2nd Global Conclave on

Future of Biosensors and Bioelectronics

June 26-27, 2025 | Berlin, Germany

Theme:

Next-Generation Biosensors and Bioelectronics: Integrating Smart Technologies for Global Health, Sustainability, and Innovation

Sub-**themes:**
- Advancements in Biosensor Technologies for Healthcare
- Bioelectronics in Precision Medicine and Personalized Healthcare
- Sustainable and Biocompatible Materials in Biosensors
- Nanotechnology in Biosensors
- Integration of Artificial Intelligence and Machine Learning with Biosensors
- Biosensors for Environmental and Agricultural Monitoring
- Wearable Biosensors for Continuous Health Monitoring
- Point-of-Care Diagnostic Biosensors
- Flexible and Stretchable Bioelectronics
- Graphene and 2D Nanomaterials in Biosensing
- Wireless and Remote Biosensing Technologie

FUTURE OF BSBE 2025

https://advanced-biosensors-bioelectronics.peersalleyconferences.com/

2 — DAYS WITH MORE THAN 45 SESSIONS, KEYNOTES & ORAL PRESENTATIONS

12+ — INNOVATIVE FEATURED SPEAKERS

20+ — HOURS OF NETWORKING EVENTS

60+ — INTERNATIONAL SPEAKERS

125+ — EDUCATIONAL SESSIONS

WHO SHOULD ATTEND?

- Biomedical Researchers
- Pharmacists
- Medical Professionals and Practitioners
- Biotechnology and Biopharmaceutical Industry Professionals
- Nanotechnologists
- Chemical Engineers
- Biochemists
- Microbiologists
- Biostatisticians
- Data Scientists
- Materials Scientists and Engineers
- Electronics and Electrical Engineers
- Microfluidics Researchers and Developers
- Healthcare Entrepreneurs and Investors
- Regulatory and Compliance Professionals
- Industrial Automation and Control Professionals
- Energy and Utilities Industry Professionals
- Healthcare IT Professionals
- Academic Researchers
- Data Scientists and Bioinformatics Professionals
- Pharmaceutical and Drug Delivery Industry Professionals

WELCOME MESSAGE

Dr. Koffka Khan
The University of the West Indies,
West Indies

Dear Participant,

On behalf of the organizing committee, it is with great pleasure that we extend our warmest welcome to the "2nd Global Conclave on Future of Biosensors and Bioelectronics" (Future of BSBE 2025), scheduled to be held on June 26-27, 2025, in the vibrant city of Berlin, Germany.

Your enthusiastic participation and contribution are highly anticipated as we gather leading experts, researchers, and innovators from around the globe to explore the latest advancements and future prospects in biosensors and bioelectronics.

This event promises to be an enriching experience filled with insightful discussions, groundbreaking research presentations, and ample networking opportunities. We are thrilled to have you join us and share your expertise with colleagues and peers from diverse backgrounds.

Once again, welcome to Future of BSBE 2025! We look forward to your presence and meaningful engagement in shaping the future landscape of biosensors and bioelectronics.

Warm regards,
Dr. Koffka Khan
The University of the West Indies, West Indies

Dear participants of the 2nd Global Conclave on Future of Biosensors and Bioelectronics 2025, it is an honor and pleasure to write a few welcome notes. The ongoing healthcare transformation towards personalized, preventive, predictive, participative precision medicine (P5M) considers individual health status, conditions, genetic and genomic dispositions in personal social, occupational, environmental and behavioral context. Thereby, the actors from multiple domains with their own methodologies, languages, ontologies, education and skills, communication and cooperation, but also new and old technical components must be able to correctly and comprehensively communicate and cooperate.

This requires a full understanding and intelligent as well as ethical action. For realizing this, the highly dynamic, complex, context-aware, multi-disciplinary transformed healthcare ecosystem must be represented as system of systems, using a system-theoretical, ontology-based, policy-driven approach standardized in ISO 23903 Interoperability and Integration Reference Architecture. Because of its formal and foundational nature, model and methodology are not restricted to health and social care, but has been successfully deployed already in many other domains. We look forward to an exciting and productive conference.

BERND BLOBEL
University of Regensburg
Germany

PRESENTATION FORUM

KEYNOTE FORUM / MINI-PLENARY SESSIONS

Presentations under Keynote Forum or Mini-Plenary Sessions includes abstracts with remarkable research value selected by the program committee. These significant speeches are delivered by globally recognized honorable speakers and it is open to all registrants.

DISTINGUISHED SPEAKERS FORUM (ORAL ABSTRACT SESSIONS)

In this forum, speakers and experts of the research field gets an opportunity to showcase their noble research work that involves comprehensive research findings. These formal oral presentations include a wide range of talks covering basic research to advanced research findings in accordance to the theme and scientific sessions of the conference.

STUDENT FORUM

POSTER SESSION

This session is particularly introduced to encourage more number of student participation at international conferences, however it is not restricted only to students since it is also available for the participants with language barrier. There are specific guidelines to be followed to prepare the poster. Poster topic should be selected only from relevant scientific sessions with in-depth technical details.

YOUNG INVESTIGATORS FORUM

An exclusive opportunity for students and young investigators to present their research work through a formal oral presentation. Young Investigators Forum provides a global platform for young researchers and scholars to showcase their valuable contribution to the scientific world and to get acknowledged by the global scientific community of experts. It is an excellent opportunity to recognize young scientific assets with promising research ideas. These oral presentations are of shorter time duration with 10-15 minutes of informative and precise presentations in relevant scientific sessions.

EDUCATIONAL WORKSHOPS/RESEARCH WORKSHOPS/ CORPORATE WORKSHOPS/MINI- SYMPOSIA

With an aim of transferring knowledge among the participants, workshops are introduced as a part of international conferences. These interactive and occasionally practical sessions gives an opportunity for participants to engage in detail discussion. Workshops are mostly scheduled for 60 to 90-minutes. It may range from learning about a specific topic relevant to international education, products and research which sometimes involves practical demonstration. It helps in enhancing skills, knowledge and understanding of the research field in depth through interactive discussions.

HIGHLIGHTS OF THE DAY SESSIONS

"Highlights of the Day Sessions" is introduced to discuss and focus a ray upon previous day ORAL ABSTRACT presentations by experts to summarise the key findings. It helps in getting better insights into the various dimensions of the topic.

MEET THE PROFESSOR @ NETWORKING SESSIONS

This session involves open discussion between the experts and session attendees, it gives enough time for getting answers to specific questions and doubts. It is an opportunity for attendees to increase their professional networking, sometimes also leads to an excellent collaboration opportunity.

EDUCATIONAL SESSIONS/ TRAINING PROGRAMS

Educational Sessions or training programs are specifically designed for a better understanding of the latest findings and technologies. These are generally 45-minute sessions that gives an exposure to the multidisciplinary field, that provides in-depth learning experiences and address educational needs.

TIME TO

CONNECT

WITH YOUR

PEERS

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Speaker Slots Filling Quickly

>>FEATURED TALKS <<

Title: Biofluorometric sensing & imaging for human VOCs

Speaker Name: Kohji Mitsubayashi

Affiliation: Institute of Science Tokyo, Japan

Abstract:

The human body emits various volatile organic chemicals (VOCs).depending on a person's genetics, disease, and metabolic conditions. Secondary alcohol dehydrogenase (S-ADH) catalyzes the reduction of acetone and the oxidation of nicotinamide adenine dinucleotide (NADH), NADH is excited by 340 nm excitation lights and subsequently emits 490 nm fluroscence. Therefore, acetone can be measured by the decrease in NADH fluorescence intensity. An acetone gas-sensor was constructed by incorporating an optic probe into a gas/liquid flow cell with an S-ADH immobilized diaphragm. The developed sensor has shown rapid response, high sensitivity, and selectivity to acetone. The breath acetone analysis for diabetic patients under medical treatment has indicated a mean value of 1207 ppb, which was higher than that of healthy subjects (750ppb).

In addition, the biofluorometric gas-imaging system with ADH (alcohol dehydrogenase) reaction could demonstrate a spatiotemporal change of gaseous EtOH. The sniff-cam was composed of a CMOS camera, a UV-LED sheet, and an ADH-immobilized mesh. The oxidation of ADH was employed for detection of gaseous EtOH related to the NADH fluorescence intensity. The image differentiation method that calculated a fluorescence change rate was employed to visualize a real-time change in the concentration distribution of EtOH. tHE DYNAMIC RANGE FOR EtOH. tHE DYNAMIC RANGE FOR eTOH was 20 ppb - 300 ppm. As the physiological application, the system successfully achieved the imaging of the concentration distributation of EtOH in exhaled breath and skin gas.

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>>FEATURED TALKS <<

Title: Practical Aspects of Ethical Decision Making in CHD

Speaker Name: Hala Al Alem

Affiliation: King Abdullah Specialized Children Hospital – Ministry of National Guard, Kingdom of Saudi Arabia

Abstract

Working in health care institutions- deal with fetal / paediatric congenital heart diseases-build up moral sensitivity at different levels. Patient-family and doctor relationship starts from the moment family decides to seek medical/surgical advice. Parents ask everywhere choosing the best compassionate expert who could help at all levels. Mutual respect and   trust are the first ethical values to launch the medical / surgical journey. Health care providers ought to practice integrity – driven ethics to deliver patient – family centred care. Technology and skill advancement will never stop. This fact would put more ethical responsibilities on health care workers. Therefore, teaching and learning how to reach ethical shared decisions are highly important. Do-No-Harm is the cornerstone of any creative innovative test or intervention. Non-maleficence is the giant umbrella over any thoughts, decision, or action.

Clinical Ethical consultation initiation would test the proposed diagnostic or therapeutic options against the four principles of medical ethics. Ethics committees are not authority to pursue certain decisions. It is an advisory board that may facilitate unbiased understanding and execution of the shared decision between parents/guardians and treating physician/surgeon.

Legal precedence and or ethical precedence may colour the decision-making process in many challenging circumstances (complex lesions, conflict, moral distress).

Ethics and law are not the same. Ethics comes above the law. However, one ought to be following his/her land law and to be ethically reasonable at the same time.

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Title: The Cooper-Pair Distribution Function of Untwisted-Misaligned Bilayer Graphene

Speaker Name: Guillermo Iván González Pedreros

Affiliation: Universidad Pedagógica y Tecnológica de Colombia, Colombia

Abstract:

The Cooper-pair distribution function $Dcp(\omega,Tc)$ of Untwisted-Misaligned Bilayer Graphene (UMBLG) in the presence of an external electric field is calculated and analyzed within the framework of first-principle calculations. A bilayer graphene structure is proposed using a structural geometric approximation, enabling the simulation of a structure rotated at a small angle, avoiding a supercell calculation. The $Dcp(\omega,Tc)$ function of UMBLG indicates the presence of the superconducting state for specific structural configurations, which is consistent with the superconductivity in Twisted Bilayer Graphene (TBLG) reported in the literature. The $Dcp(\omega,Tc)$ function of UMBLG suggests that Cooper-pairs are possible in the low-frequency vibration region. Furthermore, the structural geometric approximation allowed the evaluation of the effect of the electric field on the superconducting state of UMBLG and its superconducting critical temperature through the Ncp parameter.

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Speaker Slots Filling Quickly

Title: Electroencephalographic guided propofol remifentanil TCI anesthesia with and without dexmedetomidine in a geriatric population: electroencephalographic signatures and clinical evaluation

Speaker Name: Fernando Zurita Delgado

Affiliation: Hospital Base San José, Osorno/Universidad Austral, Chile

Abstract:

Elderly and multimorbid patients are at high risk for developing unfavorable postoperative neurocognitive outcomes; however, well-adjusted and EEG-guided anesthesia may help titrate anesthesia and improve postoperative outcomes. Over the last decade, dexmedetomidine has been increasingly used as an adjunct in the perioperative setting. Its synergistic efect with propofol decreases the dose of propofol needed to induce and maintain general anesthesia. In this pilot study, we evaluate two highly standardized anesthetic regimens for their potential to prevent burst suppression and postoperative neurocognitive dysfunction in a high-risk population. Prospective, randomized clinical trial with non-blinded intervention. Operating room and post anesthesia care unit at Hospital Base San José, Osorno/Universidad Austral, Valdivia, Chile. 23 patients with scheduled non-neurologic, non-cardiac surgeries with age>69 years and a planned intervention time>60 min. Patients were randomly assigned to receive either a propofol-remifentanil based anesthesia or an anesthetic regimen with dexmedetomidinepropofol-remifentanil. All patients underwent a slow titrated induction, followed by a target controlled infusion (TCI) of propofol and remifentanil (n=10) or propofol, remifentanil and continuous dexmedetomidine infusion (n=13). We compared the perioperative EEG signatures, drug-induced changes, and neurocognitive outcomes between two anesthetic regimens in geriatric patients. We conducted a pre- and postoperative Montreal Cognitive Assessment (MoCa) test and measured the level of alertness postoperatively using a sedation agitation scale to assess neurocognitive status. During slow induction, maintenance, and emergence, burst suppression was not observed in either group; however, EEG signatures difered signifcantly between the two groups. In general, EEG activity in the propofol group was dominated by faster rhythms than in the dexmedetomidine group. Time to responsiveness was not signifcantly diferent between the two groups (p=0.352). Finally, no signifcant diferences were found in postoperative cognitive outcomes evaluated by the MoCa test nor sedation agitation scale up to one hour after extubation. This pilot study demonstrates that the two proposed anesthetic regimens can be safely used to slowly induce anesthesia and avoid EEG burst suppression patterns. Despite the patients being elderly and at high risk, we did not observe postoperative neurocognitive defcits. The reduced alpha power in the dexmedetomidine-treated group was not associated with adverse neurocognitive outcomes.

>>FEATURED TALKS <<

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Speaker Slots Filling Quickly

Title: Portable Bioelectronic System for Real-Time Motion Tracking in Virtual Reality: Integrating Movella Sensors with Vizard for Neurorehabilitation and Sports Applications

Speaker Name: Wangdo Kim

Affiliation: Universidad de Ingeniería y Tecnología – UTEC, Perú

Abstract:

This study introduces a portable bioelectronic system that leverages Movella wearable sensors integrated with the Vizard VR platform to facilitate real-time motion tracking in virtual reality (VR) environments, particularly for neurorehabilitation and sports performance analysis. The system utilizes Bluetooth Low Energy (BLE) for robust wireless connectivity, enabling real-time kinematic data capture essential for detailed biomechanical analyses and optimized therapeutic interventions. The fusion of Movella sensors with Python-driven VR applications offers a scalable solution that enhances interactive 3D content creation and participant engagement through dynamic response to motion data.

Experimental validation was carried out using soft exoskeletons, demonstrating the system's high accuracy and reliability in tracking human movement. The study also explores the application of Laban Movement Analysis (LMA), specifically Laban's "A" Scale, to enrich the training protocols for upper limb neurorehabilitation. This inclusion aids in improving spatial awareness and motor control, which are critical in recovery post-stroke or injury.

Results from the trials indicate significant potential for the system in enhancing user engagement and adherence to rehabilitation exercises, primarily through immersive, gamified VR environments that provide instant feedback and adapt to user performance. The study underlines the system's capability not only as a tool for clinical practice but also as a framework for further research and development in motion analysis technologies.

This research supports the integration of advanced bioelectronic technologies with VR to offer novel, effective approaches to rehabilitation and sports training, demonstrating the critical role of real-time data feedback in therapeutic success.

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Speaker Slots Filling Quickly

**Title: Netnography: Methodics in Pandemic Covid-19 from a Human Digital Ecosystem of Physicians**

Speaker Name: Marcos Enrique Flores González

Affiliation: University of Montemorelos, Mexico

Introduction: The global social disruption generated by the Covid-19 pandemic produced an immeasurable hecatomb in society. Especially in the healthcare system; even though the World Health Organization and the International Labor Organization developed Biosafety actions for healthcare workers exposed to SARS-CoV-2. Inquiring about this occupational reality of physicians was unlikely, since Venezuela followed social confinement as a preventive mechanism to preserve the health of the population; this context placed physicians at a crossroads between epidemiological chaos, social uncertainty and inhospitable conditions of safety, hygiene and health at work; Therefore, research in confinement, proposed to migrate from a face-to-face methodology to the digital environment, with the purpose of reflecting on the meanings and significance that physicians attributed to medical praxis and working conditions in the Covid-19 pandemic.

Methodology: The place of the study was the human digital ecosystem, of doctors, of different specialties, from there, emerged the challenging heuristic processes that recursively configured the netnographic methodology, through which the hybridization of offline and online society merged as a social-healthcare continuum was unveiled, discovering the phenomenal complexity. Results: The netnographic methodology was guided by research focused on concrete problems; the methodological procedure and the findings are exposed as a lifeline, the categories and subcategories represent palpitating traces of online sociability, product of an ecosophical hermeneutics of dimensions: guild, medical praxis, social, safety - hygiene - occupational and psychosocial health. Conclusion: This study paradigmatically legitimizes the suitability of netnography in contributing to the construction of scientific knowledge in occupational safety, hygiene and health.

Figure Cartography of the resignification of medical praxis in the Covid-19 pandemic
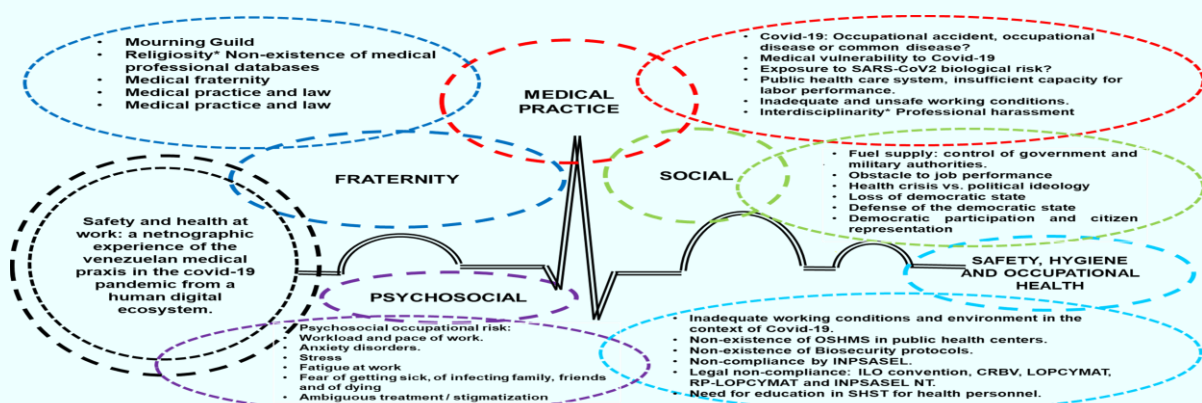
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Title: Flowscapes – the key to turning Grey to Green-Blue infrastructure in Hue, Vietnam

Speaker Name: Quoc Thang Nguyen

Affiliation: Hue University, Vietnam

Abstract:

Hue located in central Vietnam, is not only known as a heritage city (was recognized by UNESCO in 1993) but also famous due to its rich landscape resources, although this landscape has not been linked together and related to urban infrastructure to shape a system supporting the ecological environment and flood regulation - a significant challenge for Hue city as a result of urbanization and climate change. Green-Blue infrastructure (GBI) is a nature-based solution approach activating natural system as an interconnected network to provide ecological services. The GBI application in Hue is both an opportunity and a challenge for exploiting the integration of grey to green infrastructure to force the linkage. This article illustrates the foundation and initiative measures to synchronize the landscape and infrastructure to implement GBI in Hue, Vietnam based on Hue's landscape identities and values, which are categorized into three kinds of flowscapes including water infrastructure, green infrastructure, and transportation infrastructure.

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Title: Digital Twins: Innovation in Automated Systems Control Education

Speaker Name: Fanny Priscila Toalombo Sisa

Affiliation: Universidad de Las Fuerzas Armadas ESPE, Ecuador

Abstract:

This article presents the development of a learning tool based on Digital Twins, which has contributed to the understanding of theoretical concepts and the development of practical skills, designed to generate a virtual environment controlled by a PLC S7-1200. Its main objective is to generate active learning in students for the acquisition of significant knowledge. This tool allows engineering students to interact in an active and practical way with simulated industrial processes, through the use of didactic modules, in addition to being able to simulate sensors that replicate the actions at each stage, to reach a final product. Real-time communication between the controller and the work environment contributes significantly to decision-making, allowing students to design, control and manipulate industrial processes with precision, as well as to respond to possible eventualities during the execution of these processes. The research work is divided into three parts, being i) Introduction, ii) Conceptualisation of the development, iii) Development of the HIL process, iv) Experimental results and finally v) Conclusions. To evaluate the usability of the tool, the System Usability Scale (SUS) was applied to a homogeneous group of 20 students. This questionnaire consists of 10 questions, designed to measure the users' perception of the ease of use of the system. The evaluation yielded an average score of 86.5, which classifies the tool in the 'good' range. This result suggests that the tool is perceived as interactive and immersive, creating an active and user-friendly working environment, with the aim of optimising its functionality and ensuring an effective and satisfying learning experience.

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Title: The Challenge of Increasing Food Availability in the Caribbean

Speaker Name: Donovan Stanberry

Affiliation: University of the West Indies Mona, Jamaica

Abstract: The islands of the English-speaking Caribbean, form an archipelago from Bahamas in the Northern Caribbean Sea to Trinidad and Tobago in the South. This group includes Guyana in South America and Belize in Central America, all washed by the Caribbean Sea and sharing a common historical legacy of being colonized by Britain for over 300 years. This historical reality has shaped the nature and structure of their agricultural production, being oriented essentially to producing plantation crops on a monoculture basis, exclusively for export to Europe as commodities. These plantation crops, principally sugar and bananas dominated the agricultural landscape until the erosion of the preferential markets to which these crops were exported in the process of global liberalization of agricultural trade in the late 1990s.

Notwithstanding some measure of diversification in the independence era beginning in the early 1960s, with focus on domestic food crops and development of tourism, light manufacturing and extractive industries, these islands remain largely dependent on imports to satisfy their demand for food. In fact only Guyana and Belize are currently producing more than 50% of the food they consume, while in The Bahamas, up to 90 of domestic consumption is satisfied by imports. The burgeoning food import bill is fiscally unsustainable and the huge volumes of processed food imported has precipitated a crisis of obesity and non-communicable disease in the region.

The paper will analyse the drivers of food imports (a growing tourism sector and import of raw material for manufacturing), and the extent to which these very drivers constitute opportunities for expansion of agricultural production to increase food security. In this regard, the region must harness new technologies to increase food production sustainably, reduce food waste and produce higher value exports.

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Speaker Slots Filling Quickly

Title: Remote Sensing of Artisanal Mines Buried in the Ground by Infrared Thermography Using UAV

Speaker Name: Adama Coulibaly

Affiliation: University Gaston Berger, Senegal

Abstract:

The antipersonnel and anti-tank landmines create a lot of human and material damage in the Sahel countries affected by terrorism. Explosive mine detection methods are based on tools handled by human operators and target industrial metal mines. These methods are risky and limited because the types of mines most commonly used in the Sahelian context are mainly homemade and are encased in various local materials such as metal, plastic, glass, ceramic, or wood. This chapter presents a solution for remote sensing of artisanal mines buried in the ground using infrared thermography. A DJI Phantom 4 Quadcopter equipped with a FLIR thermal camera and a GNSS sensor performs an automatic low-level flyover of the potentially mined road. Thermal images of the road are collected with an overlap rate of 80% and referenced with the GNSS sensor. Photogrammetry algorithms are used to process the thermal images to detect and locate anomalies related to the presence of buried mines. Despite the limitations due to environmental influences, the model showed a detection rate of 75% during flights at an altitude of 6m and a speed of 3m/s. The experimental results show a good correlation between the thermal contrast of the mathematical model and the cooler areas containing a mine-related chemical substance.

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Speaker Slots Filling Quickly

>>FEATURED TALKS <<

Title: An Enhanced Convolutional Neural Network for Detecting Deepfake Videos

Speaker Name: Saadaldeen Rashid AHMED

Affiliation: Bayan University, Iraq

Abstract:

Deepfake detection is critical to address the proliferation of manipulated videos that can deceive and spread misinformation. Detecting deepfakes helps ensure the authenticity of visual content, protecting individuals, organizations, and society from potential harm, fraud, and misinformation. It safeguards trust in digital media and maintains the integrity of information in an era where video manipulation is increasingly sophisticated and accessible. Deepfake videos pose a significant threat to the integrity of visual content in the digital age. Detecting these manipulations is essential for safeguarding trust and authenticity. This research aims to enhance deepfake detection through the application of Rationale-Augmented Convolutional Neural Networks (RACNN) with Donald Trump Filter, addressing the urgent need to combat the proliferation of deceptive media and ensure the reliability of visual information. In our RACNN model, datasets play a crucial role in training. We have a total of 99,260 images, divided into two classes, with 70% for training. In addition, there are 1,030 images for validation, which is 10% of the dataset, and 26,914 images for testing and fine-tuning, which is 20%. This setup helps ensure that our model can accurately distinguish between real and fake videos, contributing to the ongoing fight against deceptive digital content. In this thesis, we conducted an evaluation using two datasets: the Deepfake Detection Challenge (DFDC) and the FaceForensics++. The CNN approach remained consistent, resulting in minimal variation in computational cost between the two methods. When we applied the Donald Trump filter to Deepfake videos, we found that low computational cost was essential for making a faster connection based on facial associations. This large dataset has been replicated many times, making it ideal for accurate categorization and segmentation. In addition, the simple implementation of the CNN model allowed for seamless integration with a partitioning technique, resulting in impressive accuracy rates of 94.99% for the DFDC dataset and 93.99% for the FaceForensics++ dataset.

>>FEATURED TALKS <<

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Speaker Slots Filling Quickly

Title: Numerical study of Tunis soft soil improved by combined vacuum consolidation and geodrains

Speaker Name: Halima JEBALI

Affiliation: Université de Tunis el Manar, Tunisia

Abstract:

This paper aims at presenting a numerical study of the behaviour of Tunis soft soil improved by vacuum consolidation combined with geodrains. An experimental investigation was carried out on reconstituted samples of Tunis soft soil (TSS) initially extracted from the centre of Tunis city at 35 m of depth. Three consolidation tests were carried out in a cell of 126-mm inner diameter and 290-mm height, the first one included a consolidation test by preload stress (q= 100 kPa). In the second test, vacuum consolidation tests (pv=100 kPa) were performed. The third test comprised a vacuum consolidation test combined with the preload (pv=50 kPa and q = 50 kPa). Simulation of those tests by the finite-element PLAXIS-2D code was implemented in axisymmetric conditions. Soft soil model was used to describe the behavior of Tunis soft soil (TSS). During this simulation, a parametric study was performed by varying the horizontal permeability kh of TSS. Then, by comparing the numerical results to the recorded data in laboratory, it has been verified that the numerical predicted settlements are higher than those measured during the performed laboratory tests. Further, numerical results confirmed that when the coefficient kh increases, the consolidation is complete in a shorter time. This work highlighted the usefulness of combining the vacuum pressure and geodrains improvement techniques to improve the behaviour of Tunis soft soil.

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Speaker Slots Filling Quickly

Title: Thermal Stability and Mechanical Properties of Poly(N-(2-hydroxypropyl) methacrylamide) (PHPMA) Modified by Fe2O3 Nanoparticles

Speaker Name: Zouati Noureddine

Affiliation: University of Saida-Dr. Moulay Tahar, Algeria

Abstract:

In this study, molecular dynamics (MD) simulation is used to investigate the effect of Fe2O3 nanoparticles (NPs) on the structural and thermomechanical properties of Poly(N-(2- hydroxypropyl)methacrylamide) (PHPMA) nanocomposites. Five molecular models of pure PHPMA and PHPMA/Fe2O3 nanocomposites with different NP sizes and concentrations were constructed and analyzed. The dynamics of the various models were investigated using mean square displacement (MSD), and their glass transition temperature (Tg) was estimated using both density-temperature and MSD evaluation methods. The results showed that the presence of Fe2O3 NPs in the PHPMA matrix increases the molecular mobility and flexibility of the polymer chains, decreases their Tg. The mechanical properties such as Young's and bulk modulus of PHPMA polymer are significantly decreased by the introduction of Fe2O3 NPs. The results also indicated that the effectiveness of NPs on polymer properties can be strongly influenced by the NPs characterization, the molecular mobility and flexibility of PHPMA nanocomposites increased with increasing NPs size and concentration, while Tg and the mechanical properties of PHPMA nanocomposite have a negative correlation with increasing NPs size and concentration. These findings provide insight into the effect of Fe2O3 nanoparticles on the structural and thermomechanical properties of PHPMA nanocomposites and can be useful for optimizing their design and application in various fields.

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Speaker Slots Filling Quickly

>>FEATURED TALKS <<

Title: Low-Complex ECG denoising process based on a hybrid DWT-ADTF approach: toward an embedded hardware architecture

Speaker Name: Wissam JENKAL

Affiliation: bn Zohr University, Morocco

Abstract: The electrocardiogram (ECG) is a crucial tool for diagnosing cardiac pathologies, as it captures the heart's electrical activity through specific waves and segments [1, 2]. Key features such as the P, QRS, and T waves, along with the PR, ST, and TP segments, provide insights into the heart's rhythm regularity, conductivity, and can reveal abnormalities, thus facilitating early diagnosis and monitoring of cardiac disorders [3, 4]. The ECG allows healthcare professionals to detect, monitor, and predict cardiac anomalies, enabling timely and appropriate medical intervention.

The ECG signal is generally a low-frequency signal, making it sensitive to various types of noise and interference that often fall within its frequency band [5]. These disturbances include high-frequency noise, baseline drift errors, and electrode movement during signal recording [6]. Common interference sources include power line disturbances (50Hz-60Hz) [7] and electromyogram (EMG) signal artifacts [8], both of which can cause significant distortions in the ECG signal. Such alterations compromise diagnostic accuracy, underscoring the need for advanced filtering techniques to remove or mitigate these sources of interference [9].

Various ECG signal filtering approaches are explored in the literature, utilizing linear or nonlinear techniques in time, frequency, or time-frequency domains. Common methods include finite impulse response (FIR) filters [10, 11], neural network-based techniques [12], adaptive filters [13], non-local means (NLM) filters [14], discrete wavelet transform (DWT) [15], DualTree DWT [16], empirical mode decomposition (EMD) [17], and ensemble EMD [18]. Although effective, many of these techniques demand high processing times and often lack real-time capability, limiting their implementation in portable applications. Additionally, for low-complexity applications, ECG signal processing results remain limited and unsatisfactory for a number of methods, such as FIR filters.

To address these limitations, we propose an enhanced hybrid approach based on DWT and ADTF filtering for ECG signal denoising [19-21]. This method aims to offer a low-complexity solution with high performance comparable to recent advanced techniques, but without the high computational complexity. Our proposed approach has shown highly competitive results with low complexity, encouraging us to design a hardware architecture for its embedded implementation [22]. The design was validated through simulation to confirm the architecture specifications and further validated through hardware implementation on an FPGA architecture.

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Speaker Slots Filling Quickly

Title: On quantum and LCD codes from the consatacyclic and cyclic codes over the ring $F_{p^{r}}[v]/< v^{5} - v>$

Speaker Name: Mohammed Sabiri

Affiliation: Moulay Ismail Univesity of Meknes, Morroco

Abstract:

Let $R_{5} = F_{p^{r}}[v]/< v^{5} - v>$, where p is an odd prime, $F_{p^{r}}$ is a finite field with p^{r} elements and $v^{5} = v$. In this study, we investigate quantum codes over $F_{p^{r}}$ by using constacyclic codes over R_{m}. Furthermore, by using cyclic codes over the ring R_{m} and their decomposition over the finite field $F_{p^{r}}$ into cyclic codes, a LCD codes are given as images of LCD codes over R_{m}.

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Speaker Slots Filling Quickly

Title: Centralized smart energy monitoring system for legacy home appliances

Speaker Name: Shahed Saeed Ahmad Alqadi

Affiliation:

Abstract:

The increasing global population and reliance on electrical devices for daily life resulted in sharply rising energy consumption. Also, this leads to higher household electricity bills. As a result, there is a growing demand for energy monitoring systems that can accurately estimate energy usage to help save power, especially for older home appliances that are difficult or expensive to update with monitoring sensors. However, current energy monitoring systems have some drawbacks, such as the inability to detect different types of appliances and the deployment complexity. Moreover, such systems are too costly to use in older power infrastructures. To address this issue, we proposed a centralized smart energy monitoring system designed for legacy home appliances, aiming to address the limitations of current energy monitoring systems by avoiding costly infrastructure upgrades to calculate the power consumption of legacy home appliances. The proposed system employs a two-layered architecture comprising hardware (Emontx device, Analog-to-Digital Converters (ADC), and Current Transformer (CT) sensors) and a software layer that includes Artificial Intelligence (AI) predictors using a pre-defined set of rules and K Nearest Neighbours (KNN) algorithms. We conducted three experiments on real home appliances to evaluate the proposed work. The accuracy of the proposed system showed positive results after several modifications and hard tuning of several parameters in devices, specifically for Jordanian power plants.

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Speaker Slots Filling Quickly

Title: Weaving the Future of Electromagnetic Shielding Textiles

Speaker Name: Hariharasudan Natarajan

Affiliation: Central Silk Technological Research Institute, India

Abstract:

The study focuses on the newly emerging threat to mankind, the Electromagnetic radiation. The Electromagnetic radiation abbreviated as EMR and Electromagnetic Interference, abbreviated as EMI that is instigated as a result of electric transmission, various electric and electronic appliances, which are day-to-day essential for the present and unavoidable for the future as the world has become completely depend on them. The study delves in to the sources of EMR & EMI, health hazards, calculation of its strength, causes and preventing methods. Here, we focus on harnessing the textile potential towards prevention of the living organisms and the environment from these radiations which are some at times very harmful and often creates a degradation in a slower rate. This work deliberates the different types of Textile materials with special importance to silk and conductive filaments, that can shield EMR. Further, the techniques & technology behind and further how these materials can be incorporated or turned out to be a wearable piece that can withstand and protect the human kind is deliberated in detail.

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Title: Fluorescent Graphene Quantum Dots Coupled with AI for Enhanced Arsenic Bio-sensing in Drinking Water

Speaker Name: Satanand Mishra

Affiliation: CSIR-Advanced Materials and Processes Research Institute (AMPRI), Academy of Scientific and Innovative Research (AcSIR), India

Abstract: Arsenic contamination in drinking water is one of the most critical health issues where high sensitivity and accuracy of detection methods are required. In this research a new concept is accessible artificial intelligence combined with fluorescent biosensors that are based on graphene quantum dots for the enhancement of arsenic detection. The engineered GQDs have shown strong fluorescence in the presence of arsenic ions, and this method can be utilized for optical detection with great sensitivity and selectivity. Key experimental results show that AI-enhanced GQD-based sensors obtain a limit of detection of 1 ppb, which is many times better than the standard detection methods. The sensitivity and selectivity of these sensors are also intensely improved in comparison with conventional sensors and can distinguish between arsenic and other contaminants. In addition, the use of specific machine learning algorithms such as CNNs for pattern recognition intensely improves prediction models, real-time monitoring, and automation. These ML models attain prediction accuracy of more than 95%, which is essential for efficient arsenic detection and environmental monitoring. AI integration with GQD-based biosensors improves the detection accuracy but allows for the development of smart sensors that adapt to changing environmental conditions. Adaptability to the different environmental conditions is very important for maintaining accuracy in various settings, thus increasing the reliability of the detection process. This research holds a very high potential within the realm of real-time, highly accurate arsenic monitoring within drinking water and will directly impact public health safety and environment protection. The study is aimed at prospecting linking AI with advanced nanomaterials to revolutionize technologies for bio-sensing and gives a challenging response to the experiments by arsenic contamination. This would make the sensors much more efficient and reliable, while ML algorithms will also continue to evolve and allow the possibility for wider environmental monitoring applications.

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Speaker Slots Filling Quickly

Title: Advancing wind energy conversion: smart maximum power point based on M5-Pruned algorithm for enhanced wind energy production

Speaker Name: Mujammal Ahmed Hasan Mujammal

Affiliation: University of Dr Yahia Fares, Algeria

Abstract: This paper proposes a powerful smart algorithm in energy production engineering, optimizing wind turbine efficiency to meet industrial needs for sustainable energy via a novel maximum power point tracking (MPPT) strategy based on an advanced M5-Pruned algorithm under real-world wind conditions. Slow response to wind speed variations, limited applicability, sensitivity to system parameters, significant ripples, limited efficiency in low wind speeds, and complex structure are major drawbacks of traditional techniques in wind energy. The proposed M5-Pruned algorithm overcomes these obstacles with its intelligent prediction capabilities, fast dynamic response, accurate tracking, and adaptation to sudden changes. In rigorous simulations under real variable wind speeds, the performance of the M5-Pruned model is compared with traditional proportional-integral (PI) and fuzzy logic controller (FLC) methods, where the M5P model outperformed with lower total harmonic distortion (THD) values of 1.83% compared to 1.93% (PI) and 1.92% (FLC). The findings demonstrate a substantial increase in energy efficiency, paving the way for smarter, more sustainable and harnessed wind energy.

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Title: Nintedanib in systemic sclerosis treatment

Speaker Name: Raghad Tarcha

Affiliation: Damascus University

Abstract:

Background : Nintedanib was approved for the treatment of scleroderma and scleroderma-related interstitial lung disease, as it decrease the forced expiratory volume. Case presentation : A 48-year-old Asian female patient with systemic scleroderma 6 years ago developed breathlessness, nausea, heart palpation, and sudden severe occipital headache over the preceding week. She was receiving aspirin 81 mg/day and amlodipine 5 mg/day. Her diagnosis was diffuse scleroderma with pulmonary hypertension, interstitial lung involvement, and renal crisis. The modified Rodnan score was 18. We begin captopril at a dose of 12.5 mg, progressively escalating to 200 mg/day, and oral nintedanib was started at 150 mg. A total of 12 months after initiation of treatment, the patient's kidney function was normal. The pulmonary function tests improved. The modified Rodnan score was reduced to 10. We did not encounter any side effects in our case due to nintedanib treatment. Conclusion : Treatment with nintedanib is crucial for slowing lung function decline. Diarrhea was the most common adverse event. Scleroderma renal crisis occurs in 10% of patients and typically presents with an abrupt onset of hypertension and kidney failure. The optimal antihypertensive agent for scleroderma renal crisis is an ACE inhibitor. The mainstay of therapy in scleroderma renal crisis has been shown to improve or stabilize renal function in approximately 70% of patients and improve survival in nearly 80% at 1 year. Nintedanib may be effective, and fairly safe to use. Further exploration is anticipated to advance a new period of systemic sclerosis treatment.

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Speaker Slots Filling Quickly

Title: AI-Driven Connected Medical Devices for Comprehensive Diabetes Management: Predicting Blood Glucose, Blood Pressure, and Heart Attack Risk

Speaker Name: ELachhab Anass

Affiliation: Chouaib Doukkali University, Morocco

Abstract:

It is a chronic condition that if gone unchecked, can lead to further complications. Diabetes management is complex, continuous and needs monitoring of many health parameters to avoid complications. In this project we propose a new AI-based system that not only integrates connected medical devices for monitoring blood glucose levels on a continuous basis, but also tracks other significant health vitals like blood pressure and risk of heart attack in people with diabetes. By using a combination of wearable sensors, continuous glucose monitors (CGMs), and state-of-the-art AI models, the system continuously monitors and interprets real-time data to present a comprehensive overview of a patient's current health condition. Using historical data from several months, the AI algorithms predict trends in blood pressure and then assesses cardiovascular risks — including the possibility of a heart attack — using real-time physiological signals. Such predictions allow for early interventions, where healthcare providers can recommend personalized medication, lifestyle and preventative changes. Also, the platform helps patients to interact well with the healthcare professionals, which enables for a prompt response to potential health risks. Initial tests have indicated a substantial increase in the accuracy of health forecasts and improved compliance of patients with monitoring protocols. Thus, the focus of this new model is to fulfil the current void concerning the need for systems that predict and manage not only blood glucose level but also several other parameters of health towards better management of diabetes and its complications comprising of longer duration complications and micro/microvascular complications.

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Speaker Slots Filling Quickly

Title: Optimizing sustainable bio-fuel supply chain: a multi-objective model utilizing micro-algae resources

Speaker Name: Ritu Arora

Affiliation: Gurukula Kangri (Deemed to be University, India

Abstract:

As energy demands continue to rise and concerns about the impact on the environment of fossil fuels, renewable energy sources have emerged as viable alternatives. Bio-fuels can replace non-renewable energy sources. Micro and macro-algae, animal fat, leftover cooking oil and vegetable oil can be utilized to make bio-diesel. Micro-algae is readily available and affordable, making it a viable alternative to these sources. A bio-diesel supply chain that supports large-scale production must be developed quickly. A multi-objective framework is used to construct a sustainable micro-algal bio-diesel supply chain. Bio-diesel supply chain economic objective and environmental impact is minimized in the proposed approach. Bio-diesel is advertised as a fossil fuel replacement. Bio-refineries, bio-diesel depositories, multi-harvesting centres and supply sites for micro-algae (Chlorella, chlamydomonas and Scenedesmus) are considered. The suggested multi-objective model is optimized by implementing the Genetic − Algorithm. The framework and solution technique are validated using numerical illustrations. Findings indicate that bio-diesel production facility starting expenses comprise 59% of overall costs, showing high installation costs in the supply chain. Additionally, their environmental impact accounts for 67% of total environmental installation impact. A sensitivity analysis is performed to determine the feasibility of this study. The suggested paradigm could potentially be beneficial for traders and governing bodies with an interest in bio-fuel industry.

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Speaker Slots Filling Quickly

Title: Exploring the perspectives of healthcare professionals regarding artificial intelligence; acceptance and challenges

Speaker Name: Abdullah Azam

Affiliation: The Islamia University of Bahawalpur

Abstract:

Objectives: The main objective of the study was to explore the perspectives of healthcare professionals (HCPs) regarding artificial intelligence (AI) and to identify challenges in its incorporation in the healthcare sector of Pakistan.

Methods: A qualitative exploratory study design was adopted. The study was conducted from January 15th to February 29th, 2024, and HCPs (doctors, pharmacists and nurses) from two tertiary care teaching hospitals in southern Punjab, Pakistan were taken as the study population. The interviews were conducted with the help of a semi structured interview schema. A thematic approach was adopted to analyse the data.

Results: Out of 40 HCPs approached, 25 participated in the study with a response rate of 62%. The participants included in the study were doctors (14), pharmacists (6) and nurses (5). The participants had limited knowledge regarding AI and its basics. However, they showed positive perceptions about its incorporation. They believed that many of the problems faced by the healthcare sector of Pakistan can be minimized by AI incorporation. They believed that AI can boost up the efficiency of healthcare providers, reduce their workload, save time and minimize medical errors. Four main themes with multiple subthemes were identified: (1) Cognizance of AI, (2) Acceptability of AI among HCPs and training requirements for effective incorporation, (3) Merits and Demerits of AI, and (4) Challenges in incorporation of AI with proposed solutions.

Conclusion: HCPs showed a willingness to embrace AI incorporation and believed that it may bring numerous benefits to the health system. Policymakers should take necessary steps to ensure AI incorporation in our healthcare sector.

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Speaker Slots Filling Quickly

Title: Beyond Antibiotics: Engineering a novel Recombinant Bacteriolysin in E. coli to combat Bovine mastitis

Speaker Name: Sehrish Firyal

Affiliation: University of Veterinary and Animal Sciences

Abstract:

The dairy industry is one of the fast-growing industries in Pakistan. Livestock contributes 55.1 percent in value added GDP of agriculture and has remarkable potentials to expand. There are many economically important livestock diseases in Pakistan. Staphylococcal mastitis, caused predominantly by Staphylococcus aureus, poses a significant threat to dairy cattle health and milk production, leading to substantial economic losses in the dairy industry. Despite the implementation of management practices and treatment strategies, mastitis control still continues to be insufficient and requires some inexpensive, effective, efficient and reliable strategy for its control. Major problems faced due to traditional antibiotics include antibiotic resistance and antibiotic rejection of milk. Lysostaphin, a bacteriolytic enzyme derived from Staphylococcus simulans, shows promise as an effective treatment due to its specificity in targeting and lysing staphylococcal cell walls. Present study aimed to develop recombinant lysostaphin with high purity as an alternative therapeutic to traditional antibiotics against mastitis pathogens isolated from dairy milk. The extracellular expression of protein was obtained due to addition of signal peptide at the start of nucleotide sequence of the gene. The purity and identity of the protein was confirmed by SDS-PAGE. In vitro assays demonstrated potent antibacterial activity against all tested S. aureus strains. The study presented the simplified purification directly from culture medium with high yield of protein. Moreover, this is the first attempt exhibiting production of this potent antimicrobial in Pakistan. These findings underscore the potential of lysostaphin in combating antibiotic-resistant staphylococcal infections in dairy cattle, with further in vivo studies warranted to confirm its efficacy and safety in clinical settings. This strategy also lead to the remarkable reduction in the antibiotic residues based milk rejection challenge of dairy herds. So, this novel method can be incorporated in national plan of mastitis prevention and control.

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Speaker Slots Filling Quickly

Title: 125I labelling of C-reactive protein for the development of Radioimmunoassay (RIA)

Speaker Name: Ghodke Tanhaji Sandu

Affiliation: Mangalore University, India

Abstract:

Radioimmunoassay (RIA) for C-reactive protein (CRP) is a clinical tool to quantify CRP, a cardiovascular disease (CVDs) marker, in human serum. Development of the RIA includes radioiodination of CRP with 125I radioisotope, where radioiodination is carried out following the Chloramine-T method. The present study standardizes the radiolabeling procedure and key reagent concentrations like chloramine-T (oxidizing reagent), sodium metabisulfite, and potassium iodide. The outcome of the standardized radioiodination includes a reaction time of 60 seconds, iodination analytical parameters like % Radiochemical purity was ~97% with specific activity ~17 μCi/μg, and the tracer was stable for the 60 days. The optimized radioiodination method is simple, reproducible, and has high tracer stability with high immunoreactivity to develop an RIA procedure to quantify CRP in human serum. A novel Radioimmunoassay method was developed for measuring C-reactive protein (CRP) in human serum. Polyclonal anti-CRP was coupled with magnetizable cellulose particles with an average particle size of < 2 μm. Two types of assays were developed: (1) An assay with an extended standard range (0–6400 ng/mL), which can measure CRP levels up to 160,000 ng/mL, and (2) A sensitive assay (0–200 ng/mL), which can measure the CRP level in human serum as low as 3 ng/mL. The developed assay procedures were validated after studying standard assay parameters such as sensitivity, assay variations, linearity of dilution, etc. This assay is user-friendly, with only three pipetting steps and a convenient incubation time of 1 h at room temperature. The developed CRP-RIA method covers the entire physiological and clinical useful range for routine estimation of CRP in human serum.

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Speaker Slots Filling Quickly

Title: A robust Internet of Drones security surveillance communication network based on IOTA

Speaker Name: Syeda Mahnoor Gilani

Affiliation: Air University Aerospace & Aviation Campus Kamra, Pakistan

Abstract:

Drones are increasingly utilized for a variety of purposes, spanning military to civilian applications. The rise in drone usage underscores privacy and security challenges concerning flight boundaries, data collection in public and private domains, as well as data storage and dissemination. Such issues highlight drones' capability to communicate and securely store data over potentially insecure channels. Recognizing these challenges and gaps in the literature, this paper introduces an efficient and secure security surveillance model for the Internet of Drones (IoD). Our model ensures secure communication between Ground Stations (GS) and Drones, effectively addressing various attack types. Particularly, surveillance drones are vulnerable to physical capture attacks. We delve into a scenario where a network drone is physically apprehended. Leveraging the information stored within a drone, the attacker could potentially access the session. This paper proposes a solution to counter such threats. Through experiments using MATLAB and VScode, we evaluate our network's efficiency and scalability in relation to the surge in transactions. The findings reveal our model's prowess in handling large-scale networks. Specifically, when transactions surpass 1000 per minute, our model achieves approximately a 20% reduction in processing time compared to existing works. Moreover, our approach facilitates about 80% enhanced communication efficiency relative to the contemporary state-of-the-art frameworks. A security analysis through Automated Validation of Internet Security Protocols and Applications (AVISPA) further corroborates the robustness and security of our proposed communication strategy against diverse attack types.

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Speaker Slots Filling Quickly

Title: Innovative Aerogels from Demolition Waste for Enhanced Building Thermal Insulation: A Sustainable Approach

Speaker Name: Ait Khouya Oumaima

Affiliation: University Hassan II of Casablanca, Morocco

Abstract:

Aerogel is one of the most recent and efficient thermal insulation materials. It has been widely used in various energy-saving industries, particularly in the construction industry. Due to their exceptional characteristics, such as low thermal conductivity, extremely low density, and a highly porous network, aerogel can guarantee the thermal comfort of the building, consequently reducing its energy consumption and greenhouse gas emissions. Despite its thermal properties, applications of aerogel are limited because of its high price and low mechanical strength. Therefore, the development of aerogel-plastic composites combines the best properties of aerogel and plastic to create a versatile and effective insulation material. This paper investigates the effect of silica aerogel, based on demolition waste, on the thermal properties of plastic-aerogel composites at different temperatures. The composite's thermal conductivity was characterized using the heat flow meter technique. The results showed a decrease in thermal conductivity of 18%, 34%, and 47% by adding 5, 10, and 15% of aerogel, respectively. So, the as-fabricated WB aerogel composites have good thermal performance and great potential for eco-friendly and energy-efficient design for construction purposes.

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Speaker Slots Filling Quickly

Title: A knowledge-guided machine learning approach for structural non-invasive monitoring and diagnostics

Speaker Name: Milad Zarchi

Affiliation: Shahid Rajaee Teacher Training University, Iran

Abstract:

Structural damages including structural looseness and structural cracks are the most repeatable root causes of the failures in the industrial plant. Deep diagnostics tools have been demonstrated efficient but, they exploit massive data with a high computational cost and time. So, a novel technique is proposed in this research to solve this mentioned problem. The main novelty of this method is to fuse information from various processing functions and to apply an efficient feature bank for performing an efficacious feature learning method based on the multisource strategy. The other novelty of this research is to selection of multi-distribution transferable features for the diagnostics with unseen failure distribution. The mean squared error function based on various source domains for the improvement of the diagnostics accuracy and the diagnostics independency of the failure distribution and the dimension of transferable feature space between the source domains for the enhancement of the diagnostics speed and the feature visualization are minimized jointly. This approach is verified by a real case study of structural vibration dataset for the multi-fault diagnosis problem including foundation looseness and crack under various operational conditions. The results indicate that the proposed algorithm achieves good performance in real diagnostics with unseen failure distribution.

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Speaker Slots Filling Quickly

Title: Development of Black Phosphorous Field Effect Transistor (BPFET) for Energy Efficient Artificial Synapse in Neuromorphic Applications

Speaker Name: Sunipa Roy

Affiliation: Guru Nanak Institute of Technology, India

Abstract: Synapses serve as functional connections between neurones, facilitating the transfer of "information" within the brain network. The strength of these interactions varies considerably, mostly due to the inherent variability of their chemical and biological features. This variability is essential for the diversity of neuronal activity, which, together with other brain characteristics, facilitates functions like as perception, recognition, memory, and reasoning. Recognising this variation in synaptic electronics is essential for constructing artificial neural networks capable of attaining the complexity found in biological systems. Nonetheless, this inherent heterogeneity has proven to be somewhat difficult to achieve in contemporary synaptic devices. When compared to other 2D materials, Black Phosphorus (BP) exhibits less cytotoxicity. Therefore, it is ideal for biomedical applications such as cancer therapy, biosensors, imaging and photothermal therapy, photoacoustic applications, drug delivery, photodynamic therapy, neural recognition, 3-D printing scaffold, etc. As it is a new material, there must be a proper investigation regarding the various inflammatory responses inside the systems and its effect on environmental exposure and reducing toxicity.

We present the first black phosphorus (BP) synaptic device, which exhibits inherent anisotropy in its synaptic properties due to its reduced crystal symmetry. Black phosphorus can be integrated with ferroelectric materials to create artificial synaptic devices that mimic the behavior of biological synapses. These neuromorphic devices have the potential to enable low-power, fast, and efficient computing for applications like machine learning and neural networks.

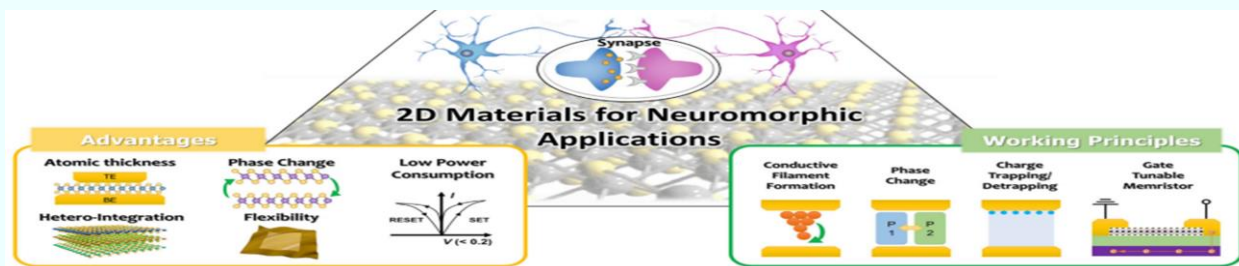Thematic of the proposed work presented in figure 1.

Fig.1: Thematic of the proposed work

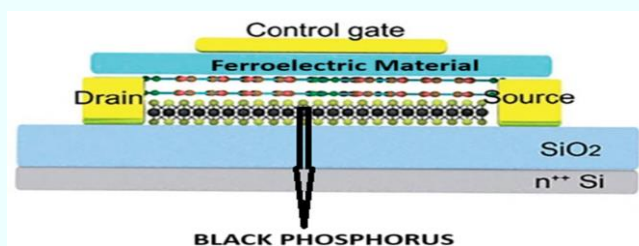The schematic of the device has been presented in Figure 2

Fig. 2 : Schematic of the BPFET

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Speaker Slots Filling Quickly

Title: Real-Time Pre-Eclampsia Prediction Model Based on IoT and Machine Learning

Speaker Name: Michael Munyao

Affiliation: Kenyatta University

Abstract:

Pre-eclampsia (PET) is a hypertensive disease that occurs during pregnancy or in the postpartum period. It complicates 2% to 8% of all pregnancies and is one of the causes of more than 50,000 maternal deaths and over 500,000 fetal deaths worldwide annually. Adverse birth outcomes due to pregnancy complications have been associated with three delays: delay in recognizing the complication, delay in reaching an appropriate facility, and delay in receiving adequate care when the facility is reached. Thus prevention, timely detection, and care of pregnancy complications can prevent maternal deaths and morbidity. The Internet of Things (IoT) and machine learning (ML) technologies have become the new revolution of research in the field of healthcare. These technologies can be utilized to interconnect various sensors, monitor the health status of a patient, and predict the occurrence of an ailment. This study has designed and prototyped a pre-eclampsia monitoring model based on IoT and machine learning for remotely monitoring the health status of an expectant woman and her unborn child, to enhance early diagnosis of pre-eclampsia and improve birth outcomes. The study involved researching the on most appropriate biosensors and then designing and prototyping the pre-eclampsia watch. To build the pre-eclampsia prediction model the best ML algorithm was empirically analysed. A Naïve Bayes pre-eclampsia prediction model was found to perform better in identifying pregnant women who are at risk of pre-eclampsia after evaluation of various pre-eclampsia models built using decision trees, Naïve Bayes, K Nearest Neighbor (KNN), logistic regression, support vector machines (SVM) and Artificial neural networks (ANN). The prototype generates alerts when the expectant woman is at risk of Pre-eclampsia. The pre-eclampsia watch model can securely capture and transmit expectant women's vital to the cloud for processing and provide timely alerts when the woman is at risk. Further research on the performance and efficacy of the model in a real environment will be done. .

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Title: Deep learning-based smart traffic management using video analytics and IoT sensor fusion
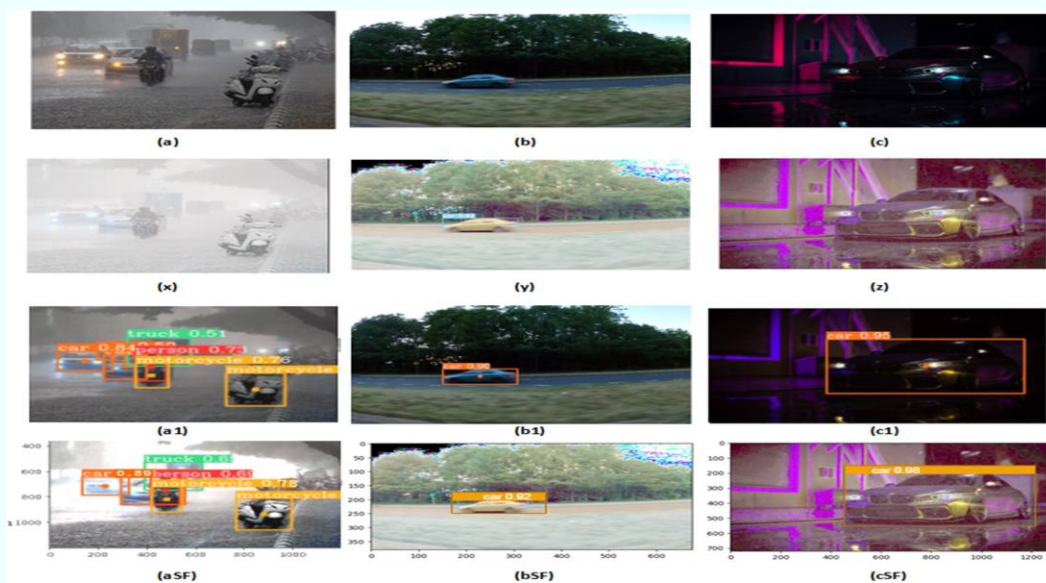
Speaker Name: Aarti Dadheech

Affiliation: Nirma University, India

Abstract: Due to the rapid growth in population and the continued rise in the number of vehicles on roads, transportation congestion has become a significant issue. Internet-of-Things-Aided Smart Transportation Systems offer promising solutions. In smart city scenarios, the combination of artificial intelligence (AI) and the Internet of Things (IoT) generates massive video streaming data at high speeds, demanding efficient real-time processing applications.

This study presents the successful implementation of a smart traffic monitoring system. A deep learning algorithm for cloud-based video analytics and IoT imager sensors is employed to ensure real-time efficiency. Several experiments validate the system's effectiveness. First, summarizing video data on a motion basis reduces transfer time and cloud storage requirements compared to original video data. Second, on the cloud server, the YOLO model processes traffic videos for object detection with high accuracy and speed, achieved through re-parameterized convolution and optimized weights. Lastly, comparisons between traditional IoT camera sensors and Logarithmic Imager IoT sensors for object detection demonstrate the latter's superior accuracy in adverse weather conditions due to its logarithmic function, which provides an extensive brightness range.

To address privacy and security concerns, secure communication protocols, strong authentication, and access control mechanisms are implemented. The system leverages a lattice-based cryptographic scheme following Babai's rounding-off algorithm to protect IoT data, encrypting it both in transit and at rest. AWS Identity and Access Management (IAM) authenticates IoT devices, and the Secure MQTT protocol ensures lightweight, secure messaging for constrained networks.

To handle scalability challenges as traffic volumes grow, the cloud framework dynamically scales resources. Horizontal scalability adds servers to manage increased workloads, with services from OpenIOT and AWS IoT aiding in deployment, management, and troubleshooting of the system.

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Speaker Slots Filling Quickly

Title: Organic Chemical Pollutants Within Water Systems and Sustainable Management Strategies

Speaker Name: Olamigoke Olawale Akingba

Affiliation: University of Benin

Abstract: Water is a major component of life, and the increasing human population has caused a surge in the demand for water globally. Likewise, this situation has resulted in an increased human activity which in turn increase solid, liquid, and gaseous waste generation from various sources such as industrial, domestic, and municipal (Figure 1). Waste sources from human activities (industrial, agricultural, and improper waste disposal) are usually more significant than natural sources (biogenic emissions and volcanic activities) in the environment. The major pollutants in aquatic systems are wastewaters which can contain tons of organic pollutants, and this causes a dire need for conscious sustainable management of water systems. Also, biota exposed to such polluted water are prone to health hazards and bioaccumulation of metals which threatens life and ecological processes as observed in different countries (Table 1). The United Nations Sustainable Development Goals also emphasized the importance of clean water in its Goal 6 (Clean water and Sanitation). It elaborates on organic pollution in context of sustainable development by awareness creation, implementation of policies, research, collaboration, adoption of technology and changes in human behaviors as holistic approaches to healthier and sustainable future. The effects of various organic pollutants on water systems differ and is solely based on its type and form. Some could result in inhibiting dissolved oxygen.

Affecting the secondary use of water, hazardous health issues, eutrophication, destruction of the environment and death in extreme cases. The use of phytoremediation processes - the use of plants to remediate organic pollutants, nano-adsorbents – which is the use of nanoscale materials with high surface area to adsorb organic pollutants, hyperaccumulators – plant species that can absorb pollutants in their tissues, and organic chemical degrading enzymes; are some sustainable approaches to management of water systems. With all of these, the environment and human are preserved.

S/N	River/water basin	Country	Pollutant sources	Effects on water systems	References
1	River Niger	Nigeria	Endrins, endosulfan, DDT, POPs	Affects domestic use of water, man, fish and health hazards	Unyimadu et al. (2017)
2	Lake Oueme	Benin Republic	Increased organic pollution	Negative effects on fauna and flora	Lawani et al. (2017)
3	River Itchen	South England	The use of herbicides, fungicides, insecticides, pharmaceutical products	Affects macroinvertebrates and secondary use of water	Robinson et al. (2022)

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Speaker Slots Filling Quickly

Title: Which Cold Plate Works Best For Lithium-Ion Module? A Comparative Study

Speaker Name: Daya Bandhu Ghimire

Affiliation: Institute of Engineering, Nepal

Abstract:

High current performance of battery cells leads to faster degradation of cells due to the rapid heat generation process. Thus, it is imperative to cool down the battery pack using different battery thermal management systems. There are various cold plate types for efficiently employing active thermal battery management systems. This study compares different types of cold plate configurations designed for the 3S3P module. The methodology involves parametric design of cold plates for the 3S3P module. Using Ansys fluent to numerically simulate the heat generation and response curve to analyze impact of coolant velocity, the comparison is done considering cell average temperature and temperature distribution. Cobweb type cold plate seem to perform best among all inlet coolant velocity. The pressure distribution using cobweb type is minimum up until around 1.5m/s only, after that serpentine type cold plate creates a minimum temperature distribution. This study scientifically compares various types of cooling plates at a range of coolant inlet velocity (0.42m/s-5m/s) to find out the best cold plate type for cooling lithium-ion battery modules.

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Speaker Slots Filling Quickly

Title: Environmental Intelligence: Deep learning and Remote Sensing for Resilient Farming

Speaker Name: Jose. P

Affiliation: Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India

Abstract: The productivity of agriculture is greatly impacted by the weather. Climate change is the main cause of plant biotic and abiotic stressors, which has an adverse impact on global agricultural productivity. These two elements are intimately related. The novel method of climate change smart agriculture presented in this paper combines deep learning algorithms with remote sensing. A multispectral environmental image is used as the input, and it is subsequently processed for normalization and noise reduction. A primary convolutional component with a stacked encoder model was used to retrieve the image. ResNet graph reinforcement neural networks are used to identify the recovered characteristics. The output of the classification process shows environmental photography showing changes in the climate. The classified climate analysis has been used to analyse the agriculture sector. The experimental findings were evaluated on several climate change-related farm datasets, assessing the F-1 score, mean average precision, recall, detection accuracy, and normalized correlation. The suggested approach obtained 98% detection accuracy, 95% normalized correlation, 92% mean average precision, 97% recall, and 94% F-MEASURE. The results show that machine learning can assist in monitoring and predicting how climate change would affect food security.
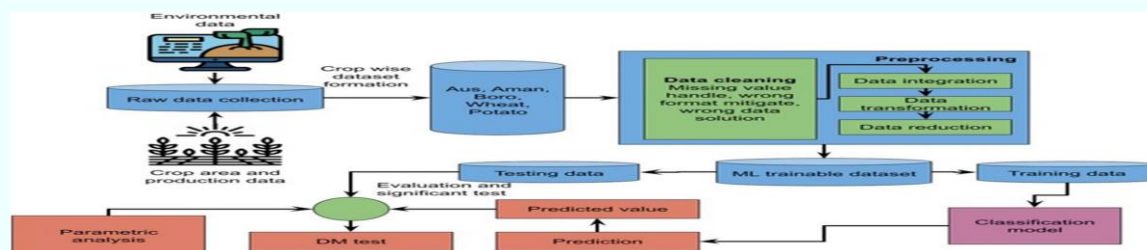
Dataset	Techniques	Detection accuracy	Normalized correlation	F-measure	Mean average precision	RECALL
B2FIND	NB-SVM	74	72	70	74	75
	KRR	79	76	74	80	82
	Res Net GRNN_PCCSE	84	81	79	85	88
LANDSAT	NB-SVM	75	73	77	74	76
	KRR	81	80	83	79	82
	Res Net GRNN_PCCSE	85	83	86	87	88
DYNAMIC EARTHNET	NB-SVM	82	72	83	76	81
	KRR	88	85	87	81	86
	Res Net GRNN_PCCSE	98	95	94	92	97

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Speaker Slots Filling Quickly

Title: An investigation into the reliability of speaker recognition schemes: analyzing the impact of environmental factors utilizing deep learning techniques

Speaker Name: Omar Ratib Khazaleh

Affiliation: Yarmouk University, Jordan

Abstract:

This paper studies the performance and reliability of deep learning-based speaker recognition schemes under various recording situations and background noise presence. The study uses the Speaker Recognition Dataset offered in the Kaggle website, involving audio recordings from different speakers, and four scenarios with various combinations of speakers. In the first scenario, the scheme achieves discriminating capability and high accuracy in identifying speakers without taking into account outside noise, having roughly one area under the ROC curve. Nevertheless, in the second scenario, with background noise added to the recording, accuracy decreases, and misclassifications increase. However, the scheme still reveals good discriminating power, with ROC areas ranging from 0.77 to 1.

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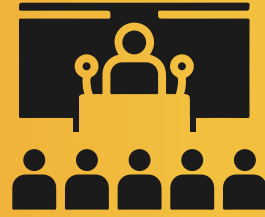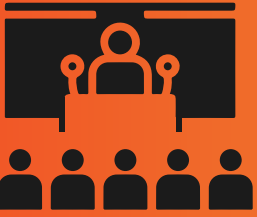
- 2D Materials for Bioelectronics
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- Advances in Biosensors for Point- of-care Testing and Diagnostics

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- Bioelectronics and Biocomputing For Synthetic Biology And Biotechnology
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- Biosensors and Bioelectronics for Infectious Disease Detection And Control
- Biosensors and Bioelectronics for Neural And Brain-Machine Interfaces

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- Biosensors in Agriculture
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- Biosensors involved in Drug Discovery
- Biosensors: Emerging Materials
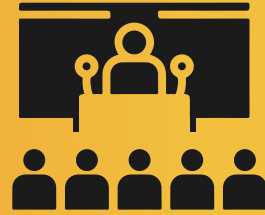- Calorimetric Biosensors
- Cell-based Biosensors
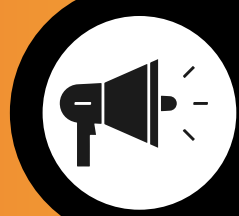
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- Cybersecurity and Ethical considerations
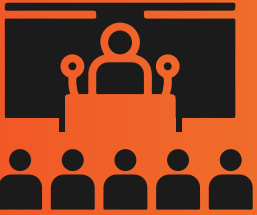
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- Electrochemical Biosensors
- Electrochemical Biosensors
- Electrochemical DNA Sensors

- Electronic Sensing Systems for Detecting and Monitoring Disease Outbreaks
- Emerging Biosensors and Bioelectronics for Veterinary and Animal Health Applications

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- Implantable Bioelectronics
- Integration of Artificial Intelligence and Machine Learning in Biosensors and Bioelectronics

- Intelligent and Biosensors
- Magnetoelastic Biosensors
- Mathematical Modelling of Biosensors
- Medical Applications of Biosensors

LUNCH BREAK

- Membranes used in Biosensors
- Microbial Nanowires
- Microfluidic Biosensors
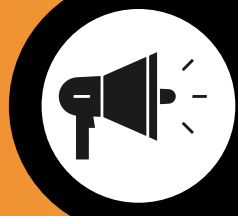- Molecular Optobioelectrnics
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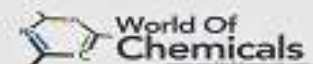Great Art at the Van Gogh Museum

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