



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

CONFERENCE PROGRAM





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**COMPLEX
SYSTEMS**
November 11-14, 2024
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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 ESSAIDI
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 KADAoui SOCIETAL METAMORPHOSIS: ON GOVERNANCE AND TRANSFORMATION IN SOCIAL ECOSYSTEMS • 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 BEREa, 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 COMPANY**

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

• **SAIDA HACHIMI EL IDRISSI 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 IDRISSI, YASSINE EL YAMANI, FAYCAL BENSALAH AND BADDI YOUSSEF**

Study and Evaluation of network security strategies in SDN networks

DETAILED CONFERENCE PROGRAM

	ROOM 3: APPLICATIONS OF AI ACROSS INDUSTRIES SESSION CHAIR: RACHID LATIF • 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	PARALLEL SESSIONS ROOM 1: MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS SESSION CHAIR: REDA BENKIRANE • 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)	KEYNOTE SPEAKER 5 : ZORAN OBRADOVIC CHARACTERIZING DISRUPTIVE EVENTS BY MODELING DYNAMICS IN MULTIPLEX NETWORKS SESSION CHAIR : ALI IDRI
9:45 AM – 10:15 AM	COFFEE BREAK
10:15 AM – 1:30 PM	PARALLEL SESSIONS
10:15 AM – 10:45 AM	ROOM 1: MODELING AND MANAGING COMPLEX SOCIAL AND ECOLOGICAL SYSTEMS SESSION CHAIR: STEPHAN PETER
	INVITED TALK : HECTOR ZENIL ON THE COMPLEXITY OF LIVING SYSTEMS AND THEIR BIOSIGNATURES • MAHAMADOU BELEM, ABDOUL RACHID COMPAORE, MEHDI SAQALLI 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

	• SMAIL BARIKO, ABDESSAMAD KLILOU, ABDELOUAHED ABOUNADA AND ASSIA ARSALANE Parallel implementation of Gaussian mixture model background subtraction on Jetson Nano • KHADIJA JAHID, RACHID LATIF AND AMINE SADDIK Comprehensive Review of Water Resource Management and Embedded Systems Applications in Morocco • HANANE EL FERDAOUSSEI, WISSAM JENKAL, MOSTAFA LAABOUBI, BOUCHRA BENDAHANE AND RACHID LATIF An Overview of FPGA-Accelerated Deep Learning for ECG Signal Classification in Precision Healthcare • HASSAN ROUANE, SOUAD TAYANE, MOHAMMED ENNAJI AND JAAFAR GABER Generative Design case study for Eco-Efficient Vehicles: Lower Emissions and Greater Range • HODA EL BOUSSAKI, RACHID LATIF AND AMINE SADDIK Deep learning methods for non-contact heart rate monitoring: a review • WALID ABOUZOUZ, SOUAD TAYANE, MOHAMED ENNAJI AND JAAFAR GABER Graphene-Based Morphing Skin: Harnessing Thermomechanical Properties for Aerodynamic Efficiency • FATIMA-EZ-ZAHRA GRINI, WALID ABOUZOUZ, 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 • HMAMOU YAHYA, CHAFI ANAS AND KAMMOURI ALAMI SALAHEDDINE Exploring the impact of industry 4.0 technologies on logistics
1:30 PM – 2:30 PM	LUNCH
2:30 PM – 2:45 PM	WCCS24 WOLFRAM PAPER AWARDS
2:45 PM – 3:00 PM	CLOSING SESSION



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