



**2024 22nd International Conference on Research and
Education in Mechatronics
(REM 2024)**

September 24–25, 2024

King Hussein bin Talal Convention Center, Dead Sea, Jordan

<https://rem2024.gju.edu.jo/>

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Welcome Message

On behalf of the German Jordanian University (GJU) and the conference organizing committee, it gives us a great pleasure to welcome you to the 22nd International Conference on Research and Education in Mechatronics (REM 2024). As the annual conference for the German Society of Mechatronics (DGM) since 1999, it is a great honor to host this prestigious event in Jordan for the first time in its history. This year's REM is taking place September 24 – 25, 2024 in Dead Sea, Jordan at the King Hussein bin Talal Convention Centre managed by Hilton.

As we celebrate the 22nd edition of REM, we are excited to bring together leading experts, passionate researchers, and dedicated educators from around the globe. At REM 2024, we're committed to creating an environment that promotes learning, collaboration, and growth. The conference aims to foster dialogue, inspire new ideas, stimulate the exchange of experiences, and address the latest challenges and advancements in mechatronics.

REM 2024 received submissions in eight tracks that cover various aspects of mechatronics engineering with emphasis on recent technological trends including artificial intelligence, robotics, and the fourth industrial revolution. The conference received 102 paper submissions in all tracks. Each of these papers was sent to three expert reviewers or more. The conference has a 67% acceptance rate where out of the 107 received papers from 26 countries, only 69 papers are included in the conference proceedings and are presented in the 13 technical sessions of this conference. The papers that are successfully presented are also submitted for publication to the IEEE Xplore digital library and indexed in Scopus.

The technical program for REM 2024 also includes four keynote speeches that will be delivered by four world renowned scientists and professionals. The keynote speeches will address cutting edge research in small scale robotics, automotive, industrial automation, and medical machine vision. The respective titles of these keynote speeches are: "Piezoelectric Systems for Small Scale Tasks: Design, Modeling, Control, and Signal Estimation", "Non-contact Sensing in Automotive Applications-A Perspective of Robustness and Reliability", "Mastering the Sustainability Challenge with Industry 4.0, AI, and Education", and "Particularity and Challenges of Machine Learning for Intra-operative Imaging (MLMI2): Towards precision and Intelligence in high intensity, dynamic environments".

We would like to thank the German Society of Mechatronics (DGM), German University Consortium for International Cooperations (DHIK), IEEE – Jordan Section for sponsoring, and supporting this conference, as well as IEEE conference operations for publishing the conference proceedings. Moreover, we would like to thank all financial sponsors for their valuable contributions and support.

Finally, yet importantly, we would like to express our deepest appreciation to the members of the National Organizing Committee, International Program Committee, Track Chairs, reviewers, and the student volunteers for their valuable efforts in making REM 2024 a successful event.

We encourage you to take full advantage of the sessions, network with your peers, and immerse yourself in the wealth of expertise on offer. Your participation and contributions are what make this conference a success, and we are delighted to have you join us at this exciting event.

Thank you for being part of REM 2024. Let's make this year's conference a memorable and impactful experience in Dead Sa, Jordan!



Prof. Ala'aldeen Al-Halhouli
President
German Jordanian University



Dr. Hisham ElMoaqet
REM 2024 Conference Chair

Program Overview

	Mount Nebo 1	Mount Nebo 2
	Day 1: Tuesday- September 24, 2024	
9:00 - 16:00	Registration	
10:00 - 11:00	Opening (Dead Sea)	
11:00 - 11:30	Coffee Break	
11:30 - 12:30	Keynote Speech 1 (Dead Sea)	
12:30 - 14:00	AIM 1	RAS 1
14:00 - 15:00	Lunch	
15:00 - 16:00	Keynote Speech 2 (Dead Sea)	
16:00 - 16:30	Coffee Break	
16:30 - 18:00	BRS 1	ISM
18:00 - 19:00	ETM	ATS 1
	Day 2: Wed Sep 25, 2023	
9:00 - 12:00	Registration	
9:00 - 11:00	AIM 2	MSD
11:00 - 11:30	Coffee Break	
11:30 - 12:30	Keynote Speech 3 (Dead Sea)	
12:30 - 14:00	SAA 1	ATS 2
14:00 - 15:00	Lunch	
15:00 - 16:00	Keynote Speech 4 (Dead Sea)	BRS 2
16:00 - 16:30	Coffee Break	
16:30 - 18:00	SAA 2	RAS 2
18:00 - 20:00	Networking and Rest	
20:00 - 22:00	Gala Dinner and Award Ceremony (Terrace)	

AIM	Artificial Intelligence, Machine Learning, and Vision
ATS	Automotive and Transportation Systems
BRS	Biomedical and Rehabilitation Systems
ETM	Education and Training in Mechatronics
ISM	Industry 4.0, Smart Systems, and Manufacturing
MSD	Mechatronics System Design, Modeling, and Control
RAS	Robotics and Autonomous Systems
SAA	Sensors and Actuators

Keynote Speeches

1. Particularity and Challenges of Machine Learning for Intra-operative Imaging (MLMI2): Towards Precision and Intelligence in high intensity, dynamic environments, **Nassir Navab**.
2. Mastering the Sustainability Challenge with Industry 4.0, AI, and Education, **Reinhard Pittschellis**.
3. Piezoelectric Systems for Small Scale Tasks: Design, Modeling, Control, and Signal Estimation, **Micky Rakotondrabe**
4. Non-contact Sensing in Automotive Applications-A Perspective of Robustness and Reliability, **Mohammad Islam**

Organizers



Technical Sponsors



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Important Information

- **Parking** for the conference participants is available for free by the convention center.
- **The accepted papers' abstracts** are posted on [REM 2024-papers](#)
- **Authors' presentations** in the technical sessions are 15 minutes including discussion.

Conference Committees



General Chair

Ala'aldeen Al-Halhouli President of the German Jordanian University

Honorary Committee

Reiner Dudziak REM Honorary President, Germany

Rolf Biesenbach President of the German Society of Mechatronics (DGM), Germany

Organizing Committee

Hisham ElMoaqet	Conference Chair	German Jordanian University
Mutaz Ryalat	Conference Co-Chair	German Jordanian University
Rolf Biesenbach	Conference Co-Chair	German Society of Mechatronics
Tarek Tutunji	Technical Program Chair	Al Hussein Technical University
Rami Alazrai	Member	German Jordanian University
Mohammad Salah	Member	Hashemite University
Ala' Khalifeh	Member	German Jordanian University
Samer Alabed	Member	German Jordanian University
Hani Muhsen	Member	German Jordanian University
Ghaith Al-Refai	Member	German Jordanian University
Sahar Qaadani	Member	German Jordanian University
Natheer Almtireen	Member	German Jordanian University
Mariam Ibrahim	Member	German Jordanian University
Mohammad AlQudah	Member	German Jordanian University

Track Chairs

Artificial Intelligence, Machine Learning, and Vision	Rami Alazrai
Automotive and Transportation Systems	Mohammed Abu Mallouh
Biomedical and Rehabilitation Systems	Samer Alabed
Education and Training in Mechatronics	Musa Al-Yaman
Industry 4.0, Smart Industry, and Manufacturing	Mohammed Bani Younis
Robotics and Autonomous Systems	Ahmad Alshorman
Mechatronics System Design, Modeling, and Control	Mohammad Salah
Sensors and Actuators	Tarek Younes

International Program Committee

Alexander Frenkel	Hamburg University of Applied Sciences	Germany
Rolf Roskam	Ostfalia University of Applied Sciences	Germany
Gernot Schullerus	Reutlingen University	Germany
Frank Pöhlau	Nuremberg Institute of Technology	Germany
Martin Hahn	University of Applied Sciences Lübeck	Germany
Clemens Faller	Bochum University of Applied Sciences	Germany
Martin Löffler-Mang	Saarland University of Technology	Germany
Claudia Meitinger	Augsburg University	Germany
Christian Khun	BW Cooperative State University -DHBW	Germany
Thomas Penzel	Charité – Berlin University Medicine	Germany
Peter Hehenberger	University of Applied Sciences Upper Austria	Austria
Eric Demeester	KU Leuven	Belgium
Dina Shona Laila	Luleå University of Technology	Sweden
Mohammad Jaradat	American University of Sharjah	UAE
Nathir Rawashdeh	Michigan Technological University	USA
Jumana Abu Khalaf	Edith Cowan University	Australia

Day 1: Tuesday

September 24th, 2024

* Indicates a Presenting Author

Time	Item	Place
09:00-16:00	Registration	
10:00-11:00	Opening Ceremony <ul style="list-style-type: none">The Royal Anthem of the Hashemite Kingdom of JordanRecitation from the Holy QuranWelcoming RemarksHisham ElMoaqet, Conference Chair, REM 2024Alaaldeen Al-Halhouli, President, German Jordanian UniversityRolf Biesenbach, President, German Society of MechatronicsMousa Al-Akhras, Chair, IEEE - Jordan Section	Dead Sea
11:00-11:30	Coffee Break	
11:30-12:30	Keynote Speech 1 Nassir Navab Chair of Computer Aided Medical Procedures and Augmented Reality, Technical University of Munich, Munich, Germany. Particularity and Challenges of Machine Learning for Intra-operative Imaging (MLMI2): Towards Precision and Intelligence in High Intensity, Dynamic Environments Session Chair: Tarek Tutunji	Dead Sea
12:30-14:00	Artificial Intelligence, Machine Learning, and Vision (AIM 1) Session Chair: Rami Alazrai Paper 1 Introducing Edges Density and Texture Contrast Scores as Quality Metrics for Enhanced Low Light Images Ghaith Alrefai* and Sahar Qadan (German Jordanian University, Jordan); Mohammed Al-Refai (Jordan University of Science and Technology, Jordan); Hisham Elmoaqet (German Jordanian University, Jordan).	Petra 1

Paper 2 Designing Intraoperative Sensors for Compartmental Balancing in Total Knee Replacements With a Foundation in Literature

Samira Al-Nasser* and Siamak Noroozi (Bournemouth University, United Kingdom (Great Britain)); Adrian Harvey (Royal Bournemouth Hospital, United Kingdom (Great Britain))

Paper 3 In-Class Examinations Proctoring System Using YOLO Architecture.

Omar H. Al-Adwan, Husam AlAbdellat, Sanad Hussein*, Omar AlJabbareen, Zaer Abo-Hammour and Adham Alsharkawi (The University of Jordan, Jordan).

Paper 4 Design of a Real-Time Detection System for Potholes and Bumps Using Deep Learning

Montaser Nalawi, Mohammad Baghdadi, Basel Alyateem*, Zaer Abo-Hammour and Adham Alsharkawi (The University of Jordan, Jordan).

Paper 5 Implementation of PLC-Integrated AI Functionalities for Condition Monitoring

Clemens Faller* (Bochum University of Applied Sciences, Germany).

Paper 6 (Virtual) Object-Specific Time-To-Collision Estimates From Monocular Vision for Drones.

Msuega Jnr Iorpenda* (Technical University of Applied Sciences & Center for Robotics, Germany); Emmanuel Asah (Technical University of Applied Sciences, Germany); Volker Willert (Technische Hochschule Würzburg-Schweinfurt, Germany).

12:30-14:00

Robotics and Autonomous Systems (RAS 1)

Petra 2

Session Chair: Ahmad Alshorman

Paper 1 Intelligent Adaptive Potential Field Motion Planning for Mobile Robots

Ahmad M. Alshorman* (JUST, Jordan); Mohammad A. Jaradat (American University of Sharjah, United Arab Emirates); Enas Yassir Ghabashneh (Jordan University of Science & Technology, Jordan); Mohammad Hamdan Garibeh (Khalifeh University, United Arab Emirates).

Paper 2 Triangulation-Enhanced WiFi-Based Autonomous Localization and Navigation System: A Low-Cost Approach.

Suleiman Abu Kharmeh, Emad Natsheh, Rahaf Nasrallah and Masa Masri *(An-Najah National University, Palestine).

Paper 3 Fuzzy State-Feedback PDC and LQR Control of Nonlinear Quadrotor

Abdulwahid A. Saif *(King Fahd University of Petroleum & Minerals, Saudi Arabia)

Paper 4 Optimizing Robot Motion: A Practical Control for Accurate and Low Energy- Consumption Industrial Manipulator

Jasim Ghaeb* and Areej Ahmad Shaar (Philadelphia University, Jordan).

Paper 5 Intelligent Exoskeleton-Based Parallel Robot for Guiding Blind People.

Ibrahim Naimi, Gulam Khan, Jawhar Ghommam, Amjad Al Mayahi* and Amal Al Adawi (Sultan Qaboos University, Oman).

Paper 6 (Virtual) Design of a Stereo Camera-Based Perception System: A Comparative Analysis

Kaushiknarayanan Chandrasekaran*, Samer Telawi and Josef Boercsoek (University of Kassel, Germany)

14:00-15:00	Lunch	
15:00-16:00	<p>Keynote Speech 2</p> <p>Reinhard Pittschellis Festo Didactic, Stuttgart, Germany.</p> <p>Mastering the Sustainability Challenge with Technology Industry 4.0, AI, and Education</p> <p>Session Chair: Hisham ElMoaqet</p>	<i>Dead Sea</i>
16:00-16:30	Coffee Break	
16:30-18:00	<p>Biomedical and Rehabilitation Systems (BRS 1)</p> <p>Session Chair: Samer Alabed</p> <p>Paper 1 Advanced EEG-Based Classification of Alzheimer's Disease Using CNN-LSTM-Attention Architecture</p> <p>Chayut Bunterngchit (Chinese Academy of Sciences, China); Thanaphon Chearanai* (King Mongkut's University of Technology North Bangkok, Thailand); Yuthachai Bunterngchit (Siam University, Thailand).</p> <p>Paper 2 Optimizing of IT-Tools and Production Processes for Supporting the Participation of Workers With Disabilities in the Industry</p>	<i>Petra 1</i>

Clemens Faller* (Bochum University of Applied Sciences, Germany).

Paper 3 (Virtual) Health Care Diagnostics Using Deep Learning: Brain Tumors Detection.

Saad Abderrahmane *(University of Médéa, Algeria); Reda Kara (Senior Lecturer, Algeria); Mounir Bouhedda (University of Medea, Algeria).

Paper 4 Validation of Heart Rate Monitoring Using PPG Sensor at Dorsalis Pedis Artery

Jumana Ma'touq*, Ibrahim ALSaaideh and Oula Hatahet (German Jordanian University, Jordan)

Paper 5 Towards Robust Cross-Subject EEG-fNIRS Classification: A Hybrid Deep Learning Model With Optimized Feature Selection

Chayut Bunterngrchit (Chinese Academy of Sciences, China); Thanaphon Chearanai *(King Mongkut's University of Technology North Bangkok, Thailand); Yuthachai Bunterngrchit (Siam University, Thailand).

16:30-18:00

Industry 4.0, Smart Systems, and Manufacturing (ISM)

Petra 2

Session Chair: Mohammed Bani Younes

Paper 1 Ignition SCADA System for a Programmable Logic Controller Mechatronics System.

Karthik Rao Racharla, Srija Gummadi and Nathir Rawashdeh* (Michigan Technological University, USA).

Paper 2 Hardware-In-The-Loop Simulation of a Programmable Logic Controller, Industrial Robots and Conveyor Systems Using RoboGuide.

Nathir Rawashdeh*, Rahul Bondalapati Budha Siva Sai, Punyokti Patil, Gurveetsingh Ajmani and Shivayogi Akki (Michigan Technological University, USA).

Paper 3 3D Printed Smart Designs - a Cost-Effective and Fast Alternative to Conventional Manufacturing Methods.

Mohammad Ishaqat (German Jordanian University & Bosch, Jordan); Mutaz Ryalat* (German Jordanian University, Jordan); Jan Mueller and Ingo Ramsteiner (Bosch, Germany).

Paper 4 Classification of Production Process Phases With Multivariate Time Series Techniques.

Anna-Maria Schmitt, Anna Antonov, Jan Schmitt* and Bastian Engelmann (Technical University of Applied Sciences Würzburg-Schweinfurt, Germany).

Paper 5 An Ontology-Based Approach for Knowledge Sharing Between Product Design and Assembly Process Planning (APP)

Baha Hasan* (University of Jordan, Jordan).

Paper 6 (Virtual) Resilience Assurance Methodology for Security in IoT Networks With Deployment of PUFs

Trcek Denis* (University of Ljubljana, Slovenia)

Education and Training in Mechatronics (ETM).

Session Chair: Musa Al-Yaman

Petra 1

18:00-19:00

Paper 1 Exploring the Impact of Arduino Robotics Instruction on Physical Computing and Programming Skills

Nurul Hazlina Noordin* (Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia)

Paper 2 Integrating Drones Into STEM Education at Al Hussein Technical University.

Abdelrahman Zaher Al-Attili, Tarek A. Tutunji*, Saif Siouf, Haya AlTabbal and Nisrien AlMansi (Al Hussein Technical University, Jordan).

Paper 3 World Twin Program for Teaching Mechatronics and Robotics Globally: An Experience Report From Two Intertwined Degree Programs.

Abid Ali, Patricia Kemmer*, Marian Daun, Shaza Elbishbishy and Jeshwitha Jesus Raja (Technical University of Applied Sciences Würzburg-Schweinfurt, Germany); Volker Willert (Technische Hochschule Würzburg-Schweinfurt, Germany).

Automotive and Transportation Systems (ATS 1)

Session Chair: Mohammed Abu Mallouh

Petra 2

18:00-19:00

Paper 1 (Virtual) On the Convergence of Electric Mobility and Energy Systems- Potentials and Challenges

Simeon Kremzow-Tennie* and Haydar Mecit (Bochum University of Applied Sciences, Germany).

Paper 2 (Virtual) Understanding the Fast-Charging Performance of Modern Electric Vehicles Through a Data Driven Approach

Simeon Kremzow-Tennie, Malek Jaziri* and Friedbert Pautzke (Bochum University of Applied Sciences, Germany); Benedikt Schmuelling (University of Wuppertal, Germany)

Paper 3 (Virtual) Implementation, Analysis and Comparison of Model-Based State Estimators for Lithium-Ion Battery Systems

Tobias Scholz, Goekhan Demirci* and Friedbert Pautzke (Bochum University of Applied Sciences, Germany); Benedikt Schmuelling (University of Wuppertal, Germany).

Paper 4 (Virtual) Battery Energy Storage Concepts and Their Potentials for Local Energy Communities From a Local Utility Point of View

Leonie Taieb*, Martin Neuwirth and Haydar Mecit (Bochum University of Applied Sciences, Germany).

Day 2: Wednesday

September 25th, 2024

* Indicates a Presenting Author

Time	Item	Place
09:00-12:00	Registration	
09:00-11:00	<p>Artificial Intelligence, Machine Learning, and Vision (AIM 2)</p> <p>Session Chair: Rami Alazrai</p> <p>Paper 1 Getting Started With a Simple Visual-Inertial Odometry Batchaya Noumeme Yacynte Divan* (Technische Hochschule Würzburg-Schweinfurt & Center for Robotics, Germany); Msuega Jnr Iorpenda (Technical University of Applied Sciences & Center for Robotics, Germany); Volker Willert (Technische Hochschule Würzburg-Schweinfurt, Germany).</p> <p>Paper 2 Sludge Age Prediction Using Machine Learning (Deep Neural Network Vs Deep Bi-LSTM Model). Messaoud Djeddou* (Oum El-Bouaghi University, Algeria); Aouatef Hellal (Oum El Bouaghi University, Algeria); Imed Loukam (Souk Ahras University, Algeria); Aida Bachiri (Mohamed Khider University of Biskra, Algeria); Ibrahim Hameed (Norwegian University of Science and Technology, (NTNU) in Alesund, Norway); Jihad Al Dallal (Gulf University for Science and Technology, Kuwait).</p> <p>Paper 3 Evaluation of YOLOv8n as a Suitable Tool for UAV Navigation Varela Eddy* (Technical University of Applied Sciences, Germany); Msuega Jnr Iorpenda (Technical University of Applied Sciences & Center for Robotics, Germany); Volker Willert (Technische Hochschule Würzburg-Schweinfurt, Germany).</p> <p>Paper 4 On the Gains of On-Device and Hybrid AI: A Qualitative Study Marco Wagner* and Ansgar M Meroth (Heilbronn University, Germany).</p> <p>Paper 5 (Virtual) Implementation of a Weed Detection System Based on YOLOv8-n Hayat Ait dahmad* and Hassan Ayad (Cadi Ayyad University, Morocco); Alfonso García Cerezo (University of Malaga, Spain); Hajar Mousannif (LISI Laboratory, Morocco).</p> <p>Paper 6 Recyclable Waste Categorization With Transfer Learning.</p>	Petra 1

Abdelrazzaq Abuhejleh*, Moath Alafeshat, Natheer Almtireen, Hisham Elmoaqet and Mutaz Ryalat (German Jordanian University, Jordan); Mohammad M. AlAjlouni (Jordan Design and Development Bureau (JODDB), Jordan).

Paper 7 Speed Control of Permanent Magnet Synchronous Machines: ANFIS Design and Performance Evaluation.

Kasim M. Al-Aubidy (Tishk International University, Iraq); Mohammad Rasem Abulaila* (Philadelphia University, Jordan); Izziyyah Mazen Alsudi (Al-Balqa Applied University, Jordan).

Paper 8 Image Fraud Detection Application Using Convolutional Neural Networks (CNNs) - "ImageGuard"

Charbel Boustany (American University of Science and Technology, Lebanon); Ali Mohammed Wehbe* (AUST, Lebanon)

09:00-11:00

Mechatronics System Design, Modeling, and Control (MSD)

Petra 2

Session Chair: Mohammad Salah

Paper 1 Experiment-Based Modeling of Extruder Temperature Behavior for Utilization in Fused Filament Fabrication 3D Printing Technology

Bahaa Shaqour (An-Najah National University, Palestine); Mohammad Abuabiah (An Najah National University, Palestine); Ahmed Qadi and Abdul Hakim Futyan (An-Najah National University, Palestine); Mohammad H Salah* (The Hashemite University, Jordan)

Paper 2 Enhancing Flying Qualities in Medium-Sized Commercial Aircraft Through Stability Augmentation

Maher Abu-Elola* (Flynas, Saudi Arabia); Ahmad Al Qaisia, Ali H Alhadidi and Adham Alsharkawi (University of Jordan, Jordan).

Paper 3 Optimization of Pneumatic Actuation Arrays for Upper-Limb Exoskeleton Suit Applications Based on Experimental Modeling

Jumana Abu-Khalaf (German Jordanian University, Jordan & Edith Cowan University, Australia); Haneen Elhamad, Mohammad Ayash, Mahmoud Al-Maghribi, Enas Abboud, Jafar Alawadi*, Yousef Qafisheh and Loiy Al-Ghussain (German Jordanian University, Jordan).

Paper 4 Sliding Mode Active Fault-Tolerant Control for Nonlinear Quadrotor UAV System in Presence of Actuator Faults

Abderrahim Ezzara*, Ahmed Youssef Ouadine and Hassan Ayad (Cadi Ayyad University, Morocco).

Paper 5 Watercraft-Specific Drone Landing and Stabilization Platform: A Low-Cost Design and Implementation Approach.

Sai Karthik Alluri and Hemanth Nanabala (Michigan Technological University, USA); Tarek A. Tutunji *(Al Hussein Technical University, Jordan); Ashraf Saleem (Michigan Technological University, USA).

Paper 6 Ground Classification for Robots Navigation Using Time Series Dataset With LSTM and CNN

Islam A Aljoan*, Sally Alradaideh*, Ghaith Alrefai and Hisham Elmoaqet (German Jordanian University, Jordan).

Paper 7 A Voltage Controlled Oscillator (VCO) Based Controller and Feedback for a Single Switch SiC Class-E Resonant Inverter.

Fadi Zghoul* (Jordan University of Science and Technology, Jordan); Osama Saadeh (GJU, Jordan); Zakariya Dalala (German Jordanian University, Jordan); Ahmad Bashaireh (Jordan University of Science and Technology, Jordan).

11:00-11:30

Coffee Break

11:30-12:30

Keynote Speech 3

Dead Sea

Micky Rakotondrabe

Systems Department, University of Technology of Tarbes Occitanie Pyrénées (UTTOP), University of Toulouse Alliance, Tarbes, France.

Piezoelectric Systems for Small Scale Tasks: Design, Modeling, Control, and Signal Estimation

Session Chair: Mutaz Ryalat

12:30-14:00

Sensors and Actuators (SAA 1)

Petra 1

Session Chair: Tarek Younes

Paper 1 The Design and Implementation of UMP STEM Cube for Environmental Monitoring

Nurul Hazlina Noordin*, Kamil Khalili Abdullah and Phuah Soon Eu (Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia).

Paper 2 Economic Network Solution for Smart Agriculture in Remote Areas

Sandra Chahine (German International University, Egypt); Adham Ossama Elwardany (German International University, Germany); Thomas Heiligenmann (Heilbronn University of Applied Sciences, Germany); Yasmine Abdalla Zaghloul and Nada Sharaf (German International University, Egypt); Ansgar M Meroth* (Heilbronn University, Germany).

Paper 3 Development of a MQTT-Based Server Software "Agriculture Precision".

Maria Nagy Kamal Boutros (German International University, Egypt); Ansgar M Meroth* (Heilbronn University, Germany); Nada

Sharaf (German University in Cairo, Egypt); Yasmine Abdalla Zaghloul (German International University, Egypt)

Paper 4 Stereo Camera and Ultrasonic Sensors Fusion for Robot Navigation and 3D Mapping Enhancement.

Mohammad M. Al-Ajlouni*, Dania Najjar, Raghad Qarajah, Mayar Jubran and Raghad Dababseh (Jordan Design and Development Bureau (JODDB), Jordan).

Paper 5 Experimental Analyses on the Degradation of Poly C-Si Glass/Glass Modules Performance Under Mediterranean Climate.

Amina Chahtou*, El Amin Kouadri Boudjelthia and Nasreddine Belhaouas (CDER, Algeria).

12:30-14:00

Automotive and Transportation Systems (ATS 2)

Petra 2

Session Chair: Mohammed Abu Mallouh

Paper 1 Optimizing Formula Student Car Chassis to Enhance Torsional Stiffness for Improved Vehicle Handling Performance

Ahmad Sarhan Alsyouri* and Feras Kafiah (Al Hussein Technical University, Jordan).

Paper 2 Attitudes and Perspectives for Installing EV Charging Station: A Case Study at Isra University, Jordan

Nour Khlaifat* (Isra University, Jordan); Nasim Alnuman (German Jordanian University, Jordan); Zakaria Al-Omari (Isra University, Jordan).

Paper 3 (Virtual) Optimization of In-Situ State of Health Analysis Using Conventional Charging Infrastructure Considering Workshop Applications

Tobias Scholz, Marvin Dullau* and Friedbert Pautzke (Bochum University of Applied Sciences, Germany); Benedikt Schmuelling (University of Wuppertal, Germany).

Paper 4 Challenges and Opportunities in Wireless Power Transfer for the Future Electromobility.

Myrel Tiemann* (University of Wuppertal, Germany); Sahar Qadan (German Jordanian University, Jordan); Benedikt Schmuelling (University of Wuppertal, Germany)

Paper 5 Design and Implementation of a Human Following Mini Truck With Computer Vision Based Gesture Recognition.

Sameeh Baqain*, Zaid Abu Azzah, Zaki Mitri and Sultan Rashdan (American University of Madaba, Jordan).

14:00-15:00

Lunch

15:00-16:00

Keynote Speech 4 (Virtual)

Dead Sea

Mohamad Islam

Halland Mechatronics, Bay City, Michigan, USA.

Non-contact Sensing in Automotive Applications-A Perspective of Robustness and Reliability

Session Chair: Mohammad Salah

15:00-16:00

Biomedical and Rehabilitation Systems (BRS 2)

Petra 2

Session Chair: Samer Alabed

Paper 1 AI-Driven Mobile App for Personalized Health Monitoring

Natheer Almtireen*, Hashem Altaha, Aws Alissa, Mutaz Ryalat and Hisham Elmoaqet (German Jordanian University, Jordan).

Paper 2 Advanced Machine Learning Techniques for Precise EEG Analysis and Epileptic Seizure Detection.

Sameer Ahmad Hasan*, Omar Yasin, Esmaail Taib, Obada Nassif, Malak Joudeh and Saben Audaall (German Jordanian University, Jordan).

Paper 3 High Sensitivity Resistive Vibration Sensing: Optimization for Wearable Heart Rate Monitoring.

Ahmed Abu Abeeleh (German Jordanian University, Jordan); Ahmed Albagdady (Coventry University, United Kingdom (Great Britain)); Mohammed Al-Mahmodi (Binghamton University, USA); Ghaith Al-Shishani* and Ala'aldeen Al-Halhouli (German Jordanian University, Jordan).

16:00-16:30

Coffee Break

16:30-18:00

Sensors and Actuators (SAA 2)

Petra 1

Session Chair: Tarek Younes

Paper 1 An Overview on Advancements in Water Leakage Detection Integrating Cutting-Edge Solutions.

Ala Khalifeh* (German University of Jordan, Jordan); Nowfal Aweisi (Princess Sumaya University for Technology, Jordan).

Paper 2 Machine Learning Approach for Cluster Head Selection in Internet of Things-Based Wireless Sensor Network

Ala Khalifeh* (German University of Jordan, Jordan); Belal AL Mohammad (German Jordanian University, Jordan).

Paper 3 Machine Learning-Based Remaining Useful Life Predictions and It's Application on Predictive Maintenance

Ala Khalifeh* (German University of Jordan, Jordan); Suleman Almeqdadi (German Jordanian University, Jordan).

Paper 4 Polymer-Polymer Bonding for Enhanced Functional Micro-Fluidic Chips Fabrication.

Suhad Sbeih* (German Jordan University, Jordan); Ahmed Albagdady (Coventry University, United Kingdom (Great Britain)); Ala'aldeen Al-Halhouli (German Jordanian University, Jordan).

Paper 5 Optimized Open-Source Pumping Apparatus for Precision Fertiligation and Smart Agriculture Experimentations

Qasem Abdelal* (German-Jordanian University, Jordan); Ghaith Al-Shishani and Muhammad Rasool Al-Kilani (German Jordanian University, Jordan).

16:30-18:00

Robotics and Autonomous Systems (RAS 2)

Petra 2

Session Chair: Ahmad Alshorman

Paper 1 Advancing Robotics With an Interactive and Musical Humanoid Robot Based on the InMoov Project

Dharsikaa Suresh*, Fabian Dax and Dorit Borrmann (Technical University of Applied Sciences Würzburg-Schweinfurt, Germany).

Paper 2 (Virtual) Development of a MATLAB Toolbox for Robot Sensor Interface (RSI) Communication With KUKA KR6 R900 SIXX and Validation by Inverse Kinematics Approach

Enad Rateb Enad Obeedat*, Sr. (Bochum University of Applied Sciences & Tamkeen Industrial and Trading Compnay, Germany); Rolf Biesenbach (Bochum University of Applied Sciences, Germany); Mohammed Baniyounis (Philadelphia University Jordan, Jordan); Jan Falkenhain (Bochum University of Applied Sciences, Jordan)

Paper 3 (Virtual) A 3D Printed Six Axes Industrial Robot Model for Educational Purposes.

Tabea Sophie Graf*, Rolf Biesenbach and Jan Falkenhain (Bochum University of Applied Sciences, Germany).

Paper 4 (Virtual) A MATLAB Software for Synchronous Robot Axis Control by Using Coordinate Transformation.

Tabea Sophie Graf*, Rolf Biesenbac and Jan Falkenhain (Bochum University of Applied Sciences, Germany).

Paper 5 (Virtual) Enhancing Path Planning Algorithms With CubicSearch: A Novel Structured Approach for Propagation and Obstacle Avoidance.

Ali Faisal Yousef (Tishreen University, Syria); Essa Alghannam (Tishreen University, Syria & Manara University, Syria); Hasan E Alwara and Amin F Haydar (Tishreen University,

Syria); Ali Ghanem* (University of Applied Sciences Ruhr West, Germany).

Paper 6 Smart Pipes: An Intelligent Robotic Solution for Pipeline Condition Assessment and Inspection.

Mohammad Alkhedher*, Mohammed A. Ghazal, Hasan Tariq Hamdan, Abdeen Ahmed Osman, Abdularahman Zakaria Awad, Omar Lutfi Sidahmed and Shahad Faisal Aljaberi (Abu Dhabi University, United Arab Emirates)

18:00-20:00

Networking and Rest

20:00-22:00

Gala Dinner and Award Ceremony

***Terrace First
Floor***