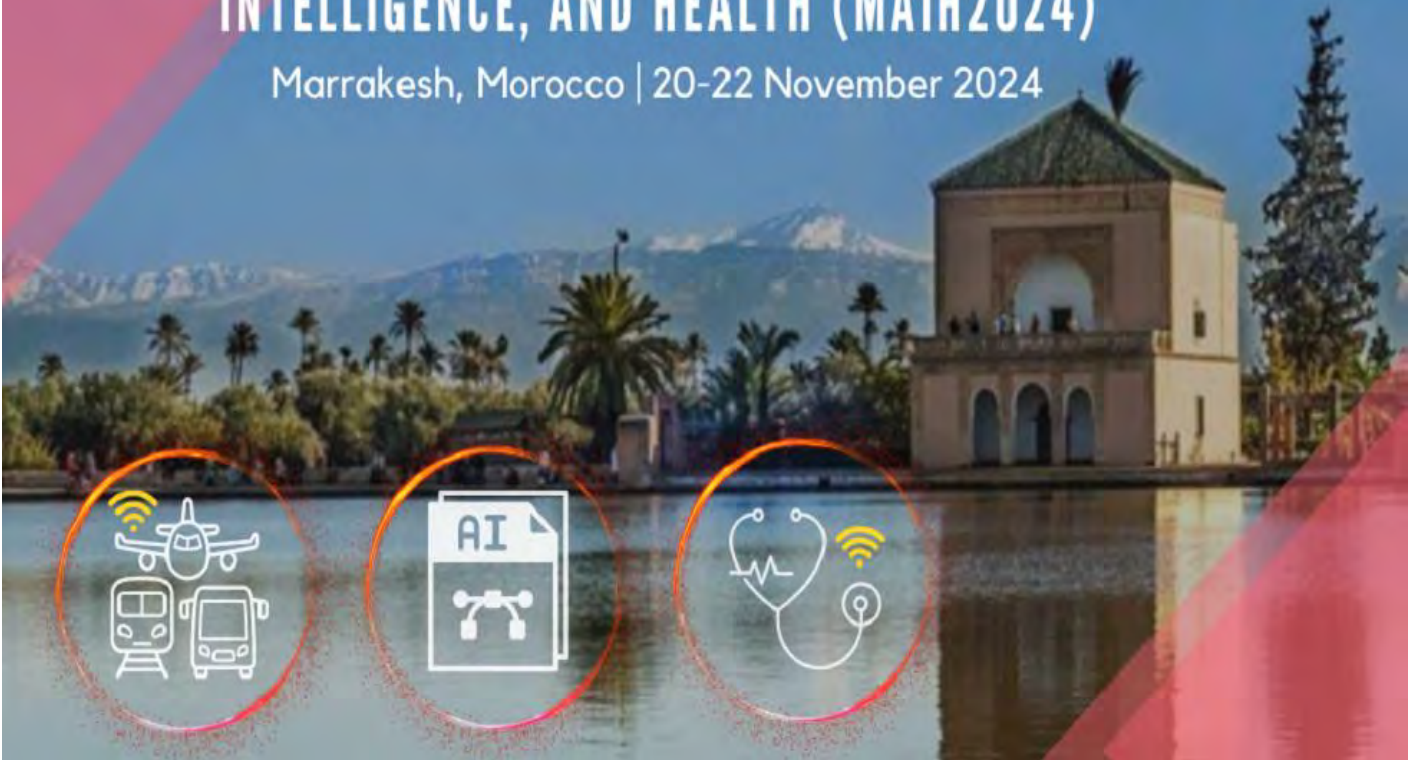


INTERNATIONAL CONFERENCE ON MOBILITY, ARTIFICIAL INTELLIGENCE, AND HEALTH (MAIH2024)

Marrakesh, Morocco | 20-22 November 2024



 **Faculty of Sciences Semlalia, Marrakesh, Morocco**

 **20-22 November 2024**



PREFACE

The Cadi Ayyad University of Marrakech (UCA) and the Moroccan School of Engineering Sciences Marrakech (EMSI) are pleased to present the main results of the International Conference on Mobility, Artificial Intelligence and Health (MAIH 24), held in Marrakech, 20 - 22 Novembre, 2024, through this Book of Proceedings.

MAIH24 Marrakech is co-organized by the LAMIGEP Research Laboratory of the Moroccan School of Engineering Sciences Marrakech, the I2SP research team and the LSEET laboratory of Cadi Ayyad University, LISAD Research Laboratory, Industrial Engineering Department, National School of Applied Sciences, Ibn Zohr University, Agadir, Morocco, and the High School of Engineering on Applied sciences (INSA) of the Université Polytechnique Hauts-de-France.

This first edition of MAIH International Conference provides a distinctive platform for researchers, professionals, and students to share and discuss ideas pertaining in the fields of Mobility, Health, and Artificial Intelligence and related subjects, exploring their practical applications in the real world. This conference is a must-attend event for those interested in staying up-to-date with the latest developments in Mobility, Health, and Artificial Intelligence.

The MAIH 24 International Conference plays a crucial role in advancing knowledge and promoting innovation in AI solutions that prioritize accessibility and inclusivity to support equitable health and mobility. We guarantee the quality, originality, adherence, and relevance of the topics covered to align with the standards of both journals: The *Cognition, Technology & Work* journal (**CTW**), and *Web of Conferences Journal* (**WoC**), indexed in Clarivat/Web of Science.

We would like to thank all the contributors, referees and the scientific committee for their kind co-operation with MAIH 24; to the honorary committees: the president of UCA, Director General of EMSI, Dean of FSSM UCA, Dean of FSTG UCA, and Director of EMSI Marrakech. To thank also the whole team of organizing committee, for their kind advise and help to publish this book. The organizers of MAIH2024 would like to thank the GRAISyHM research group and the Hauts-de-France TIFSID regional project for their support. Finally, we would like to express our gratitude to everyone who contributed from near or far to the success of this scientific event and for their support in the preparation of this conference.



Prof. A. ZEROUAL
(FSS-UCA-Marrakech)



Prof. F. VANDERHAEGEN
(INSA-FRANCE)

COMMITTEES

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KEYNOTE SPEAKERS

Pr. Najib KISSANI, Head of Neurology Department, University Hospital Mohamed VI,
Marrakech, Morocco

Dr. Eric BULEUX-OSMANN, Transhépate Hauts-de-France, Allemagne

Pr. Mohamed BAKHOUYA, professor of computer science at the International University of
Rabat, Morocco

Pr. Intissar HADDIYA, nephrologist, full Professor of Nephrology at the faculty of medicine and
pharmacy - Mohammed Premier University- Oujda, Morocco

Pr. Abdelhafid EL OUARDI, professor, Paris-Saclay University, France.

Pr. Sergio Rodriguez FLOREZ, professor, Paris-Saclay University, France.

Pr. Najib AL IDRISSI, Mohammed VI University of Sciences and Health, Casablanca, Morocco

Pr. Amr MAOUJOD, professor, Faculty of medicine & Pharmacy - Cadi Ayyad University
Marrakech Morocco

MAIN PROGRAM OF MAIH 2024 CONFERENCE

Wednesday, November 20, 2024

8h00 – 9h15	Welcome and Registration of participants	
9h15 – 9h45	Opening Ceremony of MAIH 2024 Conference Official Speeches	
09h45 – 10h45	Keynote speaker 1 : Prof. Najib KISSANI FMPM, Cadi Ayyad University Title : Moroccan experience in telemedicine and AI in neurology Chairs : Prof. H. BELAHRACH - Prof. S. IBNYAICH	
10h45 – 11h15	Coffee break	
11h15 – 12h45	Session 1 : AI (Room 1)	Session 2 : Transactions (Room 2)
12h45 - 14h45	Lunch Break	
14h45 - 16h00	Invited Session: Mobility Prof. Abdelhafid El Ouardi Prof. Sergio Rodriguez Florez Advances in Hardware-Software Codesign applied to Intelligent Transportation Systems Chairs : S. CHABAA – S.IBNYAICH	
16h00 – 16h30	Coffee break	
16h30 - 18h15	Session 3 : Mobility (Room 1)	Session 4 : Health (Room 2)

Thursday, November 21, 2024

9h00 – 09h45	Keynote speaker 2 : Dr Eric BULEUX-OSMANN Title : Newlife, A dream application for transplant patients ! Chairs : Prof. A. ZEROUAL - Prof. F. VANDERHAEGEN	
09h45 – 10h15	Coffee break	
10h15 - 12h00	Session 5 : AI (Room 1)	Session 6 : Transactions (Room 2)
12h00 - 14h00	Lunch Break	
14h00 – 14h45	Keynote speaker 3 : Prof. Mohamed BAKHOUYA International University of Rabat Title : A Blockchain-based IoT platform for enabling Sustainable and Green Mobility Chairs : Prof. A. EL KARI - Prof. S. CHABAA	
14h45 – 16h15	Session 7 : Mobility (Room 1)	Session 8 : Transactions (Room 2)
16h15 – 16h45	Coffee break	
16h45 – 18h15	Session 9 : Health (Room 1)	Session 10 : Transactions (Room 2)
20h00 - 22h00	GALA DINNER (with additional fees)	

Friday, November 22, 2024

9h00 – 11h00	Invited Session : AI in Health Prof. Intissar HADDIYA Artificial intelligence in healthcare: a focus on the best practices Prof. Najib AL IDRISSI Artificial intelligence and connected health Prof. Amr Maoujoud With the generalization of AI and algorithms: Will we still need a Nephrologist in the dialysis room ? Chairs : Dr E. BULEUX-OSMANN – Pr A. ZEROUAL	
11h00 – 11h30	Coffee break	
11h30 - 12h30	Session 11 : Health (Room 1)	Session 12 : AI (Room 2)
12h30 - 13h15	Closing Ceremony	
14h15- 15h15	Lunch Break	

SESSIONS PROGRAM OF MAIH 2024 CONFERENCE

Wednesday, November 20, 2024 - 11h15 – 12h45

Room 1 ID	Session 1 : Artificial Intelligence Chairs : Pr A.EL KARI ; Pr S.CHABAA ; Pr R. MOUACHI
4413	"Bridging Explainability and Interpretability in AI-driven SCM Projects to Enhance Decision-Making", Taoufik El Oualidi and Saïd Assar
3400	"Empowering Learners: GenIA and Their Impact on SELF-REGULATED LEARNING" , Yassine Safsouf and Raja Mouachi
0076	"Naive Bayes for Smart Building Management : Predicting Workspace Occupancy", Mohammed Ennejjar, Samira Chabaa, Mohammed Ali Jallal and Abdelouhab Zeroual
3877	"Development of an intelligent virtual assistant for digitalization of Moroccan agriculture", Jawad Iounousse and Omar Temsamani

Room 2 ID	Session 2 : Transactions Chairs : Pr H.BELAHRACH ; Pr M.CHENNANI ; Pr A.TAJER
6563	"DevSecOps pipeline for multi-tier web applications", Abderrahim Rida and Ayoub Ait Lahcen
0900	"A new miniaturized multi-band transparent antenna for V2X communication", Omar Ourahou, Hassan Belahrach and Abdelilah Ghammaz
6901	"A New Enhanced Microstrip Patch Antenna with Circular Polarization for mobile applications", Abdelilah Ait Lahcen, Samira Chabaa, Saida Ibnyaich and Abdelouhab Zeroual
1719	"Development of an Intelligent Communication Platform for Remote Practical Work in Education: Integrating AR, VR, and Cloud Technologie", Abdelali El Gourari, Mustapha Ezzini, Mustapha Raoufi, Mohammed Skouri, Samira Achki, Yassine Ait Lahcen and Raja Mouachi

Wednesday, November 20, 2024 - 16h30 - 18h15

Room 1 ID	Session 3 : Mobility Chairs : Pr D. BELKHAYAT ; Pr A.EL OUARDI ; Pr F. VANDERHAEGEN
9302	"Machine Learning Analysis of Informal Minibus Taxi Driving", Nomfundo Cele, Alain Kibangou and Walter Musakwa
8192	"Evaluating the Role of Motorcycles in Start-Up Time and Headway Distribution at Signalized Intersections in Smart Cities", Ayoub Charef and Raja Mouachi
9555	"Performance Evaluation of a Visual Defects Detection System for Railways Monitoring", Sasa Radosavljevic, Alain Rivero, Sergio Rodriguez Florez, Abdelhafid El Ouardi, Pauline Michel and Philippe Vanheeghe
8008	"Educable learning-oriented multilevel shared autonomy for inclusive mobility and healthcare", Frédéric Vanderhaegen and Corentin Ascone

Room 2 ID	Session 4 : Health Chairs : Dr E. BULEUX-OSMANN ; Pr A.OULAD SAID
5211	"Wearable fractal integrated antennas for medical applications", Abdelati Reha, Oumaima Benkhadda, Meryama Harrou and Mohamed Saih
6017	"Configuration de réseaux de parcours de santé, pour patients atteints de maladies chroniques", El Hassan Laaziz
4869	"Improving Health Through Indoor Environmental Quality Monitoring: A Review of Data-Driven Models and Smart Sensor Innovations", Rachid Kidari and Amine Tilioua (on line)
1927	"Predicting Emergency Department Patient Waiting Volume Using Time Series Machine Learning Models", Abdulaziz Ahmed, Bunyamin Ozaydin and Orhun Vural (on line)

Thursday, November 21, 2024 - 10h15 - 12h00

Room 1 ID	Session 5 : Artificial Intelligence Chairs : Pr E. CHAKIR EL ALAOUI ; Pr S.CHABAA
4670	"YOLOv10-Enabled IoT Robot Car for Accurate Disease Detection in Strawberry Cultivation", Abdelaziz Bellout, Mohamed Zarboubi, Azzedine Dliou, Rachid Latif and Amine Saddik
9585	"Efficient and real-time lane detection using a CUDA-based implementation", Hoda el Boussaki, Rachid Latif and Amine Saddik
7441	"Digital Modeling of Soil-Borne Fusarium's Nutritional: Investigating Microbiological and Microecological Dynamics in Moroccan Agroecosystems", Youssef El Hilali Alaoui, Said Bouda, Samira Chabaa, Mohammed Elouali Alami, Zakaria Khoudi and Adil Essarioui
5911	"Energy Efficiency in Smart Buildings through Prediction modeling and Optimization Using a Modified Whale Optimization Algorithm", Nasima El Assri, Mohammed Ennejjar, Mohammed Ali Jallal, Samira Chabaa and Abdelouhab Zeroual
5413	"Computational and dynamic performances of NN control in wind turbine systems", Belkasem Imodane, Kaoutar Dahmane, Brahim Bouachrine, Abdellah El Idrissi, Mohamed Benydir and Mohamed Ajaamoum

Room 2 ID	Session 6 : Transactions Chairs : Pr A.GHAMMAZ ; Pr S.IBNYAICH ; Pr A.REHA
2945	"Design and Performance Analysis of a Dual-Band Fractal Antenna for Millimeter-Wave 5G Applications", Oaima Benkhadda, Abdelati Reha, Mohamed Saih and Meryama Harrou
1277	"Design and Feeding Techniques of Patch Antenna with Various Shapes for IoT in the 2.45 GHz ISM Band", Meryama Harrou, Oaima Benkhadda, Mohamed Saih, Youssef Rhazi and Abdelati Reha
5936	"Optimization and Performance Enhancement of a Miniaturized Rectangular Patch Antenna with Slotted Ground Plane Using Ant Colony Algorithm", Ibtissam Bahlaouane, Abdelfettah Belhabib, Saida Ibnyaich and Abdelouhab Zeroual
2350	"Design of an Intelligent Energy Management Prototype for an Electric Lighting Network on a Raspberry Pi Board", Mohammed Amine Jouahri, Manal Moukhtari, Nabil Oulhaj, Mounir Khimouj, Abdelouahed Tajer and Zakaria Boulghasoul
5009	"Performance comparison of different algorithms to secure the information for Wireless sensor Network", Oumayma El Gatte, Ahmed El Abbassi, Omar Mouhib and Amine Tilioua (on line)

Thursday, November 21, 2024 - 14h45 – 16h15

Room 1 ID	Session 7 : Mobility Chairs : Pr M. BAKHOUYA ; Pr E.EL WARRAKI
1675	"Multi-model based behaviour analysis for inclusive mobility", Frédéric Vanderhaegen and Philippe Richard
7492	"Towards artificial intelligence-based rail driving assistance tools", Jean-Valentin Merlevede, Simon Enjalbert, Frédéric Vanderhaegen and Francesco Flammini
5897	"Towards cooperative management of fatigue and vigilance in railway operations", Quentin Berdal, Quentin Gadmer and Philippe Richard
4748	"Understanding the railway driving activity to design HUD: Recommendations and specificities for future light trains", Cécile Bernard, Quentin Gadmer and Philippe Richard
0601	"Robust H_{∞} Control Implementation in IFOC for High-Performance Electric Vehicle Induction Motors", Abdelhak Boudallaa, Mohammed Chennani, Ahmed Belkhadir, Karim Rhofir and Driss Belkhat

Room 2 ID	Session 8 : Transactions Chairs : Pr A.OULAD SAID ; Pr M.CHAKRAOUI ; Pr A.REHA
1332	"An Overview and State of The Art in Reconfigurable Antennas with Their Applications", Salah Salah Eddine El Aoud, Hind Abbaoui, Sanae Attioui, Nasima El Assri, Saida Ibnyaich and Abdelouhab Zeroual
0281	"IoT-Based Pest Detection in Agriculture Using Raspberry Pi and YOLOv10m for Precision Farming", Mohamed Zarboubi, Abdelaaziz Bellout, Samira Chabaa, Azzedine Dliou and Abdelouhab Zeroual
7525	"Design of a Dual Band Antenna for Wireless Communications Utilizing the Sierpinski Carpet Fractal", Sanae Attioui, Asma Khabba, Saida Ibnyaich and Abdelouahab Zeroual
2420	"TRAINING FUTURE ENGLISH TEACHERS IN THE CONTEXT OF USING DIGITAL TECHNOLOGIES", Feruz Mukhammadiev (On line)
2775	"Optimizing Convolution Operations for YOLOv4-based Object Detection on GPU", Fatima Zahra Guerrouj, Sergio Rodriguez Florez, Abdelhafid Elouardi, Mohamed Abouzahir and Mustapha Ramzi (On line)

Thursday, November 21, 2024 - 16h45 – 18h15

Room 1 ID	Session 9 : Health Chairs : Dr E. BULEUX-OSSMAN ; Pr S.CHABAA
9317	"Advanced Cancer Classification Using AI and Pattern Recognition Techniques", Sara Haddou Bouazza and Jihad Haddou Bouazza
5954	"Evaluating Machine Learning Models for Prostate Cancer Classification Using Gene Expression Profiles from DNA Microarrays", Sara Haddou Bouazza and Jihad Haddou Bouazza
5201	"Electronic nose system design and analysis", Abderrazak Manser and Tarik Saidi
4791	"Enhanced 12-Lead ECG Reconstruction from Single-Lead Data Using WaveNet", Said Et-Tousy, Soufiane Ait El Aouad, Jamal Et-Tousy and Abdellah Zyane (On line)

Room 2 ID	Session 10: Transactions Chairs : Pr S.IBNYAICH ; Pr H.BELAHACH ; Pr A.REHA
2610	"Improving High-Speed Interconnect Modeling: The Theta-Method for Accurate Simulation of Skin Effect and Computational Efficiency", Mouaad Ait Errais, Khaoula Ait Belaid, Hassan Belahrach and Abdelouhab Zeroual
6123	"Design and Optimization of a Multiband Extra Wideband Ring Patch Antenna for 5G mm-Wave Communication at 28/60/80 GHz Using MLPNN based K-fold cross validation method", Lahcen Sellak, Samira Chabaa, Saida Ibnyaich, Asma Khabba and Abdelouhab Zeroual
4441	"Enhancing Quality of Service in Software-Defined Internet of Things (SD-IoT) Environment : a review", Abdelali Grif and Abdellah Zyane
6019	"The Effectiveness of Hybrid Beamforming in Enhancing the Performance of NOMA-mmWave and Massive MIMO Systems", Mourtada Oubassghir and Mohamed Boulouird
2474	"Enhancing 5G Networks with Edge Computing: An overview Study", Halima Chaouki, Radouane Iqdour and Mohamed Boulouird

Friday November 22, 2024 - 11h30 - 12h30

Room 1 ID	Session 11 : Health Chairs : Pr A.DAROUCIHI ; Dr E.BULEUX-OSSMAN ; Pr R.ER-REBYIY
8953	"Colon Cancer Classification Using Pattern Recognition and Computer Vision Techniques", Sara Haddou Bouazza and Jihad Haddou Bouazza
8383	"Multi-Path Vision Transformer for MRI Brain Tumor Segmentation", Mourad Hikki, Aziz Darouichi and Abdessamad Elboushaki
2777	"Smart Cities: Catalyst for Sustainability and Health", Bojan Grum and Darja Kobal Grum
2659	"Disease prediction using NLP techniques", Farah Sniba and Hamza Ouabiba

Room 2 ID	Session 12 : Artificial Intelligence Chairs : Pr A.ABDALI ; Pr A.EL KARI ; Pr S.CHAKRI
6947	"Blockchain's Impact on Morocco's Financial Sector: Opportunities and Challenges", Ishaq Asly and Driss Essabbar
1377	"Leveraging AI for Enhanced Operational Risk Management in Sports Events", Malak Jibraili, Abderrahim Rharib and Zineb Jibraili
3283	"Birotor Coaxial Model Estimation using Different Influence Function of Cultural Algorithm", Mohamed Azegmout, Mostafa Mjahed, Abdeljalil El Kari and Hassan Ayad
2020	"Performance evaluation of forecasting strategies for building occupancy prediction", Amine Maniar, Laurent Delahoche, Larbi Chrifi-Alaoui, Mourad Zegrari, Mohamed Hamlich, Bruno Marhic and Jean-Baptiste Masson

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