



جامعة بيروت العربية
BEIRUT ARAB UNIVERSITY

Faculty of Engineering



IEEE Engineering in
Medicine & Biology Society
Lebanon Chapter



8th International Conference on Advances in Biomedical Engineering (ICABME 2025)

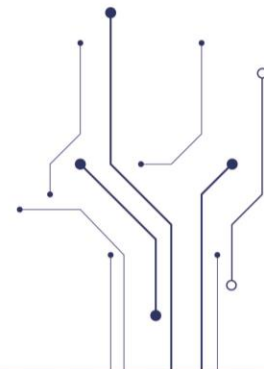


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جامعة بيروت العربية
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8th International Conference on Advances in Biomedical Engineering (ICABME 2025)



Thursday, October 9, 2025

9:30 a.m.
Omar Houry Hall
Debbieh Campus



IEEE Engineering in
Medicine & Biology Society
Lebanon Chapter





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ICABME25

**8th International Conference on
Advances in Biomedical Engineering
will be held at**

**Beirut Arab University, Debbieh Campus,
Lebanon
9 – 10 October 2025**

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Honorary Conference Chair



**Prof. Wael Nabil
Abdel Salam, MD,
PhD**

**President of Beirut
Arab University**

I am pleased to cordially welcome you to participate in the 8th International Conference on Advances in Biomedical Engineering (ICABME 2025), organized by the Faculty of Engineering at Beirut Arab University at its Debbieh Campus, and technically sponsored by the IEEE Engineering in Medicine and Biology Society (EMBS) Lebanon Chapter. This conference serves as the official scientific conference of the IEEE EMBS Lebanon Chapter and will be hosted in October 9–10, 2025 by Beirut Arab University.

The aim of ICABME 2025 is to gather scientists, engineers, and practitioners from across the world to present and discuss advances in the field. Participants will have the opportunity to showcase their latest research, results, ideas, developments, and applications in all areas of Biomedical Engineering. The conference will provide an ideal environment to exchange knowledge, engage with experts, and foster collaborative projects in this dynamic field.

The scientific program of ICABME 2025 will feature distinguished keynote speakers and experts who will present state-of-the-art research and highlight emerging trends in biomedical engineering.

All accepted and presented papers will be submitted for publication in IEEE Xplore. In addition, selected authors will be invited to prepare extended versions of their papers for possible publication in the BAU journal – Science and Technology.

We warmly thank all participants for their contributions and look forward to a fruitful and successful ICABME 2025 at Beirut Arab University.



General Chairs



Prof. Yehya Temsah



**Prof. Mohamad
Khalil**



**Prof. Mohamad
Diab**

The 8th International Conference on Advances in Biomedical Engineering (ICABME 2025) will be organized by the Faculty of Engineering at Beirut Arab University and technically sponsored by the IEEE Engineering in Medicine and Biology Society (EMBS) Lebanon Chapter. This conference is considered the official scientific conference of the IEEE EMBS Lebanon Chapter and will be hosted on October 9–10, 2025, at BAU's Debbieh Campus.

ICABME 2025 will serve as a premier forum for scientists, engineers, researchers, and practitioners to present their latest findings, innovative ideas, and cutting-edge applications across all areas of Biomedical Engineering. It will also provide an excellent opportunity for participants to exchange knowledge, foster collaborations, and promote new research initiatives at both national and international levels. The conference program will feature distinguished keynote speakers, technical sessions, and specialized panels that highlight advanced research and emerging trends in biomedical engineering. Accepted and presented papers will be submitted for inclusion in IEEE Xplore.

We warmly thank all participants and contributors for their efforts, and we look forward to a fruitful and successful ICABME 2025 at Beirut Arab University.

Keynote Speaker 1 Biography



**Mohamad Sawan,
Ph.D., FRSC, FCAE,
FIEEE, O.Q.**

**Chair Professor,
Westlake University,
China**

**Emeritus Professor,
Polytechnique
Montreal, Canada**

Mohamad Sawan is Chair Professor in Westlake University, Hangzhou, China, and Emeritus Professor in Polytechnique Montreal, Canada. He is the founder and director of the Center of Excellence in Biomedical Research on Advances-on-Chips Neurotechnologies (CenBRAIN Neurotech) in Westlake University, and of the Polystim Neurotech Lab in Polytechnique Montreal. He received his Ph.D. degree from the University of Sherbrooke, Canada.

He was awarded the Canada Research Chair in Smart Medical Devices (2001-2015) and was leading the Microsystems Strategic Alliance of Quebec (ReSMiQ), Canada (1999-2018). He is Co-Founder, Associate Editor and was Editor-in-Chief of the IEEE Transactions on Biomedical Circuits and Systems (2016-2019).

He is Founder and Co-Founder of several International conferences and working groups in bioelectronics such IEEE NewCAS, BioCAS, etc. Dr. Sawan published more than 1000 peer-reviewed journal and conference papers, one Handbook, three books, 13 book chapters, 22 patents, and 40 other patents are pending. He received several awards, among them the Barbara-Turnbull Award from the Canadian Institutes of Health Research (CIHR), the J.A. Bombardier and Jacques-Rousseau Awards from the Canadian ACFAS, the Queen Elizabeth II Golden Jubilee Medal, the Medal of Merit from the President of Lebanon, the Chinese National Friendship Award, and the Shanghai International Collaboration Award.

Dr. Sawan is a Fellow of the Royal Society of Sciences of Canada (FRSC), a Fellow of the Canadian Academy of Engineering (FCAE), a Fellow of the Engineering Institutes of Canada (FEIC), a Life Fellow of the IEEE (LFIEEE), and an "Officer" of the National Order of Quebec.

Keynote Speaker 1 Abstract



**Mohamad Sawan,
Ph.D., FRSC, FCAE,
FIEEE, O.Q.**

**Chair Professor,
Westlake University,
China**

**Emeritus Professor,
Polytechnique
Montreal, Canada**

Neuroelectronic miniaturized platforms are hybrid biomedical devices intended to address the increasing demands on intelligent system-on-chip to effectively analyze, treat and predict complex neurodegenerative diseases. These medical devices, either wearable or implantable, should be very low-power and high-speed computing resources, represented by brain-computer interfaces (BCIs) that are currently applied as closed-loop neuromodulators to deal with brain diseases. These devices consist of miniaturized systems in particular when they are intended to reside within the skull.

Implemented to continuously monitor, treat and predict diseases evolution, these BCIs contain large channel counts to record data from brain neural regions and to microstimulate tissues to re-activate functions or to stop non desired events such as seizures.

We cover in this talk multimodal interfaces and implantable platforms grouping various biosensing techniques including massively parallel neurorecording front-end module, followed by custom neuromorphic processing engines, and back-end actuators. For these systems implementation and validation, we deal with multidimensional design challenges such as security, reliability, safety, self-powered operation, high data-rate wireless telemetry. Case studies will include Vision enhancement, Language decoding, Addictions and Epilepsy.

Keynote Speaker 2 Biography



Rabeh Mansour

**Diagnostic Imaging
Application Manager
and Synapse 3D AI
Product Manager at
Fujifilm Middle East &
Africa**

Rabeh Mansour, Diagnostic Imaging Application Manager and Synapse 3D AI Product Manager at Fujifilm Middle East & Africa, based in Dubai. With deep expertise in CT, MRI, advanced visualization, and healthcare IT and AI, I have led numerous strategic projects, clinical trainings, and product launches across the region.

I am especially passionate about applying Artificial Intelligence in diagnostic imaging to optimize clinical workflows, improve decision-making, and advance patient care.

My mission is to empower healthcare providers with cutting-edge imaging technologies and AI-driven solutions.

Keynote Speaker 2 Abstract



Rabeh Mansour

**Diagnostic Imaging
Application
Manager and
Synapse 3D AI
Product Manager at
Fujifilm Middle East
& Africa**

Fujifilm's Diagnostic Imaging portfolio integrates Artificial Intelligence and automation to deliver superior image quality, reduced dose, and streamlined clinical workflows across both CT and MRI.

CT Innovations

- **AI Reconstruction (Intelli IP/Intelli IPV):** Reduces noise, preserves natural image texture, and lowers radiation dose.
- **Smart Dose: IntelliEC Plus** auto-adjusts exposure; IntelliODM reduces organ dose by up to 30%.
- **Workflow AI: AutoPose, iTilt, and Predict Scan** optimize patient positioning and contrast timing.
- **AI Post-Processing:** Synapse 3D integration supports advanced vascular, perfusion, cardiac, and oncology analysis.

MRI Innovations

- **Synergy DLR:** AI-powered noise reduction for faster, sharper scans.
- **IP-RAPID:** Accelerated imaging for greater comfort and efficiency.
- **RADAR:** Motion suppression for artifact-free, clear images.
- **SynergyDrive:** Automated planning and positioning for simplified workflow.
- **AutoExam:** One-click protocols ensure consistent brain, spine, and joint imaging.
- **Synapse 3D AI:** Advanced segmentation and surgical planning solutions for clinical precision.

In summary, Fujifilm's AI-powered CT and MRI solutions redefine diagnostic imaging—enhancing speed, accuracy, and patient safety while empowering clinicians with advanced tools for decision-making and treatment planning.



Keynote Speaker 3 Biography



Abdulmotaleb El Saddik, FRSC, FIEEE, FEIC, FCAE

Distinguished Professor, University of Ottawa, Canada

Chief Scientist, HUMAIN

Abdulmotaleb El Saddik is a Distinguished University Professor at the University of Ottawa, Chief Scientist at HUMAIN, and a globally recognized scholar in intelligent multimedia, digital twins, and immersive technologies.

He serves as Editor-in-Chief of the ACM Transactions on Multimedia Computing, Communications and Applications (ACM TOMM) and has shaped the field as Associate Editor and Guest Editor for several leading journals.

With more than 600 publications, 10 books, and supervision of over 150 researchers, his work has inspired new generations of scholars and innovators. He has chaired numerous international conferences and secured more than \$30M in research funding to advance the frontiers of AI, haptics, and digital twins.

Professor El Saddik is a Fellow of the Royal Society of Canada, IEEE, the Canadian Academy of Engineering, and the Engineering Institute of Canada. His awards include the Friedrich Wilhelm Bessel Award, IEEE Canada C.C. Gotlieb Medal, the A.G.L. McNaughton Gold Medal, and the IEEE I&M Technical Achievement Award.



Keynote Speaker 3 Abstract



Abdulmotaleb El Saddik, FRSC, FIEEE, FEIC, FCAE

Distinguished Professor, University of Ottawa, Canada

Chief Scientist, HUMAIN

Over the past decades, digital twins have evolved from ideas on paper into living companions that reflect and interact with the physical world. By staying in sync with their real counterparts, they help us monitor, understand, and improve systems in ways we could not imagine before.

Today, with the power of AI, immersive technologies (AR, VR, XR), and 5G, digital twins are moving from simple replicas into intelligent partners. With multimodal large language models (MLLMs), they can see, hear, and interpret data more like humans, opening the door to real-time, adaptive, and personalized interaction.

The influence reaches far beyond industry. In healthcare, education, and smart cities, AI-augmented digital twins can enhance well-being, extend human abilities, and create new opportunities for societies around the world.

In this keynote, I will share how AI is changing digital twins from tools into transformative forces that shape our future. It is, in the end, a journey not only about technology, but about humanity—building systems that enrich life.



Conference Program

Time	Building A4-G08	Building A4-B108	Building A4-B208
Thursday, October 9			
08:30-09:30	Registration (Omar Hourri Hall - A1 Building)		
09:30-10:30	Opening Ceremony (Omar Hourri Hall-A1 Building)		
10:30-11:00	Coffee Break 1 (A1 Building)		
11:00-12:00	Keynote 1: Prof. Mohamad Sawan Neuroelectronic Integrated Platforms to Explore and Effectively Address Brain Diseases (G08 – A4 Building)		
12:00-13:45	S11(A): Biosensor / BioCAS	S11(C): Biomechatronic / Biomechanics / Robotics	S11(B): AI/ML/DL (1)
13:45-14:15	Campus Tour		
14:15-15:15	Lunch Break 1 (A4 Building)		
15:15-16:15	Keynote 2: Rabeh Mansour Fujifilm AI in CT & MRI (Building A4-G08)		
16:15-17:45	S12(A): Biomedical Applications (1)	S12(C): Medical Imaging	S12(B): EEG/ECG
20:00-22:30	Gala Dinner (Voco Hotel)		
Friday, October 10			
09:00-10:00	Keynote 3: Prof. Abdulmotaleb El Saddik, FRSC, FIEEE, FEIC, FCAE From Mirror to Companion: AI and the Next Era of Digital Twins (Building A4-G08)		
10:00-10:30	Coffee Break 2 (A4 Building)		
10:30-12:15	S21(A): EEG-II	S21(C): AI/ML/DL (2)	S21(B): CNN/ViT
12:30-14:30	Lunch Break/Praying Time (A4 Building)		
14:30-16:00	S22(A): Health Monitoring & Rehabilitation	S22(C): BCI & Brain Tumor	S22(B): Biomedica l Applications
16:00-16:30	Closing Ceremony (A4 Building)		



Detailed Program

Thursday, October 9 8:30 - 9:30 (Asia/Beirut)

- Registration (Omar Hourri Hall - A1 Building)

Thursday, October 9 9:30 - 10:30 (Asia/Beirut)

- Opening Ceremony (Omar Hourri Hall-A1 Building)

Thursday, October 9 10:30 - 11:00 (Asia/Beirut)

- Coffee Break (A1 Building)

Thursday, October 9 11:00 - 12:00 (Asia/Beirut)

- Keynote Speaker: Neuroelectronic Integrated Platforms to Explore and Effectively Address Brain Diseases (G08 – A4 Building)
- Prof. Mohamad Sawan, IEEE Fellow
- Chair: Abdallah Kassem (Notre Dame University, Lebanon)

Thursday, October 9 12:00 - 13:45 (Asia/Beirut)

- **S11(A): Biosensor / BioCAS**
- **Room: Building A4-G08**
- **Chairs: Hiba Al Sheikh (City University, Lebanon), Hiba Bazzi (Beirut Arab University, Lebanon)**
- **CMOS Building Blocks for Real-Time Measurement of Stomach Tissue Thickness During Bariatric Surgery**
Mohamad Hajj-Hassan (Lebanese International University, Lebanon); Adnan Harb (International University of Beirut, Lebanon); Zeinab Hijazi (Lebanese International University, Lebanon); Hassan Wehbi (XNY Medical, China); Roni El khoury and Abed El Rahman Salah Baghdadi (Lebanese International University, Lebanon); Houssein Hajj Hassan (Al Maaref University, Lebanon)

- **Point-of-Care Biosensor for Sepsis Biomarker Detection in Neonates**
Khouloud Issa, Stephanie Zoghbi, Edmond Abou Khalil, Taline Chehade, Pierre Karam and Massoud Khraiche (American University of Beirut, Lebanon)
- **Lower-Limb Full-Body Motion Acquisition Using Wearable Multisensor Integration for Human-Robot Interaction**
Abderahim Ibset, Loqmane Bencharif and Hanbing Liu (University of Paris Saclay, France); Wen Qi (South China University of Technology, China); Hang Su (Université Paris-Saclay, France); Samer Alfayad (Paris Saclay, France)
- **A Novel Mach-Zehnder Interferometric Approach for Simplified and Highly Sensitive Surface Plasmon Resonance Sensors**
Abdul Rahman El Falou (Beirut Arab University, Lebanon)
- **An Early Detection Auditory Disorders System based on Power-Efficient Analog Hardware Sigmoid-based Classifiers**
Emilios Georgiou, Theodoros Kantianis, Daniela Papa, Vasileios Moustakas and Vassilis Alimisis (National Technical University of Athens, Greece); Paul Peter Sotiriadis (Johns Hopkins University EPP & Soteco Electronics LLC, USA)
- **A Power-Efficient Analog Hardware Neural Network for Hand Gesture Recognition**
Anna Mylona and Vassilis Alimisis (National Technical University of Athens, Greece); Paul Peter Sotiriadis (Johns Hopkins University EPP & Soteco Electronics LLC, USA)
- **High Q-factor Nonlocal Metasurface-enhanced Microcavity Biosensor**
Yuqiao Zheng, Xixi Song and Hongyong Zhang (Westlake University, China); Mohamad Sawan (Westlake University, China & Polytechnique Montréal, Canada)

- **S11(B): AI/ML/DL (1)**
- **Room: Building A4-B208**
- **Chairs: Abdallah AL-Sabbagh (Beirut Arab University, Lebanon & University of Technology, Sydney (UTS), Australia), Samar Sindian (Al Maaref University & MU, Lebanon)**
- **Precise Tissue Segmentation in Orthopedic Surgery Using Hyperspectral Imaging**
Aya Hage Chehade and Nadine Abdallah Saab (LabISEN, LSL, ISEN Ouest, France); Mohammed El Amine Bechar (LabISEN, ISEN Yncrea Ouest, France); Nesma Settouti (LabISEN, ISEN Yncréa Ouest, France); Olga Assainova (LabISEN, ISEN Yncrea Ouest, France); Chafiaa Hamitouche (LaTIM, INSERM, IMT-Atlantique Bretagne, France); Marwa El Bouz (LabISEN, ISEN Yncrea Ouest, France)
- **Machine Learning and Deep Learning Approaches for Obesity Prediction: A Systematic Review**
Layla Mohammad Dakdouk, Julie Bu Daher and Mahmoud Skafi (Beirut Arab University, Lebanon); Mohammad Ayache (Beirut Arab University (BAU), Lebanon)
- **Machine Learning driven Symptoms Diagnosis System**
Ziad Doughan, Rami Hammoud, Mohammad-Daoud Ghalayini, Darweesh Darweesh, Omar El Hajj Chehade and Sari Samir Itani (Beirut Arab University, Lebanon)
- **AI-Powered Smart Glasses for Object Detection and Face Recognition**
Samar Sindian (Al Maaref University & MU, Lebanon); Alaa Saad and Fatima Ghaddar (AL Maaref University, Lebanon)

- **Improving CT-MR Brain Subvolumes: Comparing 3D U-Net and SE-Residual Enhanced Architecture**

Zeinab A Chahrour and Ali El-Zaart (Beirut Arab University, Lebanon); Bilal H. Shahine (American University of Beirut Medical Center, Lebanon); Wassila El kanawati (Beirut Arab University, Lebanon)

- **MCMA-Net: Hierarchical Multi-Class Attention Network with Dual-Stream Transformers for Robust 3D Glioma Segmentation**

Jihan Alameddine, Al (CHU de Poitiers, France & Université de Poitiers, France)

- **Liver Fibrosis Stage Classification and Segmentation**

Ahmad O. Al Hassan (Lebanese International University, Lebanon); Marwan AlHawat (LIU, Lebanon); Ahmad Diab (Lebanese University, Lebanon); Lara Hamawy (LIU, Lebanese International University, Lebanon)

• **S11(C): Biomechatronic / Biomechanics / Robotics**

• **Room: Building A4-B108**

• **Chairs: Lara Hamawy (LIU, Lebanese International University, Lebanon), Mohamed Tarnini (Beirut Arab University, Lebanon)**

- **Comparative Analysis of Joint Torques During the Swing Phase of Human Gait**

Kiara Muñoz-Benites, Aylee Simeón-Quispe and Ingrid Rodriguez-Contreras (Pontificia Universidad Católica del Perú, Peru); Joseline Leon-Abad, Mario Reinoso-Regalado and Anacecilia Villa-Parra (Universidad Politécnica Salesiana, Ecuador); Victoria E. Abarca (Pontificia Universidad Católica del Perú, Peru)

- **Simulation-Based and kinematics Analysis of a 5-DOF Robot for Medical Applications**

Mohamad El Gohary (Beirut Arab University, Lebanon)

- **Rational DOF Allocation for Human Emulation in Robotic Boxing: A Biomedical Optimization**

Wael Soukarieh (University of Paris Saclay, France); Maya Sleiman (KALYSTA Actuation, France); Hang SU (University of Paris Saclay, France); Naima Ait Oufroukh (Paris-Saclay University, France); Samer Alfayad (Paris Saclay, France)

- **ROS-Oriented Dynamic Simulation for Robot-Assisted Upper Limb Rehabilitation with Personalized Trajectories**

Abd Alrahman Marshoud (Kalysta Actuation, France); Maya Sleiman (KALYSTA Actuation, France); Hang SU (University of Paris Saclay, France); Naima Ait Oufroukh (Paris-Saclay University, France); Samer Alfayad (Paris Saclay, France)

- **Development of a novel piezo-actuated fluid delivery system for precision dispensing**

Suhail Abbas and Chi-Ying Lin (National Taiwan University of Science and Technology, Taiwan)

- **Cost-Effective Body Composition Estimation Using Bioimpedance and Body Mass Index**

Mohamad Daher (Lebanese University); Rabih Barake (ULF, Lebanon); Bilal Roukaya (ULF University, Lebanon)

Thursday, October 9 13:45 - 14:15 (Asia/Beirut)

- Campus Tour

Thursday, October 9 14:15 - 15:15 (Asia/Beirut)

- Lunch Break 1 (A4 Building)

Thursday, October 9 15:15 - 16:15 (Asia/Beirut)

- Keynote Speaker2: Fujifilm AI in CT & MRI (Building A4-G08)
- Rabeh Mansour

Thursday, October 9 16:15 - 17:45 (Asia/Beirut)

- **S12(A): Biomedical Applications (1)**
- **Room: Building A4-G08**
- **Chairs: Roy Abi Zeid Daou (Université La Sagesse, Lebanon), Abdul Rahman El Falou (Beirut Arab University, Lebanon)**
- **SteadySpoon: An IoT-Enabled Stabilizing and Diagnostic Assistive Device for Parkinson's Tremors**
Noor Haddad (Université la Sagesse, Lebanon); Elias Estephan (Sagesse University, Lebanon); Roy Abi Zeid Daou (Université La Sagesse, Lebanon)
- **A Promising Contribution of Hyperspectral Unmixing for Overlapped Tissues Segmentation using Autoencoders**
Bouchra Abdel Aziz (Université Libanaise, Lebanon & LabISEN, ISEN Yncréa Ouest, France); Mohamad Khalil (Lebanese University - AZM Center for Biotechnology -DSST & Faculty of Engineering, Lebanon); Marwa El Bouz (LabISEN, ISEN Yncréa Ouest, France); Nadine Abdallah Saab (LabISEN, LSL, ISEN Ouest, France); Olga Assainova (LabISEN, ISEN Yncréa Ouest, France); Amani Raad (Université Libanaise, Lebanon)

- **AI Driven Individual Identification Using Palm Veins: A Systematic Review, Challenges, and Future Perspectives**

Ismail Khrum (Beirut Arab University, Lebanon); Fathelalem Ali (Joaan Bin Jassim Academy for Defence Studies, Qatar & Meio University, Japan); Ali Massoud Haidar (Beirut Arab University, Lebanon); Mohammad Ayache (Beirut Arab University (BAU), Lebanon)

- **Evaluating the Impact of EMD-Derived Intrinsic Mode Functions on Atrial Fibrillation Detection**

Hassan Serhal and Rana Amin Saab (Lebanese University, Lebanon); Tala Raif Abdallah (Together for Chehim, Lebanon); Shakib Ali Youssef (Ensta IP Paris, France); Aya Hage Chehade (LabISEN, LSL, ISEN Ouest, France)

- **Combined Diffusion and Functional MRI at 7 T: Advances and Applications**

Christine Fernandez-Maloigne (University of Poitiers & I3M Laboratory, France)

- **Slope of Tangent (SOT): A New Automatic Method for Segmenting Uterine Muscular Contraction Bursts from the Electrohysterogram**

Hadi A. Ammar and Ahmad Diab (Lebanese University, Lebanon); Vincent Zalc (Université de technologie de Compiègne, France); Dan Istrate (University of Technology of Compiègne UTC, France); Mohamad Khalil (Lebanese University - AZM Center for Biotechnology -DSST & Faculty of Engineering, Lebanon); Catherine Marque (Université de Technologie de Compiègne, France)

- **S12(B): EEG/ECG**

- **Room: Building A4-B208**

- **Chairs: Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon), Manal Fattoum (Beirut Arab University, Lebanon)**

- **Robust EEG-Based Machine Learning Framework for Early Detection of Parkinson's Disease: A Comparative Evaluation**

Abdallah AL-Sabbagh (Beirut Arab University, Lebanon & University of Technology, Sydney (UTS), Australia); Youssra Hassoun and Abd El Rahman Zaaroura (Beirut Arab University, Lebanon)

- **Noise Detection in ECG Recordings During MRI Using Machine Learning**

Kassem Hmady (Lebanese University, Lebanon); Milana Kasab (Rafik Hariri University (RHU), Lebanon); Maher Sabbah (Rafik Hariri University, Lebanon); Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon); Abir El Abed (Lebanese University, Lebanon)

- **EEG-Based Age Prediction: A Machine Learning Approach**

Mirna Mahmoud El Shamaa and Kamar Naifeh (Rafik Hariri University, Lebanon); Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon); Mahmoud Hassan (Reykjavik University, Lebanon); Milana Kasab (Rafik Hariri University, Lebanon)

- **Obstructive Sleep Apnea Detection System Using Electrocardiogram (ECG) Signals**

Hussein El-Haj Youssef, Abbas Yaasine, Salim Allabban, Manal Himada, Mohammad Zuhair Abou Hadba, Iman Haidar and Amira J. Zaylaa (Beirut Arab University, Lebanon); Mohammad Ayache (Beirut Arab University (BAU), Lebanon); Ali Massoud Haidar (Beirut Arab University, Lebanon)

- **GBrain: A Graph Signal Processing Approach To EEG based Attention Detection**

Sami Majanini (Faculty of Engineering and Information Technology City University Tripoli, Lebanon); Mohamad Khalil (Lebanese University - AZM Center for Biotechnology -DSST & Faculty of Engineering, Lebanon); Aya Kabbara (Lebanese International University, Lebanon); Hiba Al Sheikh (City University, Lebanon)

- **ECG Signal Classification for Heart Disease Detection: A Systematic Review and Future Directions**

Mohamad Zuhair Abo Hadba and Amira J. Zaylaa (Beirut Arab University, Lebanon); Mohammad Ayache (Beirut Arab University (BAU), Lebanon)

• **S12(C): Medical Imaging**

• **Room: Building A4-B108**

• **Chairs: Iman Haidar (Beirut Arab University, Lebanon), Maher Sabbah (Rafik Hariri University, Lebanon)**

- **Ant Colony-Based Optimization for Lung Cancer Image Classification: Towards Efficient Medical AI**

A.M. Mutawa (Kuwait University, Kuwait); Rashid Rasheed Ahmad (Jaber Alahmad Hospital, Kuwait); Sai Sruthi (Kuwait University, Kuwait)

- **From Closed to Open Vocabulary: A Systematic Review of Abnormality Detection in Medical Imaging**

Alaa Wehbe (Università degli Studi di Genova, Italy); Hawraa Hotiet (University of Genova, Italy); Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon); Abdallah Kassem (Notre Dame University, Lebanon); Silvana G. Dellepiane (University of Genova, Italy)

- **Value-Based Medicine: Early Detection of Glaucoma Using Multimodal Imaging and Open Source Software**

Gurnoor S Dang (Stanford University, USA); Gloria Wu (University of California, San Francisco, USA); Ivan Chim (University of California, San Diego, USA); Swara Tewari (University of California, Santa Barbara, USA); Priyal Badala (University of California, San Diego, USA); Brian Hoang (University of California, Davis, USA)

- **Blending of Medical Imaging Techniques and AI for Early Detection of Diseases**

Gurnoor S Dang, Majid Rodgar and Michael Snyder (Stanford University, USA)

- **Investigating Advanced Deep Learning Architectures for Uterine Fibroid Detection in Ultrasound Images**

Oussama Hallab (City University Lebanon, Lebanon); Hiba Al Sheikh (City University, Lebanon); Firas Zakaria (Lebanese International University, Lebanon); Ahmad Diab (Lebanese University, Lebanon)

- **An Improved U-Net Deep Learning Method To Reduce MRI Gadolinium-based Contrast Agents**

Nagham Jaafar Shukur (Beirut Arab University, Lebanon); Mohammed Salah Ibrahim (University of Anbar, Iraq); Ali El-Zaart and Wassila El Kanawati (Beirut Arab University, Lebanon)

Thursday, October 9 20:00 - 22:30 (Asia/Beirut)

- Gala Dinner (Voco Hotel)

Friday, October 10 9:00 - 10:00 (Asia/Beirut)

- Keynote Speaker 3: From Mirror to Companion: AI and the Next Era of Digital Twins (Building A4-G08)
- Prof. Abdulmotaleb El Saddik, FRSC, FIEEE, FEIC, FCAE
- Chairs: Abdallah El Ghaly (Beirut Arab University, Lebanon), Mohamad Khalil (Lebanese University - AZM Center for Biotechnology -DSST & Faculty of Engineering, Lebanon)

Friday, October 10 10:00 - 10:30 (Asia/Beirut)

- Coffee Break (A4 Building)

Friday, October 10 10:30 - 12:15 (Asia/Beirut)

- **S21(A): EEG-II**
- **Room: Building A4-G08**
- **Chairs: Heba El-Halabi (Beirut Arab University, Lebanon), Ali Hage-Diab (Lebanese International University, Lebanon)**
- **Analysis of Brain (EEG) and Muscle (EMG) Signaling Features to Characterize the Stages of Parkinson's Disease using ANFIS**
Mahasen Khalil El Dimassi, Mahasin (Beirut Arab University, Lebanon); Alaa Daher (Electrical and Computer Engineering, Faculty Of Engineering, Beirut Arab University, Lebanon); Ziad Doughan and Ziad Osman (Beirut Arab University, Lebanon)
- **A Novel EEG Dataset for Emotion Recognition using Machine Learning and Deep Learning**
Fatima Sbeity (Lebanese International University, Lebanon); Diyaa Akil, Shaza Assaad, Hoda Shrara, Hadi A. Ammar and Mohamad Nasserredine (Lebanese University, Lebanon); Jamal Charara (Lebanese University & Faculty of Sciences, Lebanon)

- **Predicting Cognitive Fatigue Levels Using Multimodal Signals**
Jihan Allaw and Ahmad Rifai Sarraj (Lebanese University, Lebanon); Marwan AlHawat (LIU, Lebanon); Ahmad Diab (Lebanese University, Lebanon); Antonio Pinti (Université polytechnique Hauts-de-France, France); Abir El Abed (Lebanese University, Lebanon)
- **Semi-supervised Epileptic Seizure Detection Using Anomaly Detecting Autoencoder**
Raja Mohammad Mourad (Lebanese International University, Lebanon); Ahmad Diab (Lebanese University, Lebanon); Mohamad Khalil (Lebanese University - AZM Center for Biotechnology -DSST & Faculty of Engineering, Lebanon); Zaher Merhi (Lebanese International University, Lebanon); Régine Le Bouquin Jeannès (Université de Rennes, France)
- **Comparative Study on Epileptic Seizure Prediction Using Deep Feature Engineering with Individual and Ensemble Algorithms**
Yousif A. Saadoon (Université libanaise, Lebanon & University of Misan, Iraq); Mohamad Khalil (Lebanese University - AZM Center for Biotechnology -DSST & Faculty of Engineering, Lebanon); Dalia Battikh-LU (Lebanese University, Lebanon)
- **Reproducibility of EEG-Based Face Processing Findings Across Analysis Software**
Aya Kabbara (Lebanese International University, Lebanon); Youssef El Traboulsi (Beirut Arab University, Lebanon)
- **From thoughts to text: Unlocking Your Mind with EEG**
Alaa Daher (Electrical and Computer Engineering, Faculty Of Engineering, Beirut Arab University, Lebanon); Tala Mokhtar Alomari, Eng. Tala, Diana Darwich, Eng. Diana and Sara Dabaja, Eng. Sara (Beirut Arab University, Lebanon)

- **S21(B): CNN/ViT**
- **Room: Building A4-B208**
- **Chairs: Ahmad Diab (Lebanese University, Lebanon), Firas Zakaria (Lebanese International University, Lebanon)**
- **Comparative Analysis of Convolutional Neural Networks and Vision Transformers for White Blood Cell Classification in Medical Imaging**
Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon); Fadi Dornaika (University of Basque Country and Ikerbasque Foundation, Spain); Ignacio Arganda-Carreras (UPV-IKERBASQUE, Spain); Abdallah Kassem (Notre Dame University, Lebanon)
- **Classification of Alzheimer's Disease Stages Using Deep Learning Approaches**
Aziza Hallak (City University Lebanon, Lebanon); Firas Zakaria (Lebanese International University, Lebanon); Hiba Al Sheikh (City University, Lebanon)
- **A Generalizable Deep Learning Framework for Atrial Fibrillation Detection Using Real and Simulated Data**
Ahmad O. Al Hassan (Lebanese International University, Lebanon); Marwan AlHawat (LIU, Lebanon); Ahmad Diab (Lebanese University, Lebanon)
- **Expanded EEG Datasets for Student Confusion Detection using Deep Learning**
Fatima Sbeity (Lebanese International University, Lebanon); Shaza Assaad, Diyaa Akil, Hadi A. Ammar, Hoda Shrara and Mohamad Nassereddine (Lebanese University, Lebanon); Jamal Charara (Lebanese University & Faculty of Sciences, Lebanon)

- **Attention-Guided CNN with Preprocessing Analysis for Accurate Diabetic Retinopathy Detection from Retinal Fundus Images**

Ahmad O. Al Hassan (Lebanese International University, Lebanon); Marwan AlHawat (LIU, Lebanon); Firas Zakaria (Lebanese International University, Lebanon); Ahmad Diab (Lebanese University, Lebanon)

- **Transfer Learning for Colorectal Cancer Tissue Classification: A Comparative Study of CNNs and Vision Transformers**

Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon); Sahar Al Ghadban (Lebanese International University, Lebanon); Fadi Dornaika (University of Basque Country and Ikerbasque Foundation, Spain); Ali H Cherry (International University of Beirut, Lebanon); Ali Hage-Diab (Lebanese International University, Lebanon)

- **Facial emotional recognition using artificial intelligence for autistic children**

Lara Hamawy (LIU, Lebanese International University, Lebanon); Elio Joseph Imad and Alaa Toufic El Habouche (Lebanese International University, Lebanon & LIU, Lebanon); Marwan AlHawat (LIU, Lebanon); Mohammad Abou Ali (Lebanese International University & President Elias Hrawi Governmental Hospital, Lebanon); Ahmad Diab (Lebanese University, Lebanon)

• **S21(C): AI/ML/DL (2)**

• **Room: Building A4-B108**

• **Chairs: Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon), Youssef El Traboulsi (Beirut Arab University, Lebanon)**

- **Detection Of Breast Abnormalities**

- Charbel Mazloum, Rita Abdo and Riwa Bou Akl (Lebanese University, Lebanon); Elie Dina (University of Lorraine, France); Nicole Challita (Lebanese University, Lebanon)

- **Dementia Detection from EEG Features using Machine Learning and Deep Learning**

Fatima Sbeity and Hassan Saad (Lebanese International University, Lebanon); Lara Hamawy (LIU, Lebanese International University, Lebanon)

- **Radiomics-Based Clinical Imputation and Anatomical Region Selection for Enhanced Classification of Pancreatic Ductal Adenocarcinoma**

Maissa Abdallah (ESEO, France & ESEO-tech, France); Ali Abbas (Catholic University of the West, France); Aya Hage Chehade (LabISEN, LSL, ISEN Ouest, France); Daniel Schang (ESEO-Tech, LERIA); Jean-Marie Marion (University of Angers, France); Nassib Abdallah (LaTIM, INSERM, University of Brest, France)

- **YOLOv11-Based Object Detection for Peripheral Blood Cell Classification: Toward Scalable and Clinically Granular Smear Analysis**

Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon); Mariam Abdul Fattah and Baraah Al Hussein (Lebanese International University (LIU), Lebanon); Fadi Dornaika (University of Basque Country and Ikerbasque Foundation, Spain); Ali H Cherry (International University of Beirut, Lebanon); Mohamad Hajj-Hassan (Lebanese International University, Lebanon); Lara Hamawy (LIU, Lebanese International University, Lebanon)

- **Robust Deep Learning for MRI-Based Alzheimer's Disease Detection: Overcoming Real-World Imaging Challenges**

Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon); Mostafa Mohieldin (Lebanese International University (LIU), Lebanon); Fadi Dornaika (University of Basque Country and Ikerbasque Foundation, Spain); Ignacio Arganda-Carreras (UPV-IKERBASQUE, Spain); Rejdi Chmouri (Lebanese International University (LIU), Lebanon); Ali H Cherry (International University of Beirut, Lebanon); Ali Hage-Diab (Lebanese International University, Lebanon)

- **SAM-GAN Synthesis for Equitable Skin Cancer Diagnosis: A Deep Learning Approach to Address Class Imbalance in Dermoscopy**

Mohamad Abou Ali (University of the Basque Country, Spain & Lebanese International University, Lebanon); Ali Rasoul Rifai (Lebanese International University (LIU), Lebanon); Fadi Dornaika (University of Basque Country and Ikerbasque Foundation, Spain); Ignacio Arganda-Carreras (UPV-IKERBASQUE, Spain); Ali H Cherry (International University of Beirut, Lebanon); Lara Hamawy (LIU, Lebanese International University, Lebanon); Mohamad Hajj-Hassan (Lebanese International University, Lebanon)

- **COPD Detection and Classification by Analyzing Respiratory Audio Signals Using Deep Learning Models: Systematic Review**

Isra'a Mohammad Misto (Lebanese University, Lebanon); Nassib Abdallah (LaTIM, INSERM, University of Brest, France); Bassam Daya (Lebanese University, Lebanon)

Friday, October 10 12:30 - 14:30 (Asia/Beirut)

- Lunch Break/Praying Time (A4 Building)

Friday, October 10 14:30 - 16:00 (Asia/Beirut)

- **S22(A): Health Monitoring & Rehabilitation**
- **Room: Building A4-G08**
- **Chairs: Alaa Daher (Electrical and Computer Engineering, Faculty Of Engineering, Beirut Arab University, Lebanon), Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)**
- **Family Engage: A Family Centered Web Application for Interactive Physical Activity and Social Connection**
Myriam Awaida (Holy Spirit University of Kaslik, Lebanon); Wadih Ishac (Qatar University, Qatar); Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)

- **Design of a Personalized Game to Enhance Limits of Stability in Multiple Sclerosis Balance Rehabilitation**

Hiyam Ibrahim (Cologne University of Applied Sciences, Germany & Lebanese University, Belgium); Emmanuel Guardiola (Cologne University of Applied Sciences, Germany); Ahmad Diab (Lebanese University, Lebanon)

- **Neural Network Based Firefighters Monitoring and Tracking System**

Ziad Doughan, Ali Massoud Haidar, Hafez Al Khatib, Ali Alawieh, Abbas Mostapha, Salim Sinno and Jamal Jalloul (Beirut Arab University, Lebanon); Hazar Temsah (American University of Beirut, Lebanon); Amira J. Zaylaa (Beirut Arab University, Lebanon)

- **AI-Driven Detection of Developmental Dysplasia of the Hip in Pediatric Patients**

Charles Yaacoub (Université Catholique de Lille, France); Marcellin El Khoury (Holy Spirit University of Kaslik (USEK), Lebanon); Maria El Khoury (Centre Hospitalier Alès Cévennes, France); Rana Zgheib (Notre Dame des Secours University Hospital, Lebanon); Roy Abi Zeid Daou (Université La Sagesse, Lebanon); Petra Bilane (Université Catholique de Lille, France)

- **The influence of mitral tilted implantation position on the transmitral pressure gradient**

Mouhammad El Hassan (Prince Mohammad Bin Fahd University, Saudi Arabia); Nikolay Bukharin (Southern Alberta Institute of Technology, Canada); Zeeshan A. Rana (Prince Mohammad Bin Fahd University, Al-Khobar, United Kingdom (Great Britain)); Enio Bandarra Filho (Prince Mohammad Bin Fahd University, Saudi Arabia)

- **S22(B): Biomedical Applications**
- **Room: Building A4-B208**
- **Chairs: Ziad Doughan (Beirut Arab University, Lebanon), Fatima Sbeity (Lebanese International University, Lebanon)**

- **Simulation of Tissue Mechanics during Gastric Sleeve Stapling**
Mohamad Hajj-Hassan (Lebanese International University, Lebanon); Ali H Cherry (International University of Beirut, Lebanon); Lara Hamawy (LIU, Lebanese International University, Lebanon); Soumaya Berro (Lebanese International University, Lebanon & University of Technology of Compiègne, France); Houssein Hajj Hassan (Al Maaref University, Lebanon); Jana Hammoud (Lebanese International University, Lebanon); Hassan Wehbi (XNY Medical, China)
- **Mathematical Modeling of Optimal Chemotherapy Dosing in Chronic Lymphocytic Leukemia: A Stability-Based Strategy to Prevent Allergic Reactions**
Lara Abou Orm and Rawan Abdallah (Rafik Hariri University, Lebanon)
- **The effect of Brain Training Using Video Games to Improve Cognitive Functions in Lebanese Individuals with Chronic Moderate to Severe Traumatic Brain Injury: A pilot study**
Nour El Hoda Youssef Saleh (Health, Rehabilitation, Integration, and Research Center, Lebanon & Lebanese University, Lebanon); Youssef ElZein and Houssein Yassine (Islamic University of Lebanon, Lebanon); Houssein Abou Taam (Health, Rehabilitation, Integration, and Research Center (HRIR), Lebanon); Zahra Sadek (Lebanese University & University of Picardie Jules Verne, Lebanon); Ibrahim Naim (Health, Rehabilitation, Integration, and Research Center, Lebanon)
- **Urban Air Quality Analysis using Ensemble Learning**
Iman Haidar, Sari Samir Itani, Ali Kaouk, Ahmad Kaddah, Diyaa Abou Alloul and Ziad Doughan (Beirut Arab University, Lebanon)

- **Breast Cancer Detection Using a Microwave Probe and Self-Organized Algorithm**
Mauricio Hernandez, Mohammad Omid Bagheri and Omar Ramahi (University of Waterloo, Canada)
- **S22(C): BCI & Brain Tumor**
- **Room: Building A4-B108**
- **Chairs: Hamza Issa (Beirut Arab University - Debbieh - Damour Branch, Lebanon), Amira J. Zaylaa (Beirut Arab University, Lebanon)**
- **PINNs: leveraging Alzheimer's disease diagnosis?**
Hala Khalil Ali (University of Poitiers, Laboratoire XLIM, France & Lebanese University, AZM Center, Lebanon); Pascal Bourdon (University of Poitiers, France); Carole Guillevin (CHRU Poitiers, France); Christine Fernandez-Maloigne (University of Poitiers & I3M Laboratory, France); Mohamad Khalil (Lebanese University - AZM Center for Biotechnology - DSST & Faculty of Engineering, Lebanon); David Helbert (XLIM Laboratory, France)
- **Brain tumor detection using deep learning models**
Lara Hamawy (LIU, Lebanese International University, Lebanon); Thuraya Mawad and Khalil Teres (LIU, Lebanon); Ahmad Diab (Lebanese University, Lebanon); Mohamad Hajj-Hassan and Fatima Sbeity (Lebanese International University, Lebanon)
- **Enhanced Patch-Wise Brain Tumor Segmentation Using U-Net and α -Expansion-Based Graph Cut Refinement**
Roaa Soloh, Lara Abou Orm and Mahmoud El Batish (Rafik Hariri University, Lebanon)

- **Brain-Computer Interfaces in Neurodegenerative Disorders Causing Paralysis: A Systematic Review and Meta-Analysis**

Hala Khodor Al Moghrabi (Beirut Arab University, Lebanon & L'Université Libanaise, Lebanon); Zahraa F. Audi (Lebanese University, Lebanon); Hania Nakash (Beirut Arab University, Lebanon); Elias Estephan and Hayat Harati (Lebanese University, Lebanon); Mohammad Ayache (Beirut Arab University (BAU), Lebanon)

- **Meta-Analysis of fNIRS, Hybrid, and Artistic Brain-Computer Interfaces for Neurological Disorders**

Hala Khodor Al Moghrabi (Beirut Arab University, Lebanon & L'Université Libanaise, Lebanon); Zahraa F. Audi (Lebanese University, Lebanon); Mohammad Ayache (Beirut Arab University (BAU), Lebanon); Hania Nakash (Beirut Arab University, Lebanon); Hayat Harati (Lebanese University, Lebanon)

Friday, October 10 16:00 - 16:30 (Asia/Beirut)

Close: Closing Ceremony (A4 Building)