Tourism: Social Influence and Destination Choice • ALVARO HERNANDEZ AND FABIOLA LOBOS Agent-based water market model: an analysis through a case study

DETAILED CONFERENCE PROGRAM

11:15 AM – 11:45 AM

ROOM 2: COMPLEX ENGINEERED SYSTEMS

SESSION CHAIR: DRISS MOULAY EL OUADGHIRI

INVITED TALK : MOHAMED BAKHOUYA

TOWARD SMART AND AUTONOMOUS LARGE-SCALE BLOCKCHAIN-BASED IOT SYSTEMS

• **ABDERRAHMANE ELAMRANI, HAFIDA ESSARDI, YOUSSEF ALIDRISSI, MEHDI NAJIB, KHALID ZINE-DINE, MOHAMED BAKHOUYA, ABDELILAH ROCHD AND DRISS ELOUADGHIRI.**

A Blockchain-based IoT Platform for Energy Sharing in Community-driven Farming Microgrids

• **AISSA HENNI, KHADIDJA HENNI, BOUALEM BOUKEZATA, JAAFAR GABER AND PASCAL LORENZ**

Optimization of Energy Costs using Deep Reinforcement Learning in Smart Grids

• **HAJAR EL MIRI, RAJAA NAJI EL IDRISSE, MEHDI NAJIB, AHMED NAIT SIDI MOH AND MOHAMED BAKHOUYA**

Towards a Blockchain-based IoT Platform for Buildings Energy Management integrating Electric Vehicles in Home Healthcare Context

• **SALMA ARICHE, ZAKARIA BOULGHASOUL, ABDELHAFID EL OUARDI, ABDELHADI ELBACHA, ABDELOUAHED TAJER AND STÉPHANE ESPIÉ**

Dynamic Energy Optimization for Electric Vehicle Propulsion Using Fuzzy Logic

DETAILED CONFERENCE PROGRAM

ROOM 3: APPLICATIONS OF AI ACROSS INDUSTRIES

SESSION CHAIR: MOHAMED EL ANSARI

• **SIRRI NAOUFAL, CHRISTOPHE GUYEUX AND CHRISTOPHE SOLA**

Advanced Machine Learning for Predicting Drug Resistance in Clinical Isolates of Mycobacterium tuberculosis Complex

• **MOHAMED OUBRAIME, REDA EL ABASSI AND ABDERRAHIM SABOUR**

Periodic Linear Kernel for Cancer Classification Datasets

• **BOUTHAYNA ADDAALI, RACHID LATIF AND AMINE SADDIK**

Addressing the spread of infectious diseases in the era of Explainable AI

• **HOUSSAM ZOUHRI AND ALI IDRI**

Assessing the effectiveness of Synthetic Data Generation for multi-class cyber-attacks detection using Generative Adversarial Networks

• **ABDERAHMANE HAMDouchi AND ALI IDRI**

Comprehensive evaluation of federated learning for IoT intrusion detection

• **DONGMEI CHEN, YU XIAO AND JUN WU**

Are Rank Aggregation Methods Robust to Collusive Disturbance?

1:05 PM – 2:30 PM

LUNCH

2:30 PM – 3:15 PM
(Plenary)

KEYNOTE SPEAKER 3 : ALI IDRI

ENSEMBLE LEARNING FOR MEDICAL DECISION MAKING

SESSION CHAIR: MOHAMED BAKHOUYA

DETAILED CONFERENCE PROGRAM

3:15 PM – 4:15 PM

PARALLEL SESSIONS

ROOM 1: MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS

SESSION CHAIR: LOUIS KLEIN

• **LUYAO WANG, LIBIN CHEN, ZHIWEI YANG, KEWEI YANG AND QINGQING YANG.**

DRLKHN: A Self-learning Heterogeneous Network Key Nodes Identification Method

• **LUCAS JÓDAR, SHEILA TORRES AND RAFAEL COMPANYY**

A logistic model of irregular immigration: The complex case of Spain

• **SAIDA HACHIMI EL IDRISI AND MOHAMED NEMICHE**

Formation of Complex Societies: An Agent-Based Model Inspired by Freudian Theory

ROOM 2: COMPLEX ENGINEERED SYSTEMS

SESSION CHAIR: MOHAMED BAKHOUYA AND ABDELHADI ELBACHA

• **SHUOSHUO GONG, GANG CHEN, ZHIWEI YANG, QINGQING YANG AND MENGJUN LI**

Research on Optimization of Emergency Rescue Materials Scheduling Based on Multilayer Optimization Strategy

• **FATIHA EL AOUNI, KARIMA MOUMANE, SIHAM BENDAOUYA, AYMANE AIT LAASRI AND YACINE WAHI**

Development of a JIRA plugin for tracking and managing time allocations for tasks and projects

• **JIHAD KILANI, HAMZA KARMAOUI IDRISI, YASSINE EL YAMANI, FAYCAL BENSALAH AND BADDI YOUSSEF**

Study and Evaluation of network security strategies in SDN networks

DETAILED CONFERENCE PROGRAM

	<p>ROOM 3: APPLICATIONS OF AI ACROSS INDUSTRIES</p> <p>SESSION CHAIR: RACHID LATIF</p> <ul style="list-style-type: none">• YOUNES KABBADJ AND NOURA BENTAHER Evaluating Various Training Strategies and Different Backbones for U-Net in Breast Mass Segmentation• YOUSRA CHERIF AND ALI IDRI Evaluating the Efficacy of Wrappers in Predicting Species Distribution• ZEIDANE SIDI BOUBACAR AND FAISSAL OUARDI Automating Recruitment Process Using NLP and Deep Learning: A Novel Approach for Accurate Candidate Selection
4:15 PM – 4:45 PM	COFFEE BREAK
4:45 PM – 6:00 PM	<p>PARALLEL SESSIONS</p> <p>ROOM 1: MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS</p> <p>SESSION CHAIR: REDA BENKIRANE</p> <ul style="list-style-type: none">• IHSANE SALLEH, ABDELAZIZ BEN LAHBIB AND LAHCEN AZRAR Numerical solution of nonlinear stochastic processes under Gaussian white noise• MASATOSHI FUNABASHI, KEI NONAKA AND TOMOYUKI MINAMI. Scale-Free Correction of Under-/Over-Reported Biases in Global Biotic Interaction Network• PAOLO J. SINGH AND RALUCCA GERA Designing a Dynamic Network of Knowledge of Micro-learning Content

DETAILED CONFERENCE PROGRAM

ROOM 2: COMPLEX ENGINEERED SYSTEMS

SESSION CHAIR: HAQIQ ABDELKRIM AND ZAKARIA BOULGHASOUL

• **FADWA LACHHAB AND MOHAMED BAKHOUYA**

Energy efficient lighting system control combined with shading system using IoT and AI technologies

• **ABDESSAMAD EL MOBARAKY, KHALID BENJELLOUN, KHALID KOUISS AND AHMED CHEBAK**

Interval Type-3 Adaptive Fuzzy Fixed-Time Robust Attitude Control for Fixed-Wing UAV

• **ZHU XIANG, HAILIANG CHEN, ZHIWEI YANG AND QINGQING YANG**

Simulation-based Multi-Objective Optimization of Production Systems with Multiple Rework Paths

• **ABDERRAHMANE BOUDRIBILA, ABDELOUAHED TAJER AND ZAKARIA BOULGHASOUL**

From Natural Language to Code: AI Automation in Cyber-Physical Manufacturing Systems

6:00 PM – 6:45 PM
(Plenary)

KEYNOTE SPEAKER 4 : STEPHEN WOLFRAM

COMPLEXITY AND THE COMPUTATIONAL PARADIGM
SESSION CHAIR : HIROKI SAYAMA

DETAILED CONFERENCE PROGRAM

TUESDAY, NOVEMBER 12, 2024

8:00 AM – 9:00 AM	REGISTRATION
9:00 AM – 9:45 AM (Plenary)	<p>KEYNOTE SPEAKER 5 : ZORAN OBRADOVIC CHARACTERIZING DISRUPTIVE EVENTS BY MODELING DYNAMICS IN MULTIPLEX NETWORKS SESSION CHAIR : ALI IDRI</p>
9:45 AM – 10:15 AM	COFFEE BREAK
10:15 AM – 1:30 PM	<p>PARALLEL SESSIONS</p> <p>ROOM 1: MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS</p> <p>SESSION CHAIR: STEPHAN PETER</p>
	<p>10:15 AM – 10:45 AM</p> <p>INVITED TALK : HECTOR ZENIL ON THE COMPLEXITY OF LIVING SYSTEMS AND THEIR BIOSIGNATURES</p> <ul style="list-style-type: none"> • MAHAMADOU BELEM, ABDOUL RACHID COMPAORE, MEHDI SAQALI AND IDRIS KABORE Analysis of inter-provincial migration drivers in Burkina Faso using machine learning approach • OTHMAN BOULITAMA AND KARIM SABRI Information asymmetry in the supply chain • YACOUBA OUEDRAOGO, MAHAMADOU BELEM, THÉODORE TAPSOBA AND MEHDI SAQALLI A systematic review of education system modeling • JIHAD LAGHNIMI, KARIMA MOUMANE, AHMED ZELLOU, MERYEM LAMKIMEL, ZINEB KACIMI AND YACINE WAHI ISO/IEC 27001 certification in Moroccan companies: Trends and future recommendations • ZAKARIA BELGHALI, EL HASSAN ABDELWAHED AND OLIVIER MONGA Mathematical and computational modelling of three dimensional pore space in soil images

DETAILED CONFERENCE PROGRAM

ROOM 2: CHAIR OF COMPLEXITIES ∞ HUMANITIES UM6P SESSION

SESSION CHAIRS : REDA BENKIRANE AND NICOLAS SPERRY-GUILLOU

10:15 AM – 11:00 AM

INVITED TALK : HERVÉ ZWIRN
DETERMINISM AND PREDICTABILITY

11:00 AM – 11:45 AM

INVITED TALK : GREGORY CHAITIN
VON NEUMANN ON BIOLOGY AND LIFE AS EVOLVING SOFTWARE

11:45 AM – 12:30 PM

INVITED TALK : JEAN-PAUL DELAHAYE
LA COMPLEXITÉ DE CHAITIN-KOLMOGOROV ET LA PROFONDEUR
LOGIQUE DE BENNETT

12:30 PM – 1:15 PM

INVITED TALK : HUGUES BERSINI
ALGOCRACY AND PUBLIC SERVICES

ROOM 3: APPLICATIONS OF AI ACROSS INDUSTRIES

SESSION CHAIRS : RACHID LATIF AND ABDELOUAHED TAJER

• **MOHAMED LAMANE, ABDESSAMAD KLILOU AND MOHAMED TABAA**

Detecting mechanical failure with mmWave radar using Deep Learning

• **MOHAMMED AMINE JOUAHRI, ZAKARIA BOULGHASOUL AND ABDELOUAHED TAJER**

Employing Mamdani Inference in the Detection and Localization of Faults within an Electric Lighting Network

• **MUSTAPHA EL HASSANI, ABDELHADI ELHARFI AND SAMIR EL MOURCHID**

Motion Planning Problem For A 1-D Wave Equation

• **PATRIK CHRISTEN**

Programming of Cellular Automata in C and C++

• **ZINEB ACHOR, YASSINE ZAHRAOUI, SOUAD TAYANE, MOHAMED ENNAJI AND JAAFAR GABER**

Injection Molding Analysis for Bird-Feeder by Optimizing the Shrinkage and Warpage Deformation

DETAILED CONFERENCE PROGRAM

	<ul style="list-style-type: none"> <p>• SMAIL BARIKO, ABDESSAMAD KLILOU, ABDELOUAHED ABOUNADA AND ASSIA ARSALANE Parallel implementation of Gaussian mixture model background subtraction on Jetson Nano</p> <p>• KHADIJA JAHID, RACHID LATIF AND AMINE SADDIK Comprehensive Review of Water Resource Management and Embedded Systems Applications in Morocco</p> <p>• HANANE EL FERDAOUSI, WISSAM JENKAL, MOSTAFA LAABOUBI, BOUCHRA BENDAHANE AND RACHID LATIF An Overview of FPGA-Accelerated Deep Learning for ECG Signal Classification in Precision Healthcare</p> <p>• HASSAN ROUANE, SOUAD TAYANE, MOHAMMED ENNAJI AND JAAFAR GABER Generative Design case study for Eco-Efficient Vehicles: Lower Emissions and Greater Range</p> <p>• HODA EL BOUSSAKI, RACHID LATIF AND AMINE SADDIK Deep learning methods for non-contact heart rate monitoring: a review</p> <p>• WALID ABOUZOUL, SOUAD TAYANE, MOHAMED ENNAJI AND JAAFAR GABER Graphene-Based Morphing Skin: Harnessing Thermomechanical Properties for Aerodynamic Efficiency</p> <p>• FATIMA-EZ-ZAHRA GRINI, WALID ABOUZOUL, SOUAD TAYANE, MOHAMED ENNAJI AND JAAFAR GABER Bacterial Propulsion in Challenging Fluids: A Multiphysics Approach to Simulating E. coli Active Matter in Contaminated Aquatic Environments</p> <p>• HMAMOU YAHYA, CHAFI ANAS AND KAMMOURI ALAMI SALAHEDDINE Exploring the impact of industry 4.0 technologies on logistics</p>
<p>1:30 PM – 2:30 PM</p>	<p>LUNCH</p>
<p>2:30 PM – 2:45 PM</p>	<p>WCCS24 WOLFRAM PAPER AWARDS</p>
<p>2:45 PM – 3:00 PM</p>	<p>CLOSING SESSION</p>



5th World Conference on
**COMPLEX
SYSTEMS**
November 11-14, 2024
Mohammedia, Morocco