iHumEnTech 2024

International Human-Centered Technology Conference

Conference Book

Organizer

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28 – 29 November 2024

PREFACE

International Human-Centered Technology Conference 2024 (iHumEnTech 2024), held at Impiana Hotel, Johor, Malaysia, on November 28th and 29th 2024, is a collaborative effort, proudly organized by the Institute of Human Centered Engineering (iHumEn), Universiti Teknologi Malaysia, in partnership with Graduate Institute of Biomedical Engineering, National Chung Hsing University (NCHU), Taiwan, through the great support from IJN-UTM Cardiovascular Engineering Centre and three other Centers, Media and Game Innovation Centre of Excellence (MaGICX), Sport Innovation & Technology Centre (SITC), and Medical Devices and Technology Centre (MEDiTEC).

iHumEnTech 2024 is organized as a premier platform for researchers to present and discuss their latest ideas, findings, and innovations in research fields that intersect human and technology. This Conference collaborates with the International Federation for Medical and Biological Engineering (IFMBE) and the International Symposium on Engineering and Technology 2024 (ISET 2024). Through these partnerships, we have established a robust global network of prominent researchers from leading universities and related industries.

iHumEnTech 2024 highlights several key areas, including Assistive Technology & Bio-Instrumentation, Signal & Image Processing, Artificial Intelligence for Human-Centered Technology, Health Informatics, Rehabilitation & Therapy, Nutritional & Drug Delivery Technology, Human-computer Interaction, Sports Innovation & Technology, Human-systems Integration & Ergonomics, and Health & Safety.

A total of 107 articles have been received for the open submission from February 2024 until August 2024. With 28% rejection, iHumEnTech has accepted 77 articles to be published in IFMBE Scopus-indexed Proceeding with the title ‘Emerging Science & Technology for Human Well-Being: Proceedings of the International of Human-Centered Technology’. The articles were submitted across 14 countries including Malaysia, Taiwan, United Kingdom, United States of America, Canada, Czech Republic, Japan, China, Tanzania, Iraq, Pakistan, Saudi Arabia, Vietnam, and Indonesia.

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WELCOMING NOTE
UTM VICE CHANCELLOR

Prof. Datuk Ir. Ts. Dr. Ahmad Fauzi Ismail
Vice Chancellor,
Universiti Teknologi Malaysia, Malaysia

Dear esteemed speakers, distinguished participants, and honored guests,
It is both, a pleasure and a privilege, to extend a heartfelt welcome to all of you, who are attending and participating in the International Human-Centered Technology Conference 2024 (iHumEnTech 2024).

As the Vice Chancellor of Universiti Teknologi Malaysia, I am deeply honored to witness the gathering of researchers, clinicians, and academics at this significant international event. This Conference embodies our commitment to align theoretical and practical insights for the advancement of human-centered technology, focusing on a range of significance topics and key areas.

It is inspiring to see scientific scholars from 32 institutions across 14 countries including Malaysia, are participating in this Conference to exchange ideas and research on human technologies at its first event conduction. I believe that iHumEnTech 2024 will serve as an outstanding platform for addressing pressing challenges and advancing sustainability through human-centered technologies, transformative ideas, and forward-thinking approaches.

Thank you for joining us at this milestone event. May this Conference inspires new and premium ideas for future research exploration and implementation, dedicated to researchers, academicians, clinicians, and practitioners who are leveraging human technologies.

WELCOMING NOTE
NCHU PRESIDENT

Prof. Dr. Fuh-Jyh Jan
President,
National Chung Hsing University, Taiwan

We are honored to extend our warmest welcome to all participants to join the International Human-Centered Technology Conference 2024 (iHumEnTech 2024), scheduled on November 28 - 29, 2024, at Impiana Hotel, Johor, Malaysia. iHumEnTech 2024 is under the collaboration between the Institute of Human Centered Engineering (iHumEn), Universiti Teknologi Malaysia, Malaysia and the Graduate Institute of Biomedical Engineering, College of Engineering, National Chung Hsing University, Taiwan. This Conference aims to provide an exchange platform for researchers to share their innovative research thoughts, latest research findings, and outputs in the areas related to human and technology, globally. The Conference consists of 10 themes, including assistive technology and bioinstrumentation, signal and image processing, artificial intelligence for human technology, health informatics, and so on.

In conjunction with iHumEnTech 2024, we are also pleased to co-organize the 6th International Symposium on Engineering and Technology (ISET 2024). Building on the foundation established by ISET from 2019 to 2023, ISET 2024 aims to provide a high-level platform for scholars, industrial experts, and researchers from all over the world to present research achievements, discuss and explore current issues, and engage in interdisciplinary dialogue encompassing engineering, agriculture, technology, and healthcare. We believe that the co-organization of iHumEnTech 2024 and ISET 2024 will be an enriching platform to bring the community together, providing a unique opportunity for international experts to foster collaboration and promote the exchange of scientific ideas.

We are grateful to scholars worldwide, especially from Malaysia and Taiwan, who are participating in this Conference. Once again, on behalf of the iHumEnTech 2024 and ISET 2024 organizing committee, we sincerely welcome you to this Conference and have a great time in the beautiful land of Malaysia.

WELCOMING NOTE GENERAL CHAIR iHumEnTech 2024

Prof. Dr. Mohd Shahrizal Sunar
General Chair,
International Human-Centered Technology Conference 2024

It is a great honor to warmly welcome all delegates to the International Human-Centered Technology Conference 2024 (iHumEnTech 2024), held at Impiana Hotel, Johor, Malaysia, on November 28th and 29th 2024. iHumEnTech 2024 is organized as a premier platform for researchers to present and discuss their latest ideas, findings, and innovations in research fields that intersect human and technology. This Conference collaborates with the International Federation for Medical and Biological Engineering (IFMBE) and the International Symposium on Engineering and Technology 2024 (ISET 2024). Through these partnerships, we have established a robust global network of prominent researchers from leading universities and related industries.

The integration of advanced and demanded relation between technology and human presents significant challenges, underscoring the necessity for global collaboration among researchers, clinicians, academics, and students. This Conference is dedicated to foster networking opportunities and to address pressing issues in medical and healthcare technology. It aims to encourage the exchange of ideas and discoveries in advancing human-centered technology.

Another important agenda of the Conference is the exchange ceremony of one Memorandum of Agreement (MoA) with NCHU, two Memorandum of Understanding (MoU) with Datalytica Sdn. Bhd. and Simpnify Sdn. Bhd., and one Research Contract Agreement (RCA) with IJN Sdn. Bhd.

I strongly believe that iHumEnTech 2024 serves as an ideal platform for addressing these critical topics, fostering valuable discussion, and sharing insights among postgraduate students, academics alike, and industrials. I also extend my heartfelt congratulations to the organizing committee, mainly from both universities, UTM and NCHU for making this conference a success. Their outstanding dedications are truly commendable, and I encourage continued efforts in advancing personalized human technologies.

CONFERENCE SCHEDULE

Thursday, 28th November 2024
Impiana Hotel,
Johor, Malaysia

DAY 1

8:30AM - 9:00AM	**REGISTRATION** Arrival of VIPs, Conference Committee and Participants
9.00AM - 9:30AM	**OPENING CEREMONY** • Singing of Malaysia National Anthem • Doa Recitation • Opening Speech by the General Chair, Prof. Dr. Mohd Shahrizal Sunar • Welcoming Speech by UTM Vice Chancellor, Prof. Datuk Ir. Ts. Dr. Ahmad Fauzi Ismail • Welcoming Speech by the co-organizer from National Chung Hsing University, Taiwan, Assoc. Prof. Dr. Chian-Hui Lai • Montage Video • Photo Session
9.30AM - 10:30AM	**KEYNOTE SESSION 1** Adj. Prof. Dato' Dr. Suhaini Kadiman (National Heart Institute, Malaysia)
10.30AM - 11:00AM	**MORNING BREAK**
11.00AM - 12:00PM	**KEYNOTE SESSION 2** Prof. Dr. Gou-Jen Wang National Chung Hsing University, Taiwan
12.00PM - 1.00PM	**PARALLEL SESSION 1**
1.00PM - 2.00PM	**LUNCH**
2.00PM - 3.30PM	**PARALLEL SESSION 2**
3.30PM - 4.00PM	**TEA BREAK**
4.00PM - 5.00PM	**PARALLEL SESSION 3**

CONFERENCE SCHEDULE

Thursday, 28th November 2024
Impiana Hotel,
Johor, Malaysia

GALA DINNER

7.30PM	ARRIVAL OF VIP AND DELEGATES
7.40PM - 7.45PM	WELCOMING NOTES BY MC
7.45PM - 7.55PM	OPENING SPEECH General Chair of iHumEnTech 2024 Prof. Dr. Mohd Shahrizal Sunar
7.55PM - 8.00PM	MONTAGE VIDEO
8.00PM - 8.15PM	MEMORANDUM EXCHANGE CEREMONY • MoA between UTM and National Chung Hsing University, Taiwan • MoU between UTM and Datalytica Sdn. Bhd. • MoU between UTM and Simpnify Sdn. Bhd. • RCA between UTM and IJN Sdn. Bhd.
8.15PM - 8.30PM	SPONSORSHIP RECOGNITION • IJN Sdn. Bhd. • Datalytica Sdn. Bhd. • Biocon Sdn. Bhd. • Simpnify Sdn. Bhd
8.30PM - 8.35PM	PHOTO SESSION
8.35PM - 10.00PM	DINNER

CONFERENCE SCHEDULE

Friday, 29th November 2024
Impiana Hotel,
Johor, Malaysia

DAY 2

8:30AM - 9:00AM	**REGISTRATION** Arrival of Conference Committee and Participants
9.00AM - 10:00AM	**KEYNOTE SESSION 3** Prof. Dr. Jia-Jin J. Chen National Cheng Kung University, Taiwan
10.00AM - 10.30AM	**MORNING BREAK**
10.30AM - 11.30AM	**KEYNOTE SESSION 4** Prof. Ir. Dr. Ahmad 'Athif Mohd Faudzi Universiti Teknologi Malaysia, Malaysia
11.30AM - 1.00PM	**PARALLEL SESSION 4**
1.00PM - 2.00PM	**LUNCH**
2.00PM - 4.00PM	**PARALLEL SESSION 5**
4.00PM - 4.30PM	**AFTERNOON BREAK**
4.30PM - 5.00PM	**CLOSING & AWARD CEREMONY** • Closing speech by the General Co-Chair I, Assoc. Prof. Dr. Syafiqah Saidin • Presentation Award • Paper Award • Poster Award

iHumEnTech 2024

International Human-Centered Technology Conference

Keynote Speakers

KEYNOTE SPEAKER'S BIOGRAPHY

ADJ. PROF. DATO' DR. SUHAINI KADIMAN

National Heart Institute, Malaysia

Adj. Prof. Dato' Dr. Suhaini Kadiman is a distinguished Cardiac Anaesthesiologist and the Head & Senior Consultant at the National Heart Institute (IJN) in Malaysia. He holds several high-management roles at IJN, including the member of Management Committee, the Director of Clinical Research, the Chairman of Research Committee, and the Chairman of Data Analytic and Insight Committee. Adj. Prof. Dr. Suhaini's academic journey began as a holder for Bachelor of Medical Science in 1992, followed by a Medical Doctorate in 1994, and a Master of Medicine in Anesthesiology in 2000, all from Universiti Kebangsaan Malaysia. He then furthered his fellowship at the Papworth Hospital Cambridge, United Kingdom, in 2003 and add his qualifications by obtaining the US National Board of Echocardiography as Diplomate since 2004. Throughout his career, Adj. Prof. Dr. Suhaini has been recognized with multiple prestigious awards. In 2009, he was honored with 'Pingat Pangkuan Negara' by DYMM Yang Di Pertuan Agong XIII. Later, in 2016 and 2021, he received 'Darjah Indera Mahkota Pahang (DIMP)' from DYMM Sultan Pahang, and 'Tokoh Perdana Maulidur Rasul' Award from DYMM Deputy Yang Di Pertuan Agong.

In academia, Adj. Prof. Dr. Suhaini serves as an Adjunct Professor at both, Universiti Teknologi Malaysia and Universiti Teknologi MARA. His involvement in professional boards spans across several prestigious organizations, including the Academy of Medicine of Malaysia, American Society of Cardiovascular Anesthesiologists, American National Board of Echocardiography, Asian Society of Cardiothoracic Anesthesia, Malaysian Society of Anaesthesiologists, and Malaysian Association of Thoracic and Cardiovascular Surgery. Adj. Prof. Dr. Suhaini has been instrumental in pioneering various advanced medical programs in IJN, including the Heart and Lung Transplant Program, Intraoperative Transesophageal Echocardiography (TEE), Minimally Invasive Mitral Valve Surgery, and Endovascular Structural Heart Program. His expertise and research interests encompass a wide range of areas such as organ protection in cardiac surgery, perioperative use of dexmedetomidine, computer-assisted surgery and diagnostics, mechanical assist devices, post operative neuro cognitive dysfunction, and healthcare data analytics.

KEYNOTE ABSTRACT

ADJ. PROF. DATO' DR. SUHAINI KADIMAN

National Heart Institute, Malaysia

REAL-WORLD DATA (RWD) IN HEALTHCARE DECISION-MAKING

The integration of real-world data (RWD) into healthcare decision-making has revolutionized patient care, complementing the traditional clinical trials, in fact with better valuable insights. RWD, sourced from electronic medical records, patient registries and wearable devices, provides a comprehensive view of patient demographics, treatment effectiveness, and long-term health outcomes. This talk highlights how the use of RWD at Institut Jantung Negara (IJN) enhances patient outcomes by facilitating personalized treatment plans, optimizing clinical workflows, and supporting predictive analytics. Several case studies at IJN demonstrate the successful application of integrated RWD across various systems, yielding significant improvements. These include reductions in operating theatre (OT) cancellations, intensive care unit (ICU) length of stay, and patient mortality and morbidity. Additionally, improvements in turnaround time for primary Percutaneous Coronary Intervention (PCI) reductions in heart failure patient, re-admission rates, and the development of patient bill estimation calculator based on individual risk assessments were achieved. These case studies illustrate how RWD can enhance disease management, streamline clinical operations, reduce healthcare costs, and drive innovation in treatment approaches. Furthermore, this talks emphasize the challenges associated with RWD, such as data quality and privacy concerns, while also discussing the opportunities it presents for healthcare providers, researchers, and policymakers to optimize patient care.

KEYNOTE SPEAKER'S BIOGRAPHY

PROF. DR. GOU-JEN WANG

National Chung Hsing University, Taiwan

Prof. Dr. Gou-Jen Wang received the B.S. degree in 1981 from National Taiwan University and the M.S. and PhD degree in 1986 and 1991 from the University of California, Los Angeles, all in Mechanical Engineering. Following graduation, he joined the Dowty Aerospace Los Angeles as a system engineer from 1991 to 1992. Prof. Wang joined the Mechanical Engineering Department at the National Chung-Hsing University, Taiwan in 1992 as an Associate Professor and has become a Professor in 1999. From 2003 - 2006, he served as the Division Director of Curriculum of the Center of Nanoscience and Nanotechnology. From 2007 to 2011, he was the Chairperson of the Graduate Institute of Biomedical Engineering, National Chung-Hsing University. From August 2015 to July 2021, he was the Dean of the College of Engineering. His research interests include micro electro-mechanical systems (MEMS)/nano electro mechanical systems (NEMS), nanostructured biosensors, nanofabrication, and tissue engineering.

KEYNOTE ABSTRACT

PROF. DR. GOU-JEN WANG
National Chung Hsing University, Taiwan

A COMPREHENSIVE SURFACE-ENHANCED RAMAN SCATTERING (SERS) PLATFORM FOR ANTIBODY / ANTIGEN FREE BIOMEDICAL DETECTIONS

Surface-enhanced Raman scattering (SERS) is an advancement of Raman, which can solve the shortcomings of Raman signals that are difficult to generate, susceptible to fluorescence interference, and cannot be quantified. However, the key to advancement is to have a good sensing chip. The requirements for a good chip are: (1) rough structure to increase surface area; (2) nanostructure of noble metals (such as gold and silver). Compared with Raman, the signal detected by SERS is the most significant vibration mode signal perpendicular to the plasma direction on the surface of precious metal. Therefore, materials with composite structures and metal surface plasma are currently the most effective chip structure.

The research team of the Graduate Institute of Biomedical Engineering, National Chung Hsing University, Taiwan has developed a series of Composite SERS nanochips (CSN). The characteristic of this type of chip is the use of different matrices combined with nanoparticles (needles) to provide unique three-dimensional localized surface plasmon resonance (LSPR) and hot spots. The first one is silver nanoparticles deposited photoresist microcone array (CSN1). The second one is silver nanoparticles embedded PDMS hole substrate (CSN2). The third one is to combine silver nanoparticles with specific Raman reporters to form surface-enhanced Raman spectroscopy tags, which are then combined with a stack of silver nanoparticles to become CSN3. Using the SERS characteristics of CNS1~3 chips, our research team has successfully detected COVID antibodies, HbA1c, and Neutrophil gelatinase-associated lipocalin (NGAL), achieving the goal of label-free and quantitative rapid screening. The developed biosensing technology integrating with a portable Raman spectrometer can be effectively used in Point of Care Testing (POCT).

KEYNOTE SPEAKER'S BIOGRAPHY

PROF. DR. JIA-JIN J. CHEN

National Cheng Kung University, Taiwan

Prof. Dr. Jia-Jin J. Chen received the B.S. degree from Chung Yuan Christian University, Chung-Li, Taiwan, in 1980, and the M.S. and Ph.D. degrees from Vanderbilt University, Nashville, TN, in 1987 and 1990, respectively, all in biomedical engineering. He currently holds Distinguished Professor of Department of Biomedical Engineering, National Cheng Kung University (NCKU), Taiwan. He was the founding chairman of the undergraduate biomedical engineering program in 2011 after 22 years of graduate school only program at NCKU. Prof. Chen is pioneer in promoting neural engineering in Taiwan. His previous work has been focused on control strategy of FES-cycling as well as brain mapping using near infrared spectroscopy (NIRS) for investigating neural plasticity of stroke subjects. His recent works involve neuromodulation for rodent animals of parkinsonism as well as human subjects under various brain neuromodulation schemes.

Prof. Chen was the Editor-in-Chief of Journal of Medical and Biological Engineering (JMBE), published by Taiwanese Biomedical Engineering Society. He has promoted JMBE to be listed in Science Citation Index, published by Journal Citation Reports in 2008 and ranked as one of the best regional journals in biomedical engineering. Before joined Supra Integration and Incubation Center (Si2C) to help organizing startup teams in a hub of biotech as Chief Technology Officer in 2013, he served the committee member for Department of Industrial Technology (DoIT), Ministry of Economic Affairs. This position allowed Prof. Chen to review the grant proposals for medical device development in Taiwan. He also serves as the Member of National Health Research Institute (NHRI), Taiwan extramural research committee and was appointed as the organizer for biomedical engineering division, Department of Engineering and Applied Sciences, National Science Council, Taiwan, in 2013. He also served as two-terms BioTaiwan Committee, Executive Yuan, policy platform for mapping out blueprints on biomedical industries and future development strategies in 2018 and 2020.

KEYNOTE ABSTRACT

PROF. DR. JIA-JIN J. CHEN
National Cheng Kung University, Taiwan

TREND OF DIGITAL HEALTH: DIGITAL THERAPEUTICS APPROACHES FOR BRAIN NEUROMODULATION

With the advent of new technologies, digital health has recently begun to gradually transform the healthcare landscape. The digital health technologies include various information communication technology (ICT) tools and systems, such as electronic health records (EHRs), telemedicine, wearable devices, mobile apps, and artificial intelligence (AI) applications. A brief review is overviewed on the recent developments in the hierarchical subsets of digital health, namely digital medicine and digital therapeutics, from regulatory and validation perspectives. Compared to digital medicine focusing evidence-based software or hardware for diagnostic clinical decision-making, digital therapeutics (DTx) provides patient-centered interventions to treat and manage a broad spectrum of diseases and disorders. Specifically, DTx aims to change patient behavior and provide remote monitoring as homecare devices which should be regulated and demonstrated through robust clinical trials. Additionally, DTx emphasizes patient-centered and data-driven ecosystem to involve engagements of patient, clinician, and payer in healthcare reimbursement policy or insurance system.

Current development statues of DTx among several countries as well as future trend of DTx on technological advancements and expansion to new therapeutic areas with considering regulatory focuses are also reviewed. Updating DTx technologies for various clinical applications such as diabetics/oncology disease management, rehabilitation, and mental health are then surveyed. In addition, our development of DTx beyond traditional areas on brain neuromodulation has been applied for stroke recovery and anxiety studies. Compared to invasive deep brain stimulation and bulky repetitive transcranial magnetic stimulation, our DTx utilizes noninvasive brain neuromodulation using high-definition transcranial electrical stimulation (HD-tES) for intervention. In addition, portable functional near-infrared spectroscopy (fNIRS) device has been developed for monitoring HD-tES treatment and for digital cognitive behavior therapy (dCBT). To fulfill unmet clinical needs and benefit patients, the ultimate goal of our DTx development is to commercialize these novel brain technologies through evidence-based clinical trials and by overcoming regulatory and reimbursement challenges.

KEYNOTE SPEAKER'S BIOGRAPHY

PROF. IR. TS. DR. AHMAD 'ATHIF MOHD FAUDZI
Universiti Teknologi Malaysia

Prof. Ir. Ts. Dr. Ahmad Athif Mohd Faudzi is a distinguished researcher and engineer specializing in robotics, mechatronics, and system integration. He holds a B.Eng. in Computer Engineering and an M.Eng. in Mechatronics and Automatic Control from Universiti Teknologi Malaysia, as well as a Dr.Eng. in System Integration from Okayama University. His extensive industry experience includes his work with Koganei Corp. fellowship with Ericsson Malaysia Sdn. Bhd. Prof. Ahmad Athif is a Professional Engineer with a practicing certificate (Peng-PEPC), a Chartered Engineer (CEng), and a member of IEEE Robotics and Automation Society (IEEE-RAS) Malaysia and Persatuan Saintis Muslim Malaysia (PERINTIS). From 2019 to 2023, he served as the Director of the Centre for Artificial Intelligence and Robotics (CAIRO) at Universiti Teknologi Malaysia. His significant contributions to the field of robotics were recognized with the Top Research Scientist Malaysia (TRSM) award in 2020. Prof. Ahmad `Athif's research primarily focuses on field robotics and bio-inspired robotics, where he has developed numerous tele-operated mobile robots and soft mechanism actuators. From 2019 to 2023, he served as the Director of the Centre for Artificial Intelligence and Robotics (CAIRO) at Universiti Teknologi Malaysia. His significant contributions to the field of robotics were recognized with the Top Research Scientist Malaysia (TRSM) award in 2020. Prof. Ahmad `Athif's research primarily focuses on field robotics and bio-inspired robotics, where he has developed numerous tele-operated mobile robots and soft mechanism actuators. In 2022, he founded A2TECH Sdn Bhd, a spin-off company dedicated to tele-operation robotics solutions, bridging the gap between research and commercialization. Prof. Ahmad `Athif continues to drive innovation in robotics, making a substantial impact on both academic research and practical applications.

KEYNOTE ABSTRACT

PROF. IR. TS. DR. AHMAD 'ATHIF MOHD FAUDZI
Universiti Teknologi Malaysia

TELE-OPERATION ROBOTICS AND ITS APPLICATION IN ROBOTIC FIELD

Tele-operation robotics has emerged as a transformative technology in the robotic field, enabling precise and efficient operations in challenging and hazardous environments. A2Tech, a pioneering UTM spin-off company, has developed advanced tele-operated robotic systems tailored for various applications, including ducting inspection, search and rescue, and agricultural mechanization. One of A2Tech's notable innovations is the INSPECTo unit, designed for ducting inspection and maintenance. This system leverages tele-operation to navigate and inspect complex duct systems, ensuring thorough assessments without exposing human workers to hazardous conditions. Equipped with AI-assisted inspection capabilities, INSPECTo enhances the accuracy and efficiency of maintenance tasks. For early reconnaissance in search and rescue missions, A2Tech introduces the X3CAToR. This tele-operated robot is engineered to traverse difficult terrains and detect dangerous gases and radiation sources during disaster response scenarios. Its modular design allows for rapid deployment and customization, making it an invaluable tool for locating and assessing victims in disaster-stricken areas. In the agricultural sector, A2Tech's RHINo robot revolutionizes palm oil mechanization. Utilizing tele-operation and AI, RHINo performs tasks such as loose fruit collection and fruit picking with improved efficiency. This innovation significantly reduces the need for manual labor, increasing productivity and safety in palm oil plantations. A2Tech's commitment to advancing tele-operation robotics is evident in their modular approach and integration of AI technologies. These systems are designed to adapt to various field conditions, providing reliable and advanced solutions for inspections and operations in some of the most challenging environments. Through continuous innovation, A2Tech is setting new standards in the field of tele-operation robotics.

iHumEnTech 2024

International Human-Centered Technology Conference

Parallel Session

PARALLEL SESSION SCHEDULE

Day 1					
Time	**Maharani**	**Endau**	**Senai**	**Mersing I**	**Mersing II**
12.00 pm - 1.00 pm	Parallel Session 1A Chairperson: Ts. Chm. Dr. Nor Suriani Sani (Online)	Parallel Session 1B Chairperson: Ts. Dr. Jaysuman Pusppanathan	Parallel Session 1C Chairperson: Dr. Nurizzati Mohd Daud	Parallel Session 1D Chairperson: AP Ir. Ts. Dr. Nor Hasrul Akhmal Ngadiman	Parallel Session 1E Chairperson: Dr. Izwyn Zulkapri
2.00 pm - 3.40 pm	Parallel Session 2A Chairperson: Dr. Zulhilmi Zailani (Online)	Parallel Session 2B Chairperson: Dr. Jaweria Ambreen	Parallel Session 2C Chairperson: Ts. Dr. Siti Aisyah Mualif	Parallel Session 2D Chairperson: AP Dr. Mohd Yazid Idris	Parallel Session 2E Chairperson: AP Dr. Tan Tian Swee
4.00 pm - 5.00 pm	-	Parallel Session 3A Chairperson: AP Dr. Azli Yahya	Parallel Session 3B Chairperson: Dr. Farah Hanis Juhari	Parallel Session 3C Chairperson: AP Ts. Dr. Farhan Mohamed	Parallel Session 3D Chairperson: Dr. Jaweria Ambreen

PARALLEL SESSION SCHEDULE

Day 2				
Time	**Endau**	**Senai**	**Mersing I**	**Mersing II**
11.30 pm - 12.50 pm	Parallel Session 4A Chairperson: Ts. Dr. Raimi Dewan	Parallel Session 4B Chairperson: Dr. Jaweria Ambreen	Parallel Session 4C Chairperson: Ts. Dr. Hadafi Fitri Latif (Online)	Parallel Session 4D Chairperson: Asst. Prof. Dr. Bill Cheng (Online)
2.00 pm - 4.00 pm	Parallel Session 5A Chairperson: Dr. Nur Fatihah Raimi	-	Parallel Session 5B Chairperson: Dr. Jaweria Ambreen	Parallel Session 5C Chairperson: Dr. Nadia Shaira Shafii

PARALLEL SESSION 1A

Time: : 12.00 pm - 1.00 pm

Room : Maharani (Online)

Chairperson : Ts. Chm. Dr. Nor Suriani Sani

Time	Paper ID	Title	Presenter
12.00 pm - 12.20 pm	80	Developing Monocyte-Targeting Peptide Liposomes for Targeted Drug Delivery	Bill Cheng
12.20 pm - 12.40 pm	81	Recombinantly Expressed Serglycin to Promote Keratinocyte Migration	Bill Cheng
12.40 pm - 1.00 pm	82	Developing a 3D Microfluidic Model of Metastatic Tumor Microenvironment	Bill Cheng

PARALLEL SESSION 1B

Time: : 12.00 pm - 1.00 pm

Room : Endau

Theme : Assistive Technology & Bioinstrumentation Health Informatics

Chairperson : Ts. Dr. Jaysuman Pusppanathan

Time	Paper ID	Title	Presenter
12.00 pm - 12.20 pm	46	Vital Sign Measurement using Contact Photoplethysmography based on Noise Reduction and Adaptive Thresholding	Hau Yuan Wen
12.20 pm - 12.40 pm	92	Fabrication of a Perfusable Artificial Microvascular Chip	Hui-Wen Chang
12.40 pm - 1.00 pm	106	Preliminary Testing of a Balloon Pump as Assistive Device for Fontan Circulation	Ahmad Zahran Md. Khudzari

PARALLEL SESSION 1C

Time: : 12.00 pm - 1.00 pm

Room : Senai

Theme : Nutritional & Drug Delivery Technology

Chairperson : Dr. Nurizzati Mohd Daud

Time	Paper ID	Title	Presenter
12.00 pm - 12.20 pm	62	Comparison of Glucose Monitoring using Blood and Interstitial Fluid of Diabetic Rats Model in Development Microfluidic System for Transdermal Insulin Delivery	Syaidah Md Saleh
12.20 pm - 12.40 pm	5	Haemocompatible Dual-Functional Surfaces of Everolimus- Immobilised Polydopamine Scaffolds for Drug-Eluting Stent Development	Jaweria Ambreen
12.40 pm - 1.00 pm	18	Modification of 3D Printed Polyethylene Terephthalate Glycol Scaffold with Chitosan for Bone Tissue Engineering	Murfiqah Taufiqiah Mohd Amin

PARALLEL SESSION 1D

Time: : 12.00 pm - 1.00 pm

Room : Mersing I

Theme : Artificial Intelligence for Human Technology Human-Computer Interaction

Chairperson : AP Ir. Ts. Dr. Nor Hasrul Akhmal Ngadiman

Time	Paper ID	Title	Presenter
12.00 pm - 12.20 pm	47	A Cognitive Computational Agent Model-Driven Approach for Intelligent Caregiver Support Analysis	Nurul Husna Mukhtar
12.20 pm - 12.40 pm	29	Prediction of Heart Failure using Support Vector Machine	Keshiniy Mogan
12.40 pm - 1.00 pm	60	Integration of Artificial Intelligence and Big Data into Human Decision Support Systems: Comparative Analysis of Optimization Methods	Stanislav Safranek

PARALLEL SESSION 1E

Time: : 12.00 pm - 1.00 pm

Room : Mersing II

Theme : Rehabilitation & Therapy
Sports Innovation & Technology

Chairperson : Dr. Izwyn Zulkapri

Time	Paper ID	Title	Presenter
12.00 pm - 12.20 pm	58	Comparative Study on the Physical Fitness Test of College Students between China and Malaysia Culture	Gao Yili
12.20 pm - 12.40 pm	87	KakiRow: An Interactive User Experience Gamified Virtual Reality to Improve Rowing Sports Training	Nurshamine Nazira Mohd Nor
12.40 pm - 1.00 pm	102	AI-Based BadmintonTutor for Improving Posture and Performance with TAM Analysis	Nor Azizah Sa'adon

PARALLEL SESSION 2A

Time: : 2.00 pm - 3.40 pm

Room : Maharani (Online)

Chairperson : Dr. Zulhilmi Zailani

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	104	Numerical Study on the Hemodynamic Effects of a Conceptual Left Ventricular Assist Devices: Thrombosis Potential Assessment	Muhammad Rashidi Abdul Kadir
2.20 pm - 2.40 pm	6	A Miniaturized Fractal Inspired Flower Shaped Implantable Antenna for Leadless Cardiac Pacemaker System Utilizing Visual Basic for Application	Jamil Alvir
2.40 pm - 3.00 pm	13	Improving RFID Performance Potential using Conductive Hydrogel	Fathan Khansa Arby
3.00 pm - 3.20 pm	97	Advancements and Challenges in Continuous Glucose Monitoring (CGM) Systems: A Review of Non-Commercial and Commercial Technologies	Rasha Dheyaa Mahdi AL-Khafaji
3.20 pm - 3.40 pm	103	A Preliminary Study on Poor Posture Warning System for Desk Work	Shuhei Era

PARALLEL SESSION 2B

Time: : 2.00 pm - 3.00 pm

Room : Endau

Theme : Assistive Technology & Bioinstrumentation
Health Informatics

Chairperson : Dr. Jaweria Ambreen

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	54	Effects of Enhanced Exercise with Activated Inhaled Oxygen (SOE)	Chia-Feng Hsieh
2.20 pm - 2.40 pm	66	Transistor Type Power Generator for Machining Hip Implant Micropits	Azli Yahya
2.40 pm - 3.00 pm	93	Fabrication of Reusable Electrochemical Platform based on the Host-Guest Interaction	Zhi Jia Chen

PARALLEL SESSION 2C

Time: : 2.00 pm - 3.20 pm

Room : Senai

Theme : Nutritional & Drug Delivery Technology

Chairperson : Ts. Dr. Siti Aisyah Mualif

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	88	Soft polymer-based Nanoparticles for Targeting Antibiotic Delivery	Tran Ha Lac
2.20 pm - 2.40 pm	115	A Targeted Fluorescent Probe for the Selective Detection and Imaging of Hydrogen Peroxide in Living Cells	Chian-Hui Lai
2.40 pm - 3.00 pm	94	Electrochemical Detection of the Emerging Pandemic Thrombocytopenia Syndrome (SFTS) Virus Antibodies	Wei-Jhen Wang
3.00 pm - 3.20 pm	101	Chitosan - Paper Based Analytical Colorimetric Method for Bisphenol A Detection	Ang Ruo Ping

PARALLEL SESSION 2D

Time: : 2.00 pm - 3.20 pm

Room : Mersing I

Theme : Artificial Intelligence for Human Technology Human-Computer Interaction

Chairperson : AP Dr. Mohd Yazid Idris

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	91	Enhanced Malay Automatic Speech Recognition Through Fine-Tuning Pre-Trained Whisper Models	Clement Tai Zhi Quan
2.20 pm - 2.40 pm	90	Artificial Intelligence for Adaptive Gamification: A Preliminary Framework for Enhanced Customer Engagement	Azizul Azman
2.40 pm - 3.00 pm	21	Adaptive Key Neuron-guided Fuzz Testing for Human Security in Deep Learning System	Junhan Li
3.00 pm - 3.20 pm	20	Evaluation Imbalanced Dataset for X-ray Baggage Security Screening Based on YOLO-v8 for Enhanced Threat Detection	Devi Willieam Anggara

PARALLEL SESSION 2E

Time: : 2.00 pm - 3.00 pm

Room : Mersing II

Theme : Rehabilitation & Therapy
Sports Innovation & Technology

Chairperson : AP Dr. Tan Tian Swee

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	48	Rotation Detection and 6-Minute Walk Distance Measurement using Azimuth from Android Sensors	Hau Yuan Wen
2.20 pm - 2.40 pm	111	An Interactive Digital Platform for Fine Motor Skills Training	Nor Aini Zakaria
2.40 pm - 3.00 pm	112	Quantitative Analysis of Cerebral Palsy Children's Upper Limb Signals for Rehabilitation Training Performance	Nor Aini Zakaria

PARALLEL SESSION 3A

Time: : 4.00 pm - 5.00 pm

Room : Endau

Theme : Assistive Technology & Bioinstrumentation Health Informatics

Chairperson : AP Dr. Azli Yahya

Time	Paper ID	Title	Presenter
4.00 pm - 4.20 pm	65	Cuffless Blood Pressure Monitor Based on Pulse Transit Time Technique with Accuracy Enhancement and Internet-of-Things	Hau Yuan Wen
4.20 pm - 4.40 pm	61	Telemedicine and Traditional Consultations in Malaysia: A Policy and Practice Perspective	Afraa Mohammad
4.40 pm - 5.00 pm	86	User-Centered Design and Usability Assessment of a Breathing Exercise App Tailored for Individual Emotional States	Choo Yen Lee

PARALLEL SESSION 3B

Time: : 4.00 pm - 5.00 pm

Room : Senai

Theme : Nutritional & Drug Delivery Technology

Chairperson : Dr. Farah Hanis Juhari

Time	Paper ID	Title	Presenter
4.00 pm - 4.20 pm	31	Optimization Expression of CD80 Protein and Plasmid Stability of CD80 in Escherichia coli BL21 Strain: A Co-stimulating Molecule Involved in Immune Response	Teh Yoong Mond
4.20 pm - 4.40 pm	37	Optimization of Fucoidan Extraction from Brown Algae Using Microwave Assisted-Deep Eutectic Solvent for Health and Nutrition	Nur Nadhirah Wasli
4.40 pm - 5.00 pm	38	Extraction of Swietenia Macrophylla Seed Oil: A Comparison of Microwave-Assisted, Supercritical Carbon Dioxide and Soxhlet Extraction Techniques	Roslina Jamaludin

PARALLEL SESSION 3C

Time: : 4.00 pm - 5.00 pm

Room : Mersing I

Theme : Artificial Intelligence for Human Technology
Human-Computer Interaction

Chairperson : AP Ts. Dr. Farhan Mohamed

Time	Paper ID	Title	Presenter
4.00 pm - 4.20 pm	110	AI.R Taletorium: Digital Presence in Human-AI Co-Created World of Fantasy	Predrag K. Nikolic
4.20 pm - 4.40 pm	52	Virtual Emporium: Elevating Shopping Experience with Virtual Reality in Digital Mall	Damia Humaira Rosman
4.40 pm - 5.00 pm	89	Review on Software Tools Used in Making Virtual Classroom Applications	Muhammad Ismail Mat Isham

PARALLEL SESSION 3D

Time: : 4.00 pm - 4.40 pm

Room : Mersing II

Theme : Rehabilitation & Therapy
Sports Innovation & Technology

Chairperson : Dr. Jaweria Ambreen

Time	Paper ID	Title	Presenter
4.00 pm - 4.20 pm	19	Crack Background Removal for Improving Concrete Crack Classification using Mask Inverted Otsu Thresholding in Structural Health Monitoring	Devi Willieam Anggara
4.20 pm - 4.40 pm	53	Detection of Sudan Red by Surface-Enhanced Raman Scattering (SERS) Technology	Cheng-Chung Chang

PARALLEL SESSION 4A

Time: : 11.30 am - 12.50 pm

Room : Endau

Theme : Health Informatics
Signal & Image Processing

Chairperson : Ts. Dr. Raimi Dewan

Time	Paper ID	Title	Presenter
11.30 am - 11.50 am	42	Evaluating White Matter Integrity in the Auditory Cortex in Noise-Induced Hearing Loss: A DTI Study	Mohd Khairul Izamil Zolkefley
11.50 am - 12.10 pm	68	2-Stage Arrhythmia Classification Algorithm based on Artificial Neural Network and Enhanced Decision Tree	Kan Nae Cherng
12.10 pm - 12.30 pm	17	Optimizing Temporal and Spectral Interval Selection for Imagined Speech Decoding from EEG	Qiu Fujie
12.30 pm - 12.50 pm	35	Impact of Augmentation on EEG Signal Interpretability	Lim G Wei

PARALLEL SESSION 4B

Time: : 11.30 am - 12.30 pm

Room : Senai

Theme : Nutritional & Drug Delivery Technology
Human-Computer Interaction

Moderator : Dr. Jaweria Ambreen

Time	Paper ID	Title	Presenter
11.30 am - 11.50 am	45	Optimization of SARS-CoV-2 M Protein Expression in E. coli BL21 (DE3) using pET28a+	Tasshitra R. Subramaniam
11.50 am - 12.10 pm	55	A Selective Fluorescent Probe for the Specific Detection of Polyvinyl Chloride (PVC) Microplastics in Monitoring Environmental Pollution for Human Health	Chieh-Yi Chen
12.10 pm - 12.30 pm	96	Studies on the Growth of Human Cells on Hydroxyapatite Incorporated Silica Aerogel	Nor Suriani Sani

PARALLEL SESSION 4C

Time: : 11.30 am - 12.50 pm

Room : Mersing I (Online)

Moderator : Ts. Dr. Hadafi Fitri Latif

Time	Paper ID	Title	Presenter
11.30 am - 11.50 am	107	Motion Generation using Combination of Motion Graphs and Key Pose Selection with Statistical Models	Shuntaro Kono
11.50 am - 12.10 pm	108	Visualization of Simultaneous Changes in Multiple Motion Features with Spatial Volume and Flat Arrows for Sports Motion Analysis	Tomoya Shiokawa
12.10 pm - 12.30 pm	57	Smartphone-Connected Portable System for Automated Exercise Repetition Tracking	Yovi Pratama
12.30 pm - 12.50 pm	50	Effectiveness of Advanced Tracking Models for Shuttlecock and Court Line Detection in Small-Scale Badminton Matches	Low Chew Sim

PARALLEL SESSION 4D

Time: : 11.30 am - 12.50 pm

Room : Mersing II (Online)

Moderator : Asst. Prof. Dr. Bill Cheng

Time	Paper ID	Title	Presenter
11.30 am - 11.50 am	113	Fluorescent Contrasted Neuron/Tumor Tissues during Brain Tumor Surgery Based on Cell Lines' Studies	Syed Muhammad Peroz Ali
11.50 am - 12.10 pm	114	Potential of Contrast Medium Induced Nephropathy Prevention by Liposome Encapsulation: In Vivo Mice Study	Fang-Yu Liu
12.10 pm - 12.30 pm	39	Stability Analysis of Morinda Citrifolia Extract Encapsulated Niosome by using Propylene Glycol	Siti Noor Suhaila Zulkifeli
12.30 pm - 12.50 pm	56	Paraquat and Glyphosate Residues in Tea Samples Detection using Spectrometer	Hai-Dang Nguyen-Tran

PARALLEL SESSION 5A

Time: : 2.00 pm - 3.00 pm

Room : Endau

Theme : Health Informatics
Signal & Image Processing

Moderator : Dr. Nur Fatihah Raimi

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	99	A Study of Interactive Visualization Literature Browser Reusability using Component-Based Software Engineering Approach	Najwa Ayuni Jamaludin
2.20 pm - 2.40 pm	36	Deep Learning Approaches for Facial Landmark Localization in Niqab-Occluded Face Recognition: A Survey	Muteb Sinhat Almarshadi
2.40 pm - 3.00 pm	71	Mitigating National Insecurity and Economic Issues using Face Detection Approach	Mohammed Ali Bizi

PARALLEL SESSION 5B

Time: : 2.00 pm - 4.00 pm

Room : Mersing I

Theme : Nutritional & Drug Delivery Technology
Human-Computer Interaction

Moderator : Dr. Jaweria Ambreen

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	43	Multi-user Interaction in Collaborative Augmented Reality Interface for Blood Flow Simulation in Coronary Artery	Fatin Syazliana Nazri
2.20 pm - 2.40 pm	32	The Impact of Deep Learning in Computational Biology	Nies Hui Wen
2.40 pm - 3.00 pm	22	Evaluating Human-Centric Machine Learning Clustering Techniques for Selecting Event Sequence Test Cases	Nadiah Mohd Hanim
3.00 pm - 3.20 pm	28	User Experience (UX) Issues and Strengths on Key International and Key Malaysian E-Commerce Websites	Layla Rasheed Abdallah Hasan
3.20 pm - 3.40 pm	12	Exploring Human-Technology Interaction: Key Features Impacting User Experience (UX) on E-Commerce Mobile Applications	Layla Rasheed Abdallah Hasan
3.40 pm - 4.00 pm	41	In-Visible Island: Collaborative Creativity at the Core of Inclusive Children's Tangible Interaction	Ruhiyati Idayu Nikolic

PARALLEL SESSION 5C

Time: : 2.00 pm - 4.00 pm

Room : Mersing II (Online)

Moderator : Dr. Nadia Shaira Shafii

Time	Paper ID	Title	Presenter
2.00 pm - 2.20 pm	11	DL-SCDDS: Accurate Skin Cancer Detection and Diagnosis Scheme Based on An Improved Convolutional Neural Networks Model	Mustafa Sabah Taha
2.20 pm - 2.40 pm	34	A Review of an Enhance U-Net CNN for Iris Segmentation Towards Off-angle and Non-ideal Iris Images	Leo Ming Wu
2.40 pm - 3.00 pm	64	3-Dimensional ECG Visualisation and Arrhythmia Detection via Convolutional Neural Network Algorithm	Ahmad Thariq
3.00 pm - 3.20 pm	109	Smart Trap: AI-Enhanced Monkey Recognition System for Human-Centered Wildlife Management	Mohd Hasrul Che Pa
3.20 pm - 3.40 pm	27	Numerical Simulation of Arterial Pressure Variation due to Atherosclerosis and Its Effects using Fluid Structure Interaction	Madeeha Sadia
3.40 pm - 4.00 pm	49	Expert Survey Analysis on The Risk Mitigation For Agile Global Development Framework: A Validation Study	Hidayatul Nadhirah Mohamed

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Institut Jantung Negara (IJN): A Beacon of Excellence, Innovation, and Community Care

Institut Jantung Negara (IJN) stands as Malaysia's leading heart specialist facility, synonymous with excellence and compassionate healthcare. Since opening its doors in 1992, IJN has upheld a mission to deliver accessible, world-class cardiovascular and thoracic care for all Malaysians. Founded with the vision to be a center of excellence, IJN has consistently pushed the boundaries of cardiac care, becoming a hub for some of Malaysia's most complex procedures. This commitment has led IJN to set national and international milestones, such as Malaysia's first heart transplant in 1997, and the most recent ground-breaking advancements the First in Southeast Asia to implant Aurora Extravascular Implantable Cardioverter Defibrillator (EV-ICD) solidifying its position as an innovator in the field.

Central to IJN's commitment to medical advancement is its Directorate of Clinical Research, a cornerstone in the organization's strategy to elevate cardiovascular and thoracic healthcare. For nearly three decades, this directorate has driven impactful research, firmly establishing IJN as a leader in healthcare innovation. Through collaborations with pharmaceutical and medical device companies, as well as academic institutions, IJN has advanced patient care, securing approximately RM4.0 million for 28 research projects between 2021 and 2022. Guided by the IJN Research Strategic Plan 2021-2025, IJN is committed to integrating Big Data and Artificial Intelligence (AI) to develop precision medicine, reinforcing its role as a cutting-edge clinical research hub and ensuring it remains at the forefront of digital healthcare.

At the heart of IJN's success is a relentless pursuit of quality and patient safety. Recognized for its rigorous standards, IJN holds accreditations from both the Malaysian Society for Quality in Health (MSQH) and the Joint Commission International (JCI), underscoring its dedication to upholding world-class standards. These recognitions are part of the IJN Quality and Patient Safety Plan, a strategy revised every three years to prioritize patient safety, effective care, and a superior patient experience. This robust framework fosters a proactive approach to healthcare, ensuring each team member is equipped and motivated to uphold IJN's high standards.

IJN's mission extends beyond hospital walls through its Corporate Social Initiatives (CSI) Programme, launched in 2007 to expand healthcare access across Malaysia. Since its inception, the CSI Programme has screened over 53,000 individuals at 165 locations nationwide, offering free basic health screenings as well as ECGs, ECHOs, and consultations for at-risk patients to help detect and address health issues early. In addition, it hosts educational events, like healthy cooking competitions and hygiene workshops for children, promoting healthier lifestyles and proactive health management. The CSI Programme also addresses diverse community needs with home visits, CPR and AED training, and collaborative outreach efforts with NGOs and media, empowering communities and fostering a more health-conscious society across Malaysia.

From setting benchmarks in medical treatments to driving research and innovation while fostering a culture of quality and community engagement, IJN epitomizes the power of compassionate, high-quality healthcare. As it looks to the future, IJN remains steadfast in its mission to transform Malaysia's healthcare landscape, championing innovative solutions, impactful research, and compassionate care to improve the well-being of future generations.

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Asia's Largest Integrated Insulin Manufacturing Facility

Biocon Biologics has established its first overseas biopharma manufacturing and research facility located at Kawasan Perindustrian SiLC, Iskandar Puteri, Johor, Malaysia, the new regional biotech hub of Asia, which offers a state-of-the-art biotechnology ecosystem. The company is proud to develop world-class insulin products using its proprietary technology platform. Its manufacturing facility in Johor is approved by NPRA, Malaysia, as well as several international regulatory agencies, including the U.S. FDA, EMA, TGA (Australia), ANVISA (Brazil), and others. The facility features advanced R&D, Quality Assurance, and Quality Control labs, along with a robust Quality Management System that ensures the high quality of products manufactured on-site. The 562,000 sq. ft. facility has been recognized by the Malaysia Book of Records as the first and largest integrated insulin manufacturer in Malaysia.

The state-of-the-art integrated insulin manufacturing facility in Malaysia was established with an investment of over USD 350 million (MYR 1,543.5 million), marking the largest foreign investment in biotechnology in the country to date. Commercial operations at the facility began in 2016 when Biocon Biologics' recombinant human insulin became the first locally manufactured biosimilar product approved for sale in Malaysia. The company has also contracted with Malaysia's Ministry of Health (MoH) to supply insulin products through government tenders.

Global Recognition and Employment

Since 2012, Biocon Biologics has consistently been recognized among the Top 20 Global Best Biotech Employers by Science Careers magazine and has been the only company from Asia on this list. Additionally, it ranks among the Top 3 biosimilar producers globally for recombinant human insulin and insulin glargine in terms of market volume. Biocon Malaysia presents significant opportunities for biotech professionals in Malaysia, employing over 900 people at its world-class insulin facility. Committed to addressing patients' needs for insulin in Malaysia and other parts of the world, Biocon Biologics has established a Center of Excellence (CoE) for insulins in Malaysia, with end-to-end capabilities for manufacturing a comprehensive portfolio of human insulin and insulin analogs.

Mission to Enable Universal Access to Insulins

As a leading global manufacturer of insulins, Biocon Biologics is driven by its mission to enable universal access to insulin, ensuring that this essential therapy reaches those who need it most. Biocon's vision is to impact global healthcare by providing high-quality, affordable, life-saving biotherapeutics for patients worldwide. Biocon Biologics aspires to reach 'one in five' insulin-dependent people with diabetes globally and continues to invest in building large-scale capacity in India and Malaysia to develop world-class human insulin and insulin analogs, expanding access through an innovation strategy rooted in affordability.

Reducing Malaysia's Dependency on Imports

As one of the leading global manufacturers of insulins, Biocon Biologics is committed to enable access to world-class affordable insulins to patients in Malaysia. The Company has been working closely with the Ministry of Health, Malaysia (MoH) to cater to the growing needs of diabetes patients in the country and reducing the dependency on insulin imports. Since 2016, Biocon Biologics has provided the MoH over 87 million insulin cartridges and has served the needs of nearly 300,000 people with diabetes in Malaysia. Following Biocon's entry into Malaysia, prices of human insulin have dropped by over 40% and insulinization has also improved by 30%, according to a market study.

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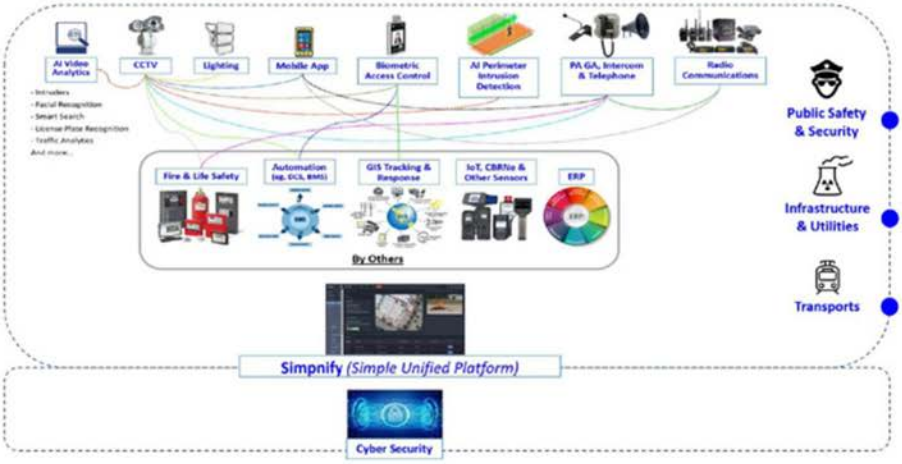

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Article Abstracts

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Parallel Session 1A

Paper ID: 80

DEVELOPING MONOCYTE-TARGETING PEPTIDE LIPOSOMES FOR TARGETED DRUG DELIVERY

Shih-Hsun Huang, Hsien-Ming Lee, Bill Cheng

Inefficient drug targeting continues to be a major problem that hamper effective treatment of chronic diseases like cancers. Clinically, anti-cancer drugs rely on the presence of enhanced permeability and retention (EPR) effect, provide less than 2-fold increases in delivery to tumor tissue compared with critical normal organs. Since monocytes are being recruited to the tumor site, it is believed these monocytes can act as carriers for anti-cancer drugs. Seven monocyte-targeting peptide liposomes (MMDCs) that consisted of different peptide sequence were developed, and were tested for their ability to anchor on the surfaces of human monocytes (THP-1). Microscopic images and flow cytometric analysis revealed Peptide-1 Liposomes could anchored on the surfaces of THP-1 for > 4 hrs at 37°C, and had no interaction with human endothelial cells (HUVEC). Conversely, the identified MMDCs could be internalized by the monocyte-derived macrophages. Our next step is to examine the targeting of Peptide-1 Liposomes for THP-1 in an in vitro perfusion system that mimic human vascular environment.

Keywords:
Monocytes, EPR, Drug Delivery.

Paper ID: 81

RECOMBINANTLY EXPRESSED SERGLYCIN TO PROMOTES KERATINOCYTE MIGRATION

Elaine Ya-Ning Chang, Bill Cheng

Human platelet lysate (hPL) is a regenerative medicine that is widely used in clinics for treating chronic wounds. However, due to the poor understanding of the functions of each protein components, some patients have responded poorly to hPL treatment. Serglycin (SRGN) is present abundantly in platelet granules, and yet the function of the protein in chronic wound healing remains elucidated. Since monocytes shares the same cell lineage as platelets, total mRNA extracted from human monocytic cell line (THP-1) were served as the RNA template for recombinant human SRGN (rhSRGN) expressions. After the recombinant expression vectors were successfully constructed, the vectors were transfected into HEK293T cells for subsequent protein expressions. The expressed rhSRGN were secreted into the conditioned media by the transfected cells. Due to the presence of a hexahistidine (6X His) tag on its C-terminal, the rhSRGN were purified from the conditioned media with an immobilized metal affinity column (IMAC). Western blotting analysis revealed the rhSRGN were decorated with three types of glycosaminoglycan (GAG) chains, heparan sulfates (HS), chondroitin sulfates (CS) and dermatan sulfates (D). In an in vitro assay that mimicked diabetic wound healing, the addition of 10 ng/mL of rhSRGN were showed to significantly enhance the migration of human keratinocytes under hyperglycemic condition.

Keywords:
Serglycin, Glycosaminoglycans, Recombinant Proteins, Wound, Healing, Re-epithelization.

Paper ID: 82

DEVELOPING A 3D MICROFLUIDIC MODEL OF METASTATIC TUMOR MICROENVIRONMENT

Ivan Su, Bill Cheng

This study aimed to develop a 3D microfluidic cell culture that stimulate cancer metastasis, providing a more cost-effective and time-efficient alternative to animal models for cancer research. Human breast cancer cells (MDA-MB-231) were used to create tumor spheroids and were analyzed under static conditions to confirm their clinical relevance. The spheroids were induced to undergo EMT using TGF-β1, a cytokine known to induce EMT in cancer development, and the transitions were monitored with a confocal microscope. The spheroids were then cultured in a 3D microfluidic cell culture system, mimicking the metastatic tumor microenvironment. Live-cell imaging revealed the spheroids underwent EMT after four days of culturing under perfusion, as opposed to at least days of culturing for the EMT to happen under static conditions. Furthermore, the metastatic spheroids could exit from the original gel matrix and invade another gel matrix, just like cancer cells moving from the primary tumor site to the secondary tumor site. These findings demonstrate the potential of the in vitro model as a powerful tool for developing precision medicine, providing new avenues for studying cancer development and metastasis, drug screening, and drug delivery.

Keywords:
Microfluidic, Metatastatic Tumor, Microenvironment

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Parallel Session 1B

Paper ID: 46

VITAL SIGN MEASUREMENT USING CONTACT PHOTOPLETHYSMOGRAPHY BASED ON NOISE REDUCTION AND ADAPTIVE THRESHOLDING

Jia Wen Lee, Nur Arbainah Shamsul Annuar, Kok Wai Soo, Ming Chern Leong, Yuan Wen Hau and Rania Hussien Ahmed Al-Ashwal

Heart rate and oxygen saturation are two common vital signs that provide crucial information about a person's cardiovascular and respiratory health. Nowadays, mobile applications can measure heart rate as well as oxygen saturation by contact photoplethysmography (PPG) method. However, there is still room for improvement in existing mobile applications for vital sign measurement using contact photoplethysmography due to the issues of motion artifact and fixed thresholding. Thus, this paper proposes an algorithm for heart rate and oxygen saturation measurements based on contact PPG method and video streaming using noise reduction and adaptive thresholding approach for accuracy performance improvement. The noise reduction concept is applied to the heart rate measurement algorithm in terms of parameter adjustment to minimize the motion artifact. Whereas, for oxygen saturation measurement, an adaptive thresholding algorithm is implemented together with machine learning algorithms, including decision tree classification and linear regression. Furthermore, data collection process is conducted on cardiopulmonary patients with the purposes of device calibration as well as functionality verification and accuracy performance benchmarking with commercial pulse oximeters. Clinical testing proves that the overall average accuracy of the algorithm has achieved 93.73% for heart rate measurement and 96.79% for oxygen saturation measurement, respectively. Additionally, this heart rate and oxygen saturation measurement function is integrated a six-minute walk test monitoring system as a test application for home rehabilitation.

Keywords:
Adaptive Thresholding, Contact Photoplethysmography, Heart Rate, Noise Reduction, Oxygen Saturation.

Paper ID: 92

FABRICATION OF A PERFUSABLE ARTIFICIAL MICROVASCULAR CHIP

Hui-Wen Chang, Ying-Ting Lin, Chi-Fu Huang, Gou-Jen Wang
Hui-Wen Chang, Ying-Ting Lin, Chi-Fu Huang, Gou-Jen Wang

In this study, a reticle mask based on the actual size of the capillaries was designed, and the corresponding structure was prepared by the soft lithography. The biodegradable and biocompatible fibrin was selected as the scaffold material. A light-curing printer was used to make an infusion device to overcome the pressure drop problem during the perfusion of the fibrin to form the scaffold. Human Umbilical Vein Endothelial cells (HUVECs) were then cultured on the surface of the scaffold, and the hybrid hydrogel with plasmin being coated on the scaffold filled with cells. After degrading of the fibrin by plasmin, an artificial microvessel of nearly actual size was formed. Finally, a micro-channel perfusion system was set up to observe the infusion of the fabricated artificial microvessel network. The experimental results show that this study can produce artificial microvessels (10 μm) close to the actual size, and overcome the pressure drop and shear stress problem during the formation of low-scale microchannels.

Keywords:
Artificial Microvessel Network, Soft Lithography, Fibrinogen, HUVEC, Plasmin Treatment.

Paper ID: 106

PRELIMINARY TESTING OF A BALLOON PUMP AS ASSISTIVE DEVICE FOR FONTAN CIRCULATION

Jackson Godfrey Rusanyu, Ahmad Zahran bin Md Khudzari, Wan Nor Syuhada Wan Zahari, Kahar Osman, Khairul Salleh Besaruddin, Amat Amir Basari, Azli Yahya, Sivakumar Sivalingam

Fontan circulation involves a series of surgical operations for paediatric patients with congenital heart diseases (CHD) like hypoplastic left heart syndrome (HLHS). Despite surgery resulting in a univentricular heart structure, Fontan circulation remains palliative and can lead to complications such as heart failure and increased central venous pressure (CVP). Researchers have proposed mechanical assist devices to alleviate these complications, either a Left Ventricular Assist Device (LVAD) or Cavopulmonary Assist Device (CPAD). This preliminary study evaluates a novel balloon pump for Fontan circulation as a CPAD. The pump, connected to a vertical water column and driven by a linear actuator, made off rack and pinion mechanism, was tested at three water column heights. Statistical analysis of water displacement, battery power consumption, and sound intensity was conducted. Results showed the balloon pump prototype performed well, with an average water displacement of nearly 60 mm (4.4 mmHg of pressure) and a noise level below the NIOSH recommendation at 59.8 dB. The device, powered by a 12V 5000 mAH battery, operated for over 4000 seconds. All results were within the target design range, supporting further development for potential clinical application in Fontan patients.

Keywords:
Congenital Heart Disease, Fontan Circulation, Cavopulmonary Assist Device, Balloon Pump, Pulsatile Flow.

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Parallel Session 1C

Paper ID: 62

COMPARISON OF GLUCOSE MONITORING USING BLOOD AND INTERSTITIAL FLUID OF DIABETIC RATS MODEL IN DEVELOPMENT MICROFLUIDIC SYSTEM FOR TRANSDERMAL INSULIN DELIVERY

Syaidah Md Saleh, Sharennaath Patchamuthu, Siti Nor Syairah Anis, Ida Idayu Muhamad, Suhaini Kadiman

Transdermal microfluidics systems for diabetes management have gained increasing attention and emerged as a potential hope. Traditionally, a hypodermic needle was utilised for biofluid sampling and subcutaneous insulin delivery. However, this invasive technique causes undesirable pain and tissue trauma. Other than blood, interstitial fluid contains a high concentration of glucose compared to another body fluid, e.g., saliva and tears. The interstitial fluid can achieve high sensitivity and accuracy in measuring glucose for non-invasive glucose sensor development. Due to minimal or non-invasive performance (less pain), microneedles are widely discovered to replace the hypodermic needle, and their combination with the microfluidic system is expected to improve diabetes treatment management. Herein, the comparison of the glucose concentration before, during, and after insulin (injection) between interstitial fluid and blood of the live diabetic rats using both microneedles and hypodermic needles was investigated. Based on findings, the changes in glucose concentration over time of interstitial fluid compared to a blood sample show a similar trend. Furthermore, microneedle is one of the most effective methods to extract interstitial fluid for continuous blood glucose monitoring.

Keywords:
Interstitial fluid, Microneedle, Microfluidic.

Paper ID: 5

HAEMOCOMPATIBLE DUAL-FUNCTIONAL SURFACES OF EVEROLIMUS-IMMOBILISED POLYDOPAMINE SCAFFOLDS FOR DRUG-ELUTING STENT DEVELOPMENT

Mohamad Amin Jumat, Jaweria Ambreen, Nur Arbainah Shamsul Annuar, Pascale Chevallier, Diego Mantovani, Farshid Sefat, Syafiqah Saidin

Biodegradable drug-eluting stent (DES) is an effective cardiovascular device, used as an intervention to regulate drug release with the main purpose to prevent thrombosis/stent restenosis, while providing a temporary structure to support narrow blood vessel. Despite the efficacy of anti-proliferative everolimus drug in preventing stent restenosis/thrombosis, tissue healing, and regeneration could be delayed due to the suppression growth of endothelial lining vascular walls. To alleviate this limitation, DES surface should be modified to avert the risks, while accelerating endothelisation. Herein, a haemocompatible dual-functional surfaces of everolimus immobilised polydopamine (PDA) mediated poly (l-lactic acid)/poly (d-lactic acid) (PLLA/PDLA) scaffolds were fabricated with intent to support endothelial integration in the abluminal area (PP-PDA) while preventing cell growth in the luminal area (PP-PDA-EVE). The PDA was also used to provide strong covalent linkages between the everolimus and the PLLA/PDLA scaffolds. All surfaces were classified as non-haemolytic, exhibited less than 2% haemolytic index which is an essential rule for the blood-in-contact surfaces. The endothelial cells were extensively proliferated on the PP-PDA surfaces with the greatest 100% viability and intact monolayers through the formation of intercellular connection. These features are specifically beneficial to support DES implantation in the abluminal area. In contrast, the PP-PDA-0.1EVE surfaces were found with less than 70% cell viability and noticeable cell apoptosis for the prevention of restenosis/thrombosis in the luminal area. The specific biological properties of the dual-functional surfaces in this study are crucial for DES development to support both biological requirements in the luminal and abluminal lesions.

Keywords:
Dual-functional Surfaces, Everolimus, Polydopamine, Antiproliferative, Endothelisation

Paper ID: 18

MODIFICATION OF 3D PRINTED POLYETHYLENE TEREPHTHALATE GLYCOL SCAFFOLD WITH CHITOSAN FOR BONE TISSUE ENGINEERING

Hemalatha Mariapen, Ravathi Marathandi, Murfiqah Taufiqiah Mohd Amin, Norhana Jusoh

Bone tissue engineering uses 3D printing to create scaffolds, addressing the high demand for bone grafting. Fused Deposition Modeling (FDM) is the 3D printing method which allows precise fabrication of scaffolds with materials like Polyethylene Terephthalate Glycol (PETG), though PETG is hydrophobic and has smooth surface which limits cell attachment. To enhance cell growth, PETG scaffolds were modified by coating with different concentration of hydrophilic chitosan (CS) (0.1wt%,0.15wt%,0.2wt% and 0.25 wt%) through dip coating and freeze-drying methods. The modified scaffolds were analyzed using Scanning Electron Microscopy (SEM), Water Contact Angle (WCA), Fourier Transform Infrared Spectroscopy (FTIR) and biomineralization testing by Simulated Body Fluid (SBF) solution. Observation through SEM revealed that CS coating created a rougher surface, improving cell attachment. Besides, the hydrophilicity of the scaffolds increased with the increasing of CS concentrations, overcoming PETG's hydrophobicity properties. PETG scaffold demonstrated 97.0º of contact angle whilst PETG+0.25wt% showed 29.4° of contact angle. The integration of chitosan with PETG was clearly observed in the FTIR analysis. New peaks from chitosan, such as broad O-H and N-H stretching at 3400-3500 cm^{-1} and the distinctive amide bands, confirm successful coating of CS. In biomineralization testing, CS-coated scaffolds exhibited significant apatite formation, indicating good mineralization and potential for bone tissue engineering. This research highlights the potential of chitosan-coated PETG scaffolds for advancing bone tissue regeneration.

Keywords:
Bone Scaffold, 3D- Printing, Chitosan, Polyethylene Terephthalate Glycol.

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Parallel Session 1D

Paper ID: 47

A COGNITIVE COMPUTATIONAL AGENT MODEL-DRIVEN APPROACH FOR INTELLIGENT CAREGIVER SUPPORT ANALYSIS

Azizi Ab Aziz, Nurul Husna Mukhtar, Husniza Husni

Caregiving exhaustion is a significant issue among informal caregivers. This exhaustion, driven by the cumulative demands of caregiving, often escalates into burnout, negatively affecting both the caregiver's well-being and the quality of care provided. The objective of this paper is to propose a model-based reasoning analysis for intelligent caregiver support. The model focuses on understanding and managing caregiving exhaustion through computational dynamics and tailored support mechanisms. To achieve this, the paper employs several threshold parameters to control the action-selection mechanisms, activating specific support actions based on the caregiver's current state and needs. The effectiveness of this approach is demonstrated through simulations based on three different caregiving scenarios, illustrating how the model can adapt to various challenges and provide targeted support. Finally, the paper verifies the dynamic properties of the proposed model, ensuring its reliability and robustness in real-world applications. This model-based approach offers a promising solution for enhancing the support provided to informal caregivers, ultimately reducing exhaustion and improving the overall caregiving experience.

Keywords:
Caregiver Exhaustion, Cognitive Analytics and Simulation, Caregiving Interaction, Behavioural Analytics, Intelligent Support Systems

Paper ID: 29

PREDICTION OF HEART FAILURE USING SUPPORT VECTOR MACHINE

Keshiniy A/P Mogan, Noor Hidayah Zakaria, Goh Eg Su, Izyan Izzati Kamsani

Support Vector Machine (SVM) finds the best-separating hyperplane to classify data points into two categories which are quantitative and qualitative features. This research aims to predict heart failure using SVM, focusing on classification accuracy and algorithm efficiency. This research addresses a review of previous studies that identified gaps. The research methodology involves a framework with four key components: Data Preparation, Data Pre-Processing, Feature Selection, and Classification; using a dataset specifically on heart failure. This research proposes using Recursive Feature Elimination (RFE), Random Forest Importance (RFI), and LASSO to improve attribute reduction and classification speed, aiding timely patient treatment. This study focuses solely on SVM and feature selection methods to determine accuracy, precision, and recall in predicting heart failure. Linear kernel and Radial Basis Function (RBF) kernel hyperparameters are implemented and the results from the validations indicated that the SVM+RFE and SVM+LASSO models consistently outperformed others, achieving the highest average accuracy, precision, and recall scores in both linear and RBF kernels. This comprehensive approach confirmed the superiority of feature selection combined with hyperparameter optimization in enhancing SVM model performance. The highest accuracy obtained is 86.16% at the RBF kernel of both SVM+RFE and SVM+LASSO.

Keywords:
SVM, Heart Failure Prediction, Feature Selection.

AI for Human Technology

Paper ID: 60

INTEGRATION OF ARTIFICIAL INTELLIGENCE AND BIG DATA INTO HUMAN DECISION SUPPORT SYSTEMS: COMPARATIVE ANALYSIS OF OPTIMIZATION METHODS

Stanislav Šafránek

This paper explores the integration of artificial intelligence (AI) and big data analytics (Big Data) into human decision support systems (DSS) to improve decision-making processes across different sectors. By leveraging predictive analytics, organizations can effectively analyze large data sets, predict future trends, optimize their operations, and make better-informed decisions. The study focuses on the theoretical underpinnings of AI, Big Data and DSS, exploring their interconnections and applications in practice. At the same time, it also addresses ethical issues such as algorithmic biases that can affect the outcomes of decision-making processes. In addition to the theoretical aspects, the paper performs a comparative analysis of three different optimization methods - Variance-Covariance Adaptive Sampling (VCAS), Adam and RMSProp - in order to understand their impact on the efficiency and stability of neural networks. This research provides a comprehensive framework for understanding the role of AI and Big Data in modern computing and offers valuable insights for future research and practical applications in various industries, including healthcare, agriculture, and smart cities.

Keywords:
Artificial Intelligence, Big Data, Decision Support Systems (DSS), Predictive Analytics, Optimization Methods, Backpropagation Algorithm, Variance-Covariance Adaptive Sampling (VCAS), Adaptive Moment Estimation (ADAM), Root Mean Squared Propagation (RMSProp)

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Parallel Session 1E

Paper ID: 58

COMPARATIVE STUDY ON THE PHYSICAL FITNESS TEST OF COLLEGE STUDENTS BETWEEN CHINA AND MALAYSIA CULTURE

Gaoyili, Hadafi Fitri Mohd Latip, Mohd Shahrizal Sunar

Support Vector Machine (SVM) finds the best-separating hyperplane to classify data points into two categories which are quantitative and qualitative features. This research aims to predict heart failure using SVM, focusing on classification accuracy and algorithm efficiency. This research addresses a review of previous studies that identified gaps. The research methodology involves a framework with four key components: Data Preparation, Data Pre-Processing, Feature Selection, and Classification; using a dataset specifically on heart failure. This research proposes using Recursive Feature Elimination (RFE), Random Forest Importance (RFI), and LASSO to improve attribute reduction and classification speed, aiding timely patient treatment. This study focuses solely on SVM and feature selection methods to determine accuracy, precision, and recall in predicting heart failure. Linear kernel and Radial Basis Function (RBF) kernel hyperparameters are implemented and the results from the validations indicated that the SVM+RFE and SVM+LASSO models consistently outperformed others, achieving the highest average accuracy, precision, and recall scores in both linear and RBF kernels. This comprehensive approach confirmed the superiority of feature selection combined with hyperparameter optimization in enhancing SVM model performance. The highest accuracy obtained is 86.16% at the RBF kernel of both SVM+RFE and SVM+LASSO.

Keywords:
SVM, Heart Failure Prediction, Feature Selection.

Paper ID: 87

KAKIROW: AN INTERACTIVE USER EXPERIENCE GAMIFIED VIRTUAL REALITY TO IMPROVE ROWING SPORTS TRAINING

Nurshamine Nazira Nor, Mohd Shahrizal Sunar, Tan Wei Kian

This paper discusses the integration of virtual reality (VR) and gamification in sports training, particularly in rowing. Technologies are increasingly used in various sectors, including education and healthcare, with VR enhancing physical education by creating immersive experiences. In rowing sports, VR simulations improve performance by providing realistic environments that facilitate better training outcomes. The research introduces KakiRow, a VR-based rowing application designed to enhance user experience and training through gamified interfaces. A pilot study involving four participants evaluated two versions of the interface: a linear design with digitalized data visualization (Group A) and a radial menu design with gamified data visualization (Group B). The results indicated that the gamified interface (Group B) led to higher user satisfaction, though technical issues affected Group A's experience. Despite the small sample size, initial findings show that VR training and gamification improve user engagement. Future studies aim to refine the design and conduct larger trials. The paper concludes by emphasizing the potential of VR and gamification to enhance sports training, noting that further development and evaluation of the user interface will be conducted to optimize user satisfaction and performance in VR environments.

Keywords:
Virtual Reality, User Experience, User Interface.

Sports Innovation & Technology

Paper ID: 102

AI-BASED BADMINTONTUTOR FOR IMPROVING POSTURE AND PERFORMANCE WITH TAM ANALYSIS

Tan Ser Xuen, Nor Azizah Saadon, Shahliza Abd Halim, Muhamad Najib Zamri

In the rapidly evolving field of sports technology, Artificial Intelligence (AI) is unlocking new possibilities for enhancing athletic performance. This paper introduces BadmintonTutor, an innovative web-based coaching application designed to assist beginners and novice badminton players in refining their skills. By leveraging advanced AI techniques such as pose estimation, object detection, and generative AI, BadmintonTutor delivers real-time audio feedback that helps players correct their posture and technique effectively. The system utilizes computer vision and machine learning algorithms to monitor and evaluate the biomechanics of badminton strokes and footwork, providing precise, actionable insights based on real-time video analysis. This continuous feedback loop not only enhances technique but also mitigates the risk of injury due to improper form. The development process, core components, and features of the application including motion capture, pose estimation, and feedback generation are thoroughly examined. Additionally, the study applies an adapted Technology Acceptance Model (TAM) Questionnaire to assess the system's usability and effectiveness. With fully completed responses, the Cronbach's alpha values indicate acceptable reliability for TAM questionnaire which is 0.868. The TAM questionnaire also demonstrates good content validity as confirmed by expert review. The implications of this research extend beyond badminton, offering a template for integrating AI-driven pose correction across various sports disciplines.

Keywords:
Badminton, Pose Corrector, Real-Time Feedback, Badminton Coaching Application, Technology Acceptance Model.

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Parallel Session 2A

Paper ID: 104

NUMERICAL STUDY ON THE HEMODYNAMIC EFFECTS OF A CONCEPTUAL LEFT VENTRICULAR ASSIST DEVICES: THROMBOSIS POTENTIAL ASSESSMENT

Muhammad Rashidi Abdul Kadir, Ahmad Zahran Md. Khudzari, Mohamad Ikhwan Kori, Kahar Osman

Heart failure remains a leading cause of mortality worldwide, with limited heart donors making Left Ventricular Assist Devices (LVADs) a critical alternative for patients with end-stage heart failure. However, current LVADs pose challenges for patients with smaller body sizes, particularly children. This study evaluates the hemodynamic performance and thrombosis potential of a smaller impeller LVAD using Computational Fluid Dynamics (CFD). A 37 mm diameter, seven-blade impeller was analyzed across rotational speeds of 2000, 2500, and 3000 rpm, and flow rates ranging from 3 to 7 L/min. Validation against experimental data confirmed the model's accuracy, with pressure differences closely matching the expected flow profile. Results indicated that high shear regions, particularly at rotational speeds of 2500 and 3000 rpm, affected 34.58 to 47.26 percent of surfaces, posing a substantial risk for platelet activation. Conversely, low shear rate regions, though minimal, with a maximum of 0.14 percent of surfaces experiencing shear rates below 54 s^{-1}, were concentrated on the suction side of the impeller blades, presenting a potential risk for stagnation and thrombus formation. While a smaller device size has the potential to improve hemodynamics by reducing areas of stagnation, it also poses a heightened risk of platelet activation due to increased shear in key areas.

Keywords:
Computational Fluid Dynamics, Left Ventricular Assist Device, Thrombosis Potential, Shear Rate.

Paper ID: 6

A MINIATURIZED FRACTAL INSPIRED FLOWER SHAPED IMPLANTABLE ANTENNA FOR LEADLESS CARDIAC PACEMAKER SYSTEM UTILIZING VISUAL BASIC FOR APPLICATION

Alvir Jamil, Raimi Dewan, DiviyaDevi Paramasivam, Fathan Khansa Arby, Maria Alessandra Sabiniano Florida

Advancements in medical technology have prompted the development of leadless cardiac pacemaker (LCP) systems, overcoming challenges associated with conventional pacemakers (CP) utilizing leads. However, the compact size of the LCP necessitates a miniaturized antenna for wireless communication, as it imposes limitations on the available space for the antenna. Thus, this study was conducted to propose a design of a miniaturized fractal-based antenna that operates at 2.40 GHz. An LCP antenna with a small footprint of (as designed using CST Microwave Studio. The antenna was simulated in free space and inside the heart tissue model to evaluate the performance of the antenna, in terms of reflection coefficient ,(S-11.) and realized gain. The performance of the antenna is impacted when simulated inside the heart tissue model compared to in free space. Therefore, the antenna is optimized to achieve satisfactory performance within a heart tissue environment. This optimization involved using a pin shorting technique and optimizing offset of the coaxial-feed cable position. These adjustments are made to bring the resonant frequency from 5.0 GHz to 2.4 GHz, with an of -32 dB and a realized gain of 25.26 dBi. In addition, the proposed antenna will be able to significantly reduce the size of the LCP, making the antenna implantation procedure more noninvasive. As a result, the miniaturized antenna design holds great promise for further advancement of the LCP systems.

Keywords:
Antenna, Fractal, Miniaturized, Pacemaker, Visual Basic for Application.

Paper ID: 13

IMPROVING RFID PERFORMANCE POTENTIAL USING CONDUCTIVE HYDROGEL

Fathan Khansa Arby, Raimi Dewan, Nurizzati Mohd Daud, You Kok Yeow, DiviyaDevi Paramasivam, Faishal Adilah Suryanata, Sim Man Seng, Alvir Jamil, Maria Sandra, Amirudin Ibrahim

Previous research indicates that placing RFID tags directly on human skin tissue causes significant signal loss, resulting in read ranges of less than 1 meter. Permittivity, electrical conductivity, and the thickness of muscle, fat, and skin layers which impacts the RFID performance. This study investigates the potential of introducing a hydrogel layer between the RFID tag and the skin to mitigate these effects. Both non-conductive and conductive hydrogels were developed, with hydrogel conductivity varied through different salt mass concentrations. The effect of hydrogel conductivity on RFID read range was examined in both simulations and experimental settings. Results demonstrated a consistent pattern of decreased read range with increasing NaCl content and validated by simulation. However, an unexpected peak in read range was observed at 10% m/v NaCl concentration, indicating an optimal concentration for improving RFID tag performance. Beyond this concentration, at 20%, 30% and 40% immersed NaCl, led to reduced read range due to increased signal attenuation. This study provides valuable insights into the relationship between hydrogel conductivity, salt concentration, and RFID performance, offering recommendations for optimizing RFID applications.

Keywords:
Conductivity, Gelatin, Hydrogel, Permittivity, PVA, RFID Tag.

Paper ID: 97

ADVANCEMENTS AND CHALLENGES IN CONTINUOUS GLUCOSE MONITORING (CGM) SYSTEMS: A REVIEW OF NON-COMMERCIAL AND COMMERCIAL TECHNOLOGIES

Rasha Dheyaa Mahdi AL-Khafaji, Jaysuman Bin Pusppanathan, Ahmad Moolla, Fatin Aliah Phang Abdullah

Continuous glucose monitoring (CGM) systems have revolutionized diabetes management by providing real-time monitoring of glucose levels, reducing the risks of hypoglycemia and hyperglycemia. This paper offers a comprehensive review of both non-commercial and commercial CGM technologies, categorizing them based on optical, electrochemical, ultrasound, electromagnetic, and microwave principles. It highlights the various detection ranges, calibration requirements, and sensitivities to environmental factors of each system, emphasizing their advantages and limitations. Non-commercial systems, though innovative, still face challenges related to sensor lifespan, frequent calibration, and environmental interferences such as temperature and pH fluctuations. Commercial systems, particularly those like DexCom and Insulet's Omnipod provide more reliable performance within a physiological glucose range, offering seamless glucose management. Recent advancements, such as AI-driven algorithms and novel power sources, are discussed as potential solutions to the challenges of current CGM systems. The study concludes with an analysis of the critical limitations that must be addressed, including improving accuracy, extending sensor lifespan, and reducing calibration frequency, to further advance CGM technology and enhance diabetes care.

Keywords:
Continuous Glucose Monitoring (CGM), Non-commercial CGM, Commercial CGM, Diabetic.

Ergonomics, Health & Safety

Paper ID: 103

A PRELIMINARY STUDY ON POOR POSTURE WARNING SYSTEM FOR DESK WORK

Shuhei Era, Kunio Yamamoto, Masaki Oshita

In this study, we propose a system that uses a depth camera and skeletal tracking to detect poor posture during desk work and alerts users. This approach eliminates challenges associated with sensor attachment and installation, typically faced by conventional systems that rely on multiple sensors, by assessing various postural issues using a single sensor. The system focuses on the alignment of core body parts such as the head and torso and evaluates posture based on misalignment features. An Intel RealSense depth camera and NuiTrack were used for skeletal tracking, whereas an LSTM-based posture classification model was implemented to detect common poor postures, such as slouching, sacral sitting, and scoliosis, from the tracking data. As the camera's field of view is limited to the upper body, the system leverages the time series capability of the LSTM model to effectively detect poor posture even without lower-body data. Initial experiments showed that slouching and sacral sitting could be classified with reasonable accuracy. However, the detection of scoliosis remains challenging. Future work will focus on improving the model with more diverse data and developing a real-time warning system that visually displays a user's core body misalignment.

Keywords:
Posture Evaluation, Poor Posture, Skeletal Tracking.

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Parallel Session 2B

Assistive Technology & Bio-Instrumentation

Paper ID: 54

EFFECTS OF ENHANCED EXERCISE WITH ACTIVATED INHALED OXYGEN (SOE)

Chia-Feng Hsieh, Cheng-Chung Chang, Tun-pin Hung

This research presents the design and development of a compact singlet oxygen energy (SOE) generation device aimed at augmenting athletic performance. The device employs a photosensitizer to activate atmospheric oxygen and generate singlet oxygen upon exposure to red light. The subsequent return of singlet oxygen to its ground state and releases energy, known as SOE. Through a comparative analysis of exercise pulmonary measurements in 12 untrained volunteers, we determined that the inhalation of SOE, either pre-exercise or during exercise, can elicit physiological adaptations and enhance exercise efficiency. Specifically, SOE inhalation was found to decrease exercise heart rate, reduce oxygen consumption, and lower blood lactate levels. A concomitant reduction in carbon dioxide output is also anticipated. These findings suggest that our device optimizes oxygen utilization and availability, promotes aerobic metabolism during exercise, mitigates muscle fatigue, and ultimately enhances performance, especially in untrained individuals. Ongoing clinical trials are investigating the feasibility of extending the application of this technology to the general population.

Keywords:
Reactive Oxygen Species, Singlet Oxygen, Singlet Oxygen Energy, Photosensitizer, Photodynamic Therapy, Lactate.

Paper ID: 66

TRANSISTOR TYPE POWER GENERATOR FOR MACHINING HIP IMPLANT MICROPITS

Azli Yahya, Nazriah Mahmud, Nor Hisham Khamis, Norhalimah Idris

Electrical Discharge Machining (EDM) is used as to shape, cut and creation of complex and deep cavities in a range of conductive materials (metals). The biomedical industry is becoming more and more interested in micro-machining, especially in terms of improving hip implant lubrication. To meet this demand, the creation of micro pits is suggested to improve lubrication, thereby prolonging the durability of hip implants. In this regard, specific crater dimensions will be established at various locations and depths on the surface of the hip-implant as to minimize friction between two metallic surfaces. As a result, this paper presents an innovative design for a Pulse Power Generator (PPG), which considers the optimal of material removed, the wear ratio, the density of surface cracks, and the finished material quality. While the RC type generator yields superior surface quality, its machining efficiency may be compromised by the time required to charge the capacitor. Therefore, it is highly advisable to utilize a transistor pulse generator to machine hip implants, as it offers significant improvements in the removal rate due to its increased machining speed.

Keywords:
Removal Rate, Electrical Discharge, Micropits, Implant.

Paper ID: 93

FABRICATION OF REUSABLE ELECTROCHEMICAL PLATFORM BASED ON THE HOST-GUEST INTERACTION

Zhi Jia Chen, Wun Liang, Muhammad Aneeq u Rehman, Chian-Hui Lai

The electrochemical sensor has gained significant attention in biosensor design recently, thanks to its advantages like high sensitivity, affordability, and practicality. Although most disposable biosensors can prevent samples contamination, they cannot perform downstream analysis. In addition, increasing the usage of electrochemical sensors is beneficial for reducing costs, making it essential to develop a reusable electrode surface. In this study, the authors employed a glassy carbon electrode (GCE) modified with β-cyclodextrin (β-CD) through electro-grafting and solid-phase synthesis. The β-CD selectively recognizes the benzimidazole (BM) derivative via host-guest interactions. Since BM is a pH-responsive molecule, it can be released from the electrode surface in an acidic environment. This process allows the electrode surface to regenerate and be prepared for subsequent detections. During fabrication, the authors evaluated the conditions and performance of two modified electrodes (GCEβ-CD and GCEβ-CD/PEG-Me). Following this, the primary analyte (Mannose-BM) will be used to assess electrochemical detection and reusability in an acidic solution.

Keywords:
Electrochemical Sensor, Reusable Eelectrode Surface, β-Cyclodextrin.

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Parallel Session 2C

Paper ID: 88

SOFT POLYMER-BASED NANOPARTICLES FOR TARGETING ANTIBIOTIC DELIVERY

Tran Ha Lac, Chen Yu Xuan, Wu Tsu Chien, Lai Chian Hui

The escalating prevalence of antibiotic resistance poses a substantial global health threat. While many antibiotics exhibit potent antimicrobial activity, their efficacy is often compromised by limitations in targeted delivery and biofilm penetration, potentially resulting in collateral tissue damage. Nano-particle-based antibiotic delivery systems offer a promising solution, leveraging their unique properties to facilitate precise targeting of infected sites, minimize systemic exposure, and enhance antibiotic efficacy against recalcitrant biofilms. In this study, we investigate the potential of incorporating small molecules with bacterial surface affinity to improve the targeting capabilities of nanoscale delivery systems. We synthesized various polymers using RAFT polymerization, incorporating different small molecules at varying ratios. These polymers self-assembled into nanoparticles and encapsulated a hydrophobic antibiotic, Rifampicin, which resulted in three Rifampicin-encapsulated nanoparticles: Rif@NP1, Rif@NP2, and Rif@NP3. The sizes of three nanoparticles ranged from 124.6 ± 31.1 to 239.7 ± 17.8 nm, and their ζ potential is from -45.4 ± 2.5 nm to -22.3 ± 1.8 nm. The release of Rifampicin from nanoparticles was monitored in PBS buffer at pH 6.0 and pH 7.4. While Rif@NP1 released less than 20% of Rifampicin in both pH, Rif@NP2 and Rif@NP3 were able to release up to 40% after 72 hours. The antimicrobial activity of three nanoparticles was tested on Escherichia coli and Staphylococcus aureus, and Rif@NP3 showed a better effect on both bacteria than the other nanoparticles. In conclusion, three polymer-based nanoparticles encapsulating Rifampicin, although three nanoparticles possess different properties, were able to release Rifampicin and show antimicrobial effects on E. coli and S. aureus, which indicated the potential to be employed in further studies such as biofilm-forming prevention.

Keywords:
Antibiotic Resistance, Polymer-based Nanoparticle, Rifampicin, Targeting Drug Delivery

Paper ID: 115

A TARGETED FLUORESCENT PROBE FOR THE SELECTIVE DETECTION AND IMAGING OF HYDROGEN PEROXIDE IN LIVING CELLS

M Aneeq U Rehman, ZhiJia Chen, Lai Chian Hui

In recent years, fluorescent turn-on probes have become invaluable in diagnosing diseases and investigating pathological mechanisms due to their high sensitivity and minimal background interference. Among reactive oxygen species (ROS), hydrogen peroxide (H2O2) is particularly significant, as it plays a central role in regulating essential cellular processes like signaling, immune responses, and oxidative stress. In this research, we have produced an innovative fluorescent probe, HCyB, incorporating hemicyanine and arylboronate structures, specifically tailored for detecting H2O2 within biological systems. HCyB showed a robust linear fluorescence response to H2O2 concentrations ranging from 15 to 50 μM, with an impressive detection threshold of 76 nM, allowing for the identification of minute H2O2 levels. The probe exhibited exceptional selectivity for H2O2 over other biologically relevant molecules, reducing false signals and ensuring accurate detection. Additionally, HCyB demonstrated low cytotoxicity, making it ideal for live-cell imaging applications. Its ability to target mitochondria further increased its utility, given the critical role mitochondrial H2O2 plays in various cellular functions and disease mechanisms. The effectiveness of HCyB was confirmed across different cell lines, including mouse macrophages (RAW 264.7), human skin fibroblasts (WS1), breast cancer cells (MDA-MB-231), and human leukemia monocytic cells (THP1). HCyB successfully tracked both exogenous and endogenous H2O2 levels within these cells, highlighting its potential for real-time, in situ detection of H2O2 across various biological settings. This positions HCyB as a promising tool for biomedical research, particularly in studying oxidative stress-related diseases and H2O2-mediated cellular signaling pathways.

Keywords:
A Detection Probe (H2O2), Arylboronate, Fluorescent Turn-on, Indole Salt, Mitochondrial Targeting

Paper ID: 94

ELECTROCHEMICAL DETECTION OF THE EMERGING PANDEMIC THROMBOCYTOPENIA SYNDROME (SFTS) VIRUS ANTIBODIES

Wei-Jhen Wang, Ying-Ting Lin, Yin-Ching Wu , Gou-Jen Wang

Severe fever with thrombocytopenia syndrome (SFTS), an emerging tick-borne viral infection caused by the SFTS virus (SFTEV), poses a significant global public health threat due to its potential for pandemic spread. In this study, a self-assembly (Au-SH) method was used to sequentially attach 1,6-hexanedithiol (1,6-HDT) and colloidal gold nanoparticles to a gold film sputtered on a polyethylene terephthalate (PET) substrate to form an electrode with a single layer of gold nanoparticles. Then, the antigen of the SFTS viruses (SFTSV) are firmly attached to the electrode through the self-assembly method to make the biosensor for the detection of SFTSV antibody. The results of electrochemical impedance analysis show that the single-layer gold nanoparticle biosensor proposed in this research can successfully detect the antibody of SFTSV in 65 min with a wide linear detection range from 200 to 25000 ng/mL with a linearity of 0.9701. The detection limit is measured to be 2.076 ng/mL. The single-layer gold nanoparticle biosensor proposed in this research has the advantages of simple manufacturing process, low cost, high detection sensitivity, and short detection time. It has great commercial application feasibility.

Keywords:
Electrochemical Impedance Spectroscopy, Severe Fever with Thrombocytopenia Syndrome, Single Layer Gold Nanoparticle Electrode.

Paper ID: 101

CHITOSAN - PAPER BASED ANALYTICAL COLORIMETRIC METHOD FOR BISPHENOL A DETECTION

Ang Ruo Ping, Ida Idayu Muhamad, Syaidah Md Saleh, Siti Nor Syairah Anis

The synthetic chemical bisphenol A (BPA) is widely used in food containers, water bottles, and other items. However, problems occur when it leaches into the food and water. Being a strong endocrine disruptor, it may change a number of bodily functions or trigger estrogen-like activities that have a variety of detrimental consequences on health and can potentially cause carcinogenesis and mutagenesis. Due to this, it is important to determine the presence of BPA in water samples. Traditional methods for detecting BPA use highly sensitive tools like inductively coupled plasma-mass spectrometry, mass spectrometry, or other alternative spectrophotometry analysis. These tools can reliably examine the contaminants with high sensitivity. However, these instruments are not ideal for quick evaluation due to their high cost and time consumption, which is uneconomical for on-site and real-time monitoring. Hence, this research investigated an available quantitative technique using the paper-based analytical colorimetric method for BPA detection using functionalized chitosan. The reaction was investigated at different BPA concentrations and modified fabrication methods of chitosan-paper-based analytical devices. The research also determined the optimal parameters for BPA detection under selective conditions and its performance at higher BPA concentrations, i.e., the concentration of sulfamethoxazole, the concentration of sodium nitrite, and the effect of pH. Quantitative detection of BPA was accomplished using a smartphone and ImageJ software. Based on the outcome, the percentage of similarity between the modified Chitosan paper-based analytical device fabrication method and the Karrat's reported method is about 35% after considering the key parameters of fabrication and performance metrics.

Keywords:
Bisphenol A, Calorimetric, Chitosan.

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Parallel Session 2D

Signal & Image Processing

Paper ID: 91

ENHANCED MALAY AUTOMATIC SPEECH RECOGNITION THROUGH FINE-TUNING PRE-TRAINED WHISPER MODELS

Hon Keat Pong, Zhi Quan Clement Tai, Yen Lee Choo

Automatic Speech Recognition (ASR) technology has changed the interaction between humans and machines as evidenced by the creation of voice-controlled devices and real-time transcription. While these improvements are impressive, there are challenges when ASR technology is used in low-resource languages like Malay. The arduous work involved in collecting sufficient labelled Malay speech data and the lengthy model building process have hampered the application of ASR in low-resource languages. A solution to these issues is to perform fine-tuning on a pre-trained model. In this work, a fine-tuning method is proposed to fine-tune Whisper, a recent high-performing ASR model. The proposed fine-tuning process significantly boosts the performance of the ASR model for Malay speech data. In one of the datasets that are used to test our fine-tuned model, the word error rate (WER) has been remarkably reduced from 54.77% to 8.89%.

Keywords:
Automatic Speech Recognition, Pre-Training, HCI.

Paper ID: 90

ARTIFICIAL INTELLIGENCE FOR ADAPTIVE GAMIFICATION: A PRELIMINARY FRAMEWORK FOR ENHANCED CUSTOMER ENGAGEMENT

Azizul Azman, Mohd Shahrizal Sunar

This paper introduces an innovative framework that combines artificial intelligence (AI) with adaptive gamification to boost customer engagement. As businesses strive to keep users interested over the long term, the framework uses AI to dynamically adjust gamification elements based on each user's behavior, preferences, and performance. By employing machine learning algorithms, natural language processing, and real-time data analysis, the system continuously refines the gamification experience. The framework's conceptual architecture is outlined, detailing its AI components, gamification elements, and adaptation mechanisms, which are designed for use across various industries. To illustrate its potential, a hypothetical case study of this framework applied to an e-commerce platform is presented, highlighting expected improvements in customer engagement metrics. This research contributes to the field of AI-driven customer experience optimization and offers a theoretical blueprint for researchers and businesses exploring advanced gamification strategies. The framework's applications extend beyond e-commerce to sectors such as education, healthcare, and finance, providing a versatile foundation for enhancing engagement in diverse contexts. Essentially, this preliminary framework acts like a digital chameleon, constantly adapting to user needs and keeping experiences fresh and exciting.

Keywords:
Artificial Intelligence, Adaptive Gamification, Customer Engagement, Machine Learning Algorithm.

Paper ID: 21

ADAPTIVE KEY NEURON-GUIDED FUZZ TESTING FOR HUMAN SECURITY IN DEEP LEARNING SYSTEM

Junhan Li, Radziah Mohamad, Johanna Ahmad

Deep learning (DL) systems are being used in scenarios with increasingly complex environments, especially in human security scenarios, such as autopilot, medical diagnosis and facial recognition. These applications with DL systems inside not only bring great convenience, but also bring severe challenges. The fault behavior of DL systems will not only lead to huge economic losses, but even human casualties. Therefore, making software testing to ensure the quality of such systems particularly important. Traditional software testing techniques are not suited to the internal structure and operating mechanism of DL systems. Traditional fuzz testing commonly exist inefficiencies such as invalid test case selection and generation leading to waste of resources. Recent fuzz testing methods did not accurately utilize the output of key neurons of critical neuron layers, which could not be more efficiently affect adversarial input in the terms of test case screening accuracy. This paper proposes an adaptive key neuron-guided method with fuzz testing for test case selection. The algorithm developed based on the internal feature of deep neural network. Empirical investigations have been undertaken to assess the efficacy of the suggested methodology utilizing two distinct datasets, one fuzzer, four test case selection algorithms and five DL models. The results show that the strategy can significantly improve the efficiency of the state-of-the-art fuzzer for DL models, not only in terms of screening more adversarial inputs compared with other test case selection algorithms, but also achieving higher mutation and generation success rate.

Keywords:
Deep learning Systems, Human Security, Fuzz Testing

Paper ID: 20

EVALUATION IMBALANCED DATASET FOR X-RAY BAGGAGE SECURITY SCREENING BASED ON YOLO-V8 FOR ENHANCED THREAT DETECTION

Mohd Shafry Mohd Rahim, Ajune Wanis Ismail, Devi Willieam Anggara, Nurfathin Atika Nawawi, Mohd Shahrizal Sunar, Farhan Mohammed

Screening X-ray baggage is crucial for border security, but image quality and available prohibited data are challenges. Lack of data in training AI models can affect the detection results. Here, we evaluate object detection based on YOLO-v8 with an imbalanced dataset from SIXray dataset. The proposed X-ray baggage security screening framework consists of image acquisition, annotation, classification, and threat detection phases. The YOLO-v8 architecture is used to train the model, allowing for quick and accurate identification of potential threats. Evaluation methods such as confusion matrix and precision-recall curve provide a comprehensive view of the classifier's performance. The model was trained using 17498 images and 1642 images for validation. The model performance achieves the largest recall value of 92%, and the largest precision of 93.80%. However, even with an F1 score is 63.81%, the experiment showing the YOLO-v8 algorithm can detect small objects and overlap objects in different orientations. This shows that the Yolo architecture can handle imbalanced datasets.

Keywords:
Object Detection, X-Ray Imagine, Security Screening, Video Processing, YOLO-v8.

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Parallel Session 2E

Paper ID: 48

ROTATION DETECTION AND 6-MINUTE WALK DISTANCE MEASUREMENT USING AZIMUTH FROM ANDROID SENSORS

Wei Xuan Tan, Kok Wai Soo, Ming Chern Leong, Yuan Wen Hau

The 6-Minute Walk Test (6MWT) is widely used in assessing the functional exercise capacity of individuals with chronic respiratory and pulmonary disorders. The primary measurement of this test is the 6-minute walk distance (6MWD), which is the total distance walked by the patients on a flat, hard surface within 6 minutes. When the patients walk forth and back on the walkway with a fixed length, the body rotates to complete a turn and continues to the next lap, resulting in changes in rotation angles. Hence, rotation detection based on the data obtained from the smartphone-embedded sensors is a suitable method to calculate 6MWD. This paper presents an Android mobile application that utilizes accelerometer and magnetometer sensors to compute the azimuth signal for rotation detection and 6MWD measurement. The rotation detection algorithm is developed based on calculation of the azimuth change before and after rotation, and the threshold values for rotation detection are determined based on the analysis of the azimuth graph obtained from data collection of 17 cardiovascular disease patients. Validation results show that this solution achieves the average accuracy of 92.46% and 92.44% for rotation detection and 6MWD measurement, respectively, while a user performing 6MWT using this mobile app and placing the handphone on the waist using waistband. This mobile app solution would be useful for the public community to facilitate home rehabilitation by enabling self-monitoring of fitness recovery after certain disease onset in an indoor home environment.

Keywords:
6 Minute Walk Distance, Accelerometer, Azimuth, Magnetometer, Rotation Detection

Rehabilitation & Therapy

Paper ID: 111

AN INTERACTIVE DIGITAL PLATFORM FOR FINE MOTOR SKILLS TRAINING

Norlaili Mat Safri, Nor Aini Zakaria, See Mee Chin

Human movement is essential for daily tasks, with fine motor skills playing a crucial role in early childhood development. This study introduces a digital fine motor training system, created using MIT App Inventor, to facilitate fine motor skills in children. The system features three interactive tasks, i.e. Tap the Picture, Be a Painter, and Trace the Line, accompanied by a reward system utilizing audio and lighting. Non-invasive electromyography (EMG) data were collected from flexor muscles during task completion in two children and two older adults, one with a prior muscle injury. EMG data were processed through a Butterworth bandpass filter, followed by rectification and linear enveloping. The EMG data were analyzed in time and frequency domains. Results showed that older participants demonstrated higher muscle activity during simpler tasks, compensating for neuromuscular declines with age, while children exhibited lower muscle activity, especially in more complex tasks. In the Trace the Line task, participants exerted the most muscle force, highlighting the need for precision and control. Mean absolute value of muscle activity increased with task complexity, emphasizing the role of challenging activities in enhancing fine motor engagement. Healthy older adult performed better in motor control tasks, while children, especially the one not yet in kindergarten, showed a need for further development in fine motor skills. The findings suggest that the developed interactive digital platforms can support fine motor skill development in children and help older adults maintain muscle function.

Keywords:
Interactive Digital Platform, Fine Motor Skills, Electromyogram Signal, Digital Training, Early Childhood Development.

Paper ID: 112

QUANTITATIVE ANALYSIS OF CEREBRAL PALSY CHILDREN'S UPPER LIMB SIGNALS FOR REHABILITATION TRAINING PERFORMANCE

Najla Ilyana Abdul Majid, Nor Aini Zakaria, Norlaili Mat Safri, Nasrul Humaimi Mahmood, Mohd Azhar Abdul Razak, Nik Noordini Nik Abd Malik

Accurate motion capture is essential for obtaining quantitative data on muscle contraction, acceleration, and angular velocity. This study presents a motion data acquisition system that meets the requirements of a wearable, wireless system by utilizing a combination of portable inertial measurement units (IMU) and surface electromyography (SEMG) sensors worn on the upper limb to capture functional movements. The system gathers functional movement data from 10 typically developing children as controls. The participants perform five tasks based on Activities of Daily Living (ADL) involving upper limb movements, designed by therapists to improve motor function, under a clinician's guidance. The collected data were analyzed using mean, Mean Absolute Value (MAV), Root Mean Square (RMS), standard deviation, skewness, and number of zero crossing (NZR), and classified for each task using Principal Component Analysis (PCA). The results from the typically developing children serve as a benchmark for functional movement. Preliminary findings indicate that MAV, mean, RMS, and standard deviation are significant parameters in determining functional movement, with an accuracy of over 80%. The system successfully captures and classifies signals from both the IMU and SEMG for each task.

Keywords:
Cerebral Palsy, Activity Daily Living, Inertial Measurement Unit, Surface Electromyography, Principal Component Analysis.

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Parallel Session 3A

Paper ID: 65

CUFFLESS BLOOD PRESSURE MONITOR BASED ON PULSE TRANSIT TIME TECHNIQUE WITH MOBILE APP AND WEB-BASED HEALTHCARE SYSTEM

Florence Jade Wen Sung, Yi Yun Koay, Su Shen Lim, Ming Chern Leong, Yuan Wen Hau

Hypertension is a significant health concern affecting more than a billion adults worldwide. Early detection is crucial, highlighting the importance of frequent and regular blood pressure monitoring. Conventional cuff-based blood pressure meters can be uncomfortable and cause skin issues due to repetitive cuff inflation and deflation. To address these challenges, previous works have developed cuffless blood pressure monitors based on electrocardiogram (ECG) and photoplethysmography (PPG) sensors and the pulse transit time technique. However, these devices have shown limitations in accurately measuring blood pressure in individuals with hypertension and lack integration with the Internet of Things (IoT). This study aims to enhance the accuracy of cuffless blood pressure monitoring for individuals with hypertension through clinical data collection and integration with mobile and web-based applications, creating a healthcare system for self and remote monitoring, empowering individuals to manage their blood pressure more effectively. To enhance the device's accuracy for hypertensive individuals, clinical data collection was conducted involving 24 subjects, of which 7 were hypertension patients. The device underwent a calibration process by updating the blood pressure estimation equation using a linear regression technique with the collected data. For clinical validation, 30 subjects, including 5 hypertension patients, were recruited to test the device's performance. The results of this study demonstrate significant improvements, with the device achieving an accuracy of 95.49% for systolic blood pressure and 88.89% for diastolic blood pressure measurements in hypertensive individuals, and 91.91% for systolic blood pressure and 90.64% for diastolic blood pressure in overall measurements.

Keywords:
Cuffless Blood Pressure, Electrocardiogram (ECG), Internet of Things, Photoplethysmography (PPG), Pulse Transit Time.

Health Informatics

Paper ID: 61

TELEMEDICINE AND TRADITIONAL CONSULTATIONS IN MALAYSIA: A POLICY AND PRACTICE PERSPECTIVE

Afraa Mohammed M. Gaashan, Fazlina Mohd Ali, Abdulaziz A. Alashbi, Siti Dhalila Mohd Satar, Shaima M. Gaashan

Telemedicine offers numerous advantages, particularly in enhancing access to healthcare in rural and remote areas where medical facilities are limited. However, its effectiveness is challenged by issues such as communication problems, information security concerns, and uncertainties regarding the quality of care compared to traditional face-to-face consultations. This study reviews the growing adoption of telemedicine in healthcare, emphasizing the various challenges that could impede its success. A critical gap is the lack of comprehensive data on the current state of telemedicine in Malaysia, especially when compared to face-to-face consultations. This data scarcity hinders the advancement of telemedicine services, leaving concerns about the inconsistent quality of care, patient reluctance due to doubts about its effectiveness, and the potential exacerbation of health disparities unaddressed. The study employs the Unified Theory of Acceptance and Use of Technology (UTAUT) model to assess the determinants influencing the adoption of telemedicine. Through a comparative analysis, this study aims to explore these issues, focusing on patient satisfaction, clinical effectiveness, and economic impact, to provide insights for improving telemedicine practices in Malaysia.

Keywords:
Telemedicine, Conventional Medical Systems, Patient Satisfaction, Quality of Care.

Health Informatics

Paper ID: 86

USER-CENTERED DESIGN AND USABILITY ASSESSMENT OF A BREATHING EXERCISE APP TAILORED FOR INDIVIDUAL EMOTIONAL STATES

Choo Yen Lee, Pong Hon Keat, Tan Huey Wen, Logenthini A/P Mariappan, Pang Yee Yong

Stress significantly impacts emotional well-being, leading to conditions such as anxiety, depression, and burnout. While breathing exercises have been shown to alleviate stress, there is a lack of research involving users in the design of tools that visualise emotions and provide personalised, real-time stress relief. This study addresses that gap by developing and evaluating a personalised mobile app designed to visualise users' emotions and deliver tailored breathing exercises to reduce stress. The study integrates psychological theory through the Plutchik Model with personalised breathing techniques, aiming to enhance emotional awareness, engagement, and well-being, aligning with Sustainable Development Goal 3. A user-centered design approach was critical, involving users aged 18 to 30, who often experience high stress levels, throughout the design and development process. This ensured the app was tailored to their needs. Usability testing showed a significant increase in user satisfaction and stress reduction, with customisable breathing exercises proving highly effective. The app's ability to track emotional states and provide real-time stress-relief interventions offered substantial benefits for users' mental health. Further refinement of the emotion classification algorithm and the integration of emerging technologies like AI, AR, and VR could enhance the user experience and emotional management, contributing to better emotional literacy and stress reduction.

Keywords:
User-Centered Design, Human-Computer Interaction, Stress, SDG3, Usability Assessment, Breathing Exercise.

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Parallel Session 3B

Paper ID: 31

OPTIMIZATION EXPRESSION OF CD80 PROTEIN AND PLASMID STABILITY OF CD80 IN ESCHERICHIA COLI BL21 STRAIN: A CO-STIMULATING MOLECULE INVOLVED IN IMMUNE RESPONSE

Yoong Mond Teh, Tasshitra A/P R. Subramaniam, Siti Aisyah Mualif

This study aimed to optimize the expression of the CD80 protein in Escherichia coli BL21 (DE3) using the high copy pET32C+ plasmid system. CD80, a key costimulatory molecule in immune response, poses significant challenges in recombinant expression, primarily due to issues related to protein solubility and plasmid stability. This research focused on refining colony incubation conditions for colony PCR to address plasmid stability concerns, as well as optimizing induction parameters to enhance both protein yield and solubility. Initial transformations of the ligated CD80 sequence into DH5α cells were successful, but subsequent transformations into BL21 cells necessitated further optimization due to nonspecific binding observed in colony PCR and reduced plasmid stability. The findings revealed that post-transformation incubation at 30 °C significantly improved plasmid stability compared to 37 °C, thereby minimizing nonspecific binding. Furthermore, induction at 18 °C was found to produce soluble CD80 protein at lower IPTG concentrations, in contrast to the higher IPTG requirements at 28 °C to achieve similar solubility. Despite these optimizations, the expressed CD80 protein was truncated, likely due to the presence of rare codons in BL21. It is recommended that future studies utilize the BL21 CodonPlus strain to facilitate the expression of full-length CD80, providing valuable insights for improving recombinant protein production in E. coli.

Keywords:
Protein Expression, CD80 Protein.

Paper ID: 37

OPTIMIZATION OF FUCOIDAN EXTRACTION FROM BROWN ALGAE USING MICROWAVE ASSISTED-DEEP EUTECTIC SOLVENT FOR HEALTH AND NUTRITION

Nur Nadhirah Wasli, Yanti Maslina Mohd Jusoh, Nur Hidayah Zainan

Fucoidans, a polysaccharide present in various brown seaweeds like Sargassum sp., are increasingly recognized for their health benefits as antioxidants and antimicrobials. Microwave assisted deep eutectic solvent (MA-DES) approach for polysaccharides extraction has been popular compared to the traditional since this method presents a more effective and environmentally safe for achieving a substantial fucoidan yield. In this study, Response Surface Methodology (RSM) was employed to optimize the fucoidan extraction by using MA-DES based on four factors including extraction time (5-35 min), temperature (50-90 °C), water content (10-50%) and solid to liquid ratio (1-3 g/50 mL). The results showed that the highest yield of fucoidan obtained from optimization was 10.4% with the optimized extraction condition of 70°C, 30% water content, 20 min extraction time and 1:25 g/mL solid to liquid ratio with 2g raw material loading. This study demonstrates that MA-DES is an effective method for improving the yield of fucoidan, offering enhanced efficiency and time-saving benefits. This study also marks a significant advancement in bioprocessing technology, with important implications for human nutrition. By increasing the extraction efficiency of this bioactive compound, the research opens opportunities for developing functional foods and dietary supplements that are healthy and rich in fucoidan. Such innovations are vital for promoting health and nutrition in an increasingly health-conscious society.

Keywords:
Fucoidan, Microwave Assisted Extraction, Deep Eutectic Solvent, Brown algae, Response Surface Methodology

Paper ID: 38

EXTRACTION OF SWIETENIA MACROPHYLLA SEED OIL: A COMPARISON OF MICROWAVE-ASSISTED, SUPERCRITICAL CARBON DIOXIDE AND SOXHLET EXTRACTION TECHNIQUES

Noor Fadzilah Abu Bakar, Nurizzati Mohd Daud, Liza Md Salleh, Angzzas Sari Mohd Kassim, Dayang Norulfairuz Abang Zaidel

Swietenia macrophylla contain multiple bioactive compounds with anti-inflammatory, anti-diabetic, anti-tumour and antioxidant properties. Standardised extraction techniques with optimum oil yield recovery are needed as compared to conventional method that requires huge volume of solvent and longer extraction time. S. macrophylla seed was extracted by using microwave-assisted extraction (MAE) technique to improve the oil yield and phytochemical properties at different processing parameters. A comparison study on oil yield, bioactive compounds, antioxidant and antidiabetic analysis was conducted with other methods namely supercritical carbon dioxide extraction (SC-CO2), and soxhlet extraction (SE) methods at optimum extraction conditions. The result showed that 43.69 ± 0.09 w/w % oil yield was obtained at optimal condition of 6 min irradiation time, solvent-to-solid ratio of 26 mL solvent/g solid and 460 W microwave power with oleic acid as the major fatty acid component from MAE extraction. The seed oil extracted using MAE exhibited the highest total phenolic content and antioxidant properties as compared to the SC-CO2 and SE methods. S. macrophylla seed oil demonstrated potent inhibition of the α-amylase enzyme, suggesting potential antidiabetic properties. The extracts also showed excellent inhibition of Escherichia coli and Bacillus subtilis. These findings prove that S. macrophylla seed oil extracted using MAE can provide better quantity and quality oil in a shorter time compared to the SC-CO2 and SE methods.

Keywords:
Swietenia macrophylla, Microwave Assisted Extraction, Supercritical Carbon Dioxide Extraction, Total Phenolic Content, Antidiabetic Properties.

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Parallel Session 3C

Paper ID: 110

AI.R TALETORIUM: DIGITAL PRESENCE IN HUMAN-AI CO-CREATED WORLD OF FANTASY

Predrag K. Nikolic

AI.R Taletorium is a character-driven, interactive, multi-modal AI platform designed to bring children and parents together in a collaborative storytelling journey with artificial intelligence. This system fosters a co-creative user experience, blending human and AI creativity in a unique narrative process. This paper focuses on the interaction between humans and AI through avatars and a co-creative interface within the fairy tale storylines created by the platform. The interface acts as a bridge, connecting users to their sense of authorship and digital presence, thereby facilitating a collaborative experience that integrates the creative inputs of both humans and AI. We argue that this interface is the system's core, enabling children and parents to embark on a distinctive storytelling journey with AI. One of the key challenges encountered during the development of the AI.R Taletorium system is the user interface design that fosters seamless collaboration between children and AI and enhances users' perception of control, ownership, and creative contribution within a shared digital environment. By offering a seamless and engaging collaborative experience, the system aims to empower children to express their creativity and imagination in an AI-created storytelling environment, providing an exciting and enjoyable journey for both children and parents.

Keywords:
Human-AI interaction, Co-Creative User Experience, User Interface Design.

Paper ID: 52

VIRTUAL EMPORIUM: ELEVATING SHOPPING EXPERIENCE WITH VIRTUAL REALITY IN DIGITAL MALL

Damia Humaira Rosman, Ikmal Faiq Albakri Mustafa Albakri, Mohd Khalid Mokhtar, Norhaida Mohd Suaib, Muhammad Nur Affendy Nor, Muhammad Zahir Zulkernain

This paper presents a project focused on developing an immersive virtual reality (VR) shopping experience, known as a virtual emporium, to overcome the limitations of traditional and online shopping. The project leverages VR technology to achieve several objectives: identifying the mechanics needed to build a virtual world, developing an immersive virtual emporium shopping mall simulation, and evaluating the usability of the virtual shopping mall in terms of user interaction, ease of use, and satisfaction within the immersive environment. The project follows the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) methodology, which has been adapted for VR development. The process begins with strategic planning, emphasizing the user experience. The Development and Implementation phases are closely integrated to ensure the VR project is effectively built, thoroughly tested, and properly maintained. The final phase, Evaluation, involves both quantitative and qualitative analysis. Quantitative analyses utilize SUS (System Usability Scale) and SSQ (Simulator Sickness Questionnaire) metrics, while qualitative analysis involve expert testing to provide a comprehensive evaluation of the VR shopping mall's usability and overall effectiveness.

Keywords:
Virtual Reality, Shopping Mall, Virtual Emporium, Extended Reality

Paper ID: 89

REVIEW ON SOFTWARE TOOLS USED IN MAKING VIRTUAL CLASSROOM APPLICATIONS

Muhammad Ismail bin Mat Isham, Siti Munira binti Jamil, Noor Asma binti Husain, Nazri bin Ali, Mohd Nur Asmawisham bin Alel

Virtual Reality (VR) technology has rapidly expanded across numerous fields, with education being one of the most prominent areas of growth. This review paper explores the current landscape of VR software tools specifically designed for smart classroom applications. A comprehensive review of academic journals and conference publications was conducted to identify and filter a diverse array of VR-related papers based on the game engines employed in the VR application development process. The inclusion of VR into educational environments, widely referred to as smart classrooms, has the potential to transform traditional teaching methods by offering students immersive, interactive, and engaging learning opportunities. VR improves students' comprehension of complicated concepts, making instruction more dynamic and effective. This paper provides a comprehensive evaluation of the various VR software tools that are tailored to modern educational settings. It emphasizes how these tools can elevate teaching and learning by fostering an immersive atmosphere that encourages hands-on participation and deeper engagement in classroom activities.

Keywords:
Virtual Reality, Virtual Classroom, Software Tools.

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Parallel Session 3D

Paper ID: 19

CRACK BACKGROUND REMOVAL FOR IMPROVING CONCRETE CRACK CLASSIFICATION USING MASK INVERTED OTSU THRESHOLDING IN STRUCTURAL HEALTH MONITORING

Devi Willieam Anggara, Abdul Rashid Husain, Mohd Shafry Mohd Rahim, Izni Syahrizal Ibrahim, Asniyani Nur Haidar Abdullah

Crack monitoring in concrete structures is very important for the maintenance of healthy civil infrastructure. Traditional computer vision-based methods have challenges with various textures and patterns in the background that can interfere with the accurate classification and segmentation of cracks. To overcome this problem, This research modified the region-based method from the OTSU algorithm to segment the crack shapes accurately. The OTSU can calculate the maximum and minimum value of the pixel threshold and differentiate foreground and background objects using the intensity pixel in the image. The masking process with inverted OTSU thresholding in the feature extraction process is used to remove the crack background. First, the mean filter and illumination correction are used to clean up small pixels that look like cracks. Second, OTSU thresholding is used to divide the background and foreground of the image. Then, inverse the thresholding to change the background into the foreground. After that, for the background of the crack, the dilation of the pixel for 1 mm was used to add a region of segmentation for the crack. Afterward, mask the background with the scene to remove the cracked background. Third, train the feature cracks that have been merged using SVM with OTSU for the segmentation of the cracks. Lastly, the width and length of the crack are calculated using Euclidean distance. By combining these methods, the accuracy of the classifier increases from 79% to 87%.

Keywords:
Support Vector Machine, Crack Detection, Artificial Intelligence, Image Processing, Machine Learning.

Paper ID: 53

DETECTION OF SUDAN RED IN FOOD SAFETY FOR HUMAN USING SURFACE-ENHANCED RAMAN SCATTERING (SERS) TECHNOLOGY

Fang-Yi Chu, Cheng-Chung Chang

Raman spectroscopy detects molecular signatures through elastic light scattering, and in recent years, it has gained popularity in sectors such as food, agriculture, forestry, fisheries, and animal husbandry. In this study, the authors developed a 3-dimensional plasmonic hotspot-rich (3D-PHS) nanostructure using randomly arranged silver nanowires in a woodpile formation. This nanochip features a random crossed-wire structure that generates unique 3D localized surface plasmon resonance (LSPR) and hotspots, enabling surface-enhanced Raman scattering (SERS). Compared to a 2D nanostructure, the 3D design increases the chip's sensitivity by 1000 times, which not only reduces the sample amount required but also improves the detection limit. Consequently, the SERS spectra of Sudan Red dyes (I, II, III, IV) were effectively recorded and analyzed, achieving detection limits between 1 μM and 0.05 μM in a 20 μL sample. This 3D nanoplatform shows significant promise as an affordable, robust, and portable sensing device for potential future uses.

Keywords:
Food Safety, Food Additives, Localized Surface Plasmon Resonance (LSPR), Surface-enhanced Raman scattering (SERS), Sudan Red.

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Parallel Session 4A

Paper ID: 42

EVALUATING WHITE MATTER INTEGRITY IN THE AUDITORY CORTEX IN NOISE-INDUCED HEARING LOSS: A DTI STUDY

Mohd Khairul Izamil Zolkefley, Rajeev Shamsuddin Perisamy, Ailin Razali, Daud Adam, Muhamad Ariff Muhamad Noordin

The auditory cortex is essential for processing auditory stimuli, encompassing specialized regions like A1, A4, A5, LBelt, MBelt, and PBelt, each playing distinct roles in auditory information processing. Noise-Induced Hearing Loss (NIHL) poses a significant public health concern which it can severely affect communication abilities, social interaction, and overall quality of life, leading to social isolation, depression, and reduced cognitive functioning. NIHL characterized by cochlear hair cell damage and subsequent auditory pathway impairment. This cross-sectional study investigates the relationship between Fractional Anisotropy (FA) values, indicative of white matter integrity measured via diffusion tensor imaging (DTI), and neural responses to various sound frequencies across specific auditory cortex regions. Thirty-one male subjects, comprising sixteen NIHL patients and fifteen with normal hearing, underwent MRI scans to assess FA values in auditory cortex. Significant correlations were found, particularly in left A4, left MBelt and right PBelt with specific frequencies of sounds ($p < 0.05$), indicating associations between FA values and frequency-specific auditory processing. Findings underscore the impact of NIHL on auditory cortex white matter integrity and highlight region-specific vulnerabilities and adaptations to auditory stimuli. These insights could inform targeted interventions to preserve or restore auditory function in individuals affected by NIHL.

Keywords:
Noise-induced Hearing Loss, Diffusion Tensor, White Matter, Auditory Cortex.

Paper ID: 68

2-STAGE ARRHYTHMIA CLASSIFICATION ALGORITHM BASED ON ARTIFICIAL NEURAL NETWORK AND ENHANCED DECISION TREE

Nae Cherng Kan, Yuan Wen Hau, Rania Al-Ashwal

Cardiovascular disease (CVD) is one of the leading causes of death worldwide, emphasizing the critical need for frequent heart monitoring to detect abnormalities in heart rhythm. While current electrocardiogram (ECG) devices mostly acquire and display ECG signals for clinician's manual interpretation, they lack the capability for self-classification of multiple complex arrhythmias. To address these issues, previous in-house work has developed a 2-stage arrhythmia classification technique, which the first stage consists of two distinct beat arrhythmia classifiers and rhythm arrhythmia classifiers, respectively, whereas the second stage acts as the final decision maker of arrhythmia detection based on the detection result from the first-stage classifiers. However, these algorithms show some inaccuracies in detecting certain arrhythmias especially when two algorithms are integrated together. This study aims to enhance the accuracy of the second stage of the existing two-stage arrhythmia classification algorithm by applying a decision tree approach. In this study, Olimex EKG/EMG Shield and Arduino Uno board are also utilized to design a ECG signals acquisition unit, to acquire signals from the Fluke ProSim 3 vital sign simulator for offline ECG signals recordings for system processing and functionality verification. Results reveal that the overall accuracy of the arrhythmia detection is 90.83% based on the proposed enhanced algorithm.

Keywords:
Artificial Neural Network (ANN), Arrhythmia Classification, Decision Tree, Electrocardiogram (ECG).

Paper ID: 17

OPTIMIZING TEMPORAL AND SPECTRAL INTERVAL SELECTION FOR IMAGINED SPEECH DECODING FROM EEG

Fujie Qiu, Tian Swee Tan, Matthias Foh Thye Tiong, Jahanzeb Sheikh

Decoding speech imagination to directly control machines is a novel human-computer interaction approach and holds potential as a neural speech prosthetic. The aim of this work is to test whether any temporal or spectral specificity exists in speech imagination. This work further seeks to identify the optimal time window and frequency band for decoding imagined speech using a scalp electroencephalogram (EEG). Two open-access datasets were included and segmented into six frequency bands (delta, theta, alpha, beta, gamma, and full band) with three-time windows (-500–0 ms, 0–2,000 ms, and -500–2,000 ms). Dataset 1 was a five-word/phrase imagery classification experiment, while dataset 2 was a four-syllable imagery classification experiment. Machine learning was used to realize the classification and evaluation of different temporal and spectral intervals. Feature extraction and selection were implemented by independent component analysis (ICA) and mutual information (MI). The classification was realized using a support vector machine (SVM) with a radial basis function kernel. Results confirmed that the gamma band provides the highest accuracy and that the -500–0 ms pre-onset standby period contains speech-related information and is distinguishable. With a -500–2,000 ms time window and a gamma band-pass filter, the average one-versus-rest balanced accuracy achieved was 56.9% ± 9.9% and 64.7% ± 13.2% on the training and test sets, respectively, in dataset 1, while 93.5% ± 5.7% and 82.8% ± 17.3% in dataset 2.

Keywords:
Imagined Speech, Machine Learning, Time-frequency Interval

Signal & Image Processing

Paper ID: 35

IMPACT OF AUGMENTATION ON EEG SIGNAL INTERPRETABILITY

Lim G Wei, Pang Yee Yong, Nor Azman Ismail, Masitah Ghazali, Sim Hiew Moi, Teo Pei Kian, Fong Cheng Weng

Drowsiness Detection has become one of the key factors of traffic accidents recently which can result in death, money loss or serious physical loss. Much research has been done to overcome this problem. Among the solution, by using physiological measures, especially EEG signal provides the most satisfied result in accuracy. In this study, we investigated various EEG signal augmentation techniques to enhance the training process of CNN drowsiness detection. We explore tons of data augmentation and evaluate through their performance through accuracy. Our investigation will handle data augmentation strategies that can significantly improve CNN performance, reducing overfitting and enhancing model adaptability to unseen data. In the end of the result, scaling data scores the best performance among the data augmentation technique. This research will help upcoming research to do baseline assessment and understanding about EEG works in drowsiness detection. By giving a comprehensive evaluation of augmentation methods, this study contributes to the development of more reliable and accurate drowsiness detection systems using EEG data when working with data augmentation.

Keywords:
EEG, Data Augmentation Technique, Shifting, Noise Addition, Convolutional Neural Network.

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Parallel Session 4B

Paper ID: 45

OPTIMIZATION OF SARS-COV-2 M PROTEIN EXPRESSION IN E. COLI BL21 (DE3) USING PET28A+

Tasshitra Subramaniam, Siti Aisyah Mualif, The Yoong Mond

The SARS-CoV-2 membrane (M) protein is an attractive target for therapeutic research since it has a low mutational rate and is involved in viral morphogenesis and assembly. This work aimed to optimize the expression of the M protein in Escherichia coli strain BL21 (DE3) by utilizing the low-copy pET28a+ vector. The study discovered that amplification of the M protein gene by PCR produced non-specific bands when a high amount of template DNA was used. Hence, the amount of template was carefully controlled to perform amplification of the M protein gene in pET28a+-M extracted from the transformants. In order to find the ideal circumstances for optimizing the yield of soluble protein, induction with different Isopropyl Thiogalactoside (IPTG) concentrations and temperatures was carried out. The M protein remained mostly insoluble at 18°C and 37°C, so bacterial protein extraction reagent (B-PER) was used to solubilize the protein expressed. Since low-copy plasmid decreased the overall protein production, usage of richer media is suggested to obtain large yields of soluble M protein. The findings highlight the necessity for extensive refinement to enhance protein solubility and enable large-scale production.

Keywords:
SARS-CoV-2 M Protein, Escherichia coli Strain BL21 (DE3), pET28a+, Protein Expression.

Paper ID: 55

A SELECTIVE FLUORESCENT PROBE FOR THE SPECIFIC DETECTION OF POLYVINYL CHLORIDE (PVC) MICROPLASTICS IN MONITORING ENVIRONMENTAL POLLUTION FOR HUMAN HEALTH

Chieh-Yi Chen, Cheng-Chung Chang

A selective fluorescent probe, MA12C, was developed specifically for the detection of polyvinyl chloride (PVC) microplastics. MA12C is an acridone derivative that presents fluorescence turn-on when binding to PVC microplastics through a twisted intramolecular charge transfer (TICT) mechanism. In this study, reaction condition between PVC and compound was evaluated in aqueous and in organic solvents with temperature dependent. Eventually, we concluded that higher incubated temperature (55°C), with respect to room temperature, can promote interaction and increase the fluorescence-staining effect. Alternatively, these staining results seem to be solvent independent. Furthermore, the selectivity of MA12C to PVC was confirmed from microplastics polyethylene terephthalate (PET) and polystyrene (PS), which showed significantly weaker fluorescence. Hence, we constructed a fast-screening platform based on the fluorescence turn-on of MA12C when combined with a hand-held UV light and irradiated with 365 nm light source. Eventually, this platform was successfully applied to detect the PVC in soil with the naked eye. These findings indicate that MA12C is not only an effective tool for detecting PVC microplastics but also offers practical applications in environmental monitoring for human health, enabling rapid, low- cost, and selective detection of PVC in various contaminated matrices, contributing to the mitigation of plastic pollution.

Keywords:
PVC, Microplastics, Fluorescence Turn-On, Twisted Intramolecular Charge Transfer (TICT), Fast Screening.

Paper ID: 96

STUDIES ON THE GROWTH OF HUMAN CELLS ON HYDROXYAPATITE INCORPORATED SILICA AEROGEL

Nor Suriani Sani, Nik Ahmad Nizam Nik Malek, Ahmad Taufiq

Hydroxyapatite (HA) is extensively utilized in bone tissue engineering due to its osteoconductive properties and high biocompatibility; however, its inherent brittleness and low degradation rate significantly limit its effectiveness in promoting cell proliferation and integration within host tissues. To address these drawbacks, this study investigated hydroxyapatite-incorporated silica aerogels (HA-SA-Np) with a HA/SiO2 ratio 0.5, synthesized from rice husk ash via an aqueous sol-gel process. The aim was to evaluate the efficacy of HA-SA-Np in the proliferation and adhesion of normal human fibroblast (HSF 1184) and osteoblast (NHOst) cells in vitro. This was done by comparing with free HA and silica aerogel nanoparticles (SA-Np) based on MTT assays, scanning electron microscopy (SEM), and energy-dispersive X-ray (EDX) analysis after incubation periods of 3, 5, 7, and 21 days. The results demonstrated that HA-SA-Np significantly enhanced cell proliferation and adhesion, and HA-SA-Np significantly outperformed both HA and SA-Np in supporting cell growth. This was attributed to the controlled release of silicic acid and the consumption of phosphate ions, which are critical for cellular growth. These findings suggested that HA-SA-Np has strong potential as an advanced biomaterial for tissue engineering, offering enhanced support for cell attachment, proliferation, and tissue formation compared to conventional HA and silica-based material.

Keywords:
Silica Aerogel, Sol-Gel, Cell Proliferation.

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Parallel Session 4C

Paper ID: 107

MOTION GENERATION USING COMBINATION OF MOTION GRAPHS AND KEY POSE SELECTION WITH STATISTICAL MODELS

Shuntaro Kono, Kunio Yamamoto, Masaki Oshita

In computer animation, generating motion is difficult. There is a need for a technology to generate actions by reusing motion data in animation and game production. In this study, we develop a system that allows users to generate motions interactively by specifying the types of motions and detailed features based on existing motion data. Because there is no need for new motion capture, this system is useful for quickly creating animation prototypes. The idea of the system is to map key postures in motion to a latent space such that the user can control the posture used for motion generation. Furthermore, detailed posture features can be specified interactively if necessary. The set of original motions and key postures in the motion are input in advance. At runtime, the user specifies the types and characteristics of the motions. A motion graph is used to generate and output the motions. We created a prototype of the system and confirmed that it can generate motions by specifying key postures.

Keywords:
Computer Animation, Motion Synthesis, Interaction.

Paper ID: 108

VISUALIZATION OF SIMULTANEOUS CHANGES IN MULTIPLE MOTION FEATURES WITH SPATIAL VOLUME AND FLAT ARROWS FOR SPORTS MOTION ANALYSIS

Tomoya Shiokawa, Kunio Yamamoto, Masaki Oshita

It is important for beginners practicing sports motions such as tennis shots or baseball batting to check their own body movements and the correct movements of skilled players, and to understand the differences between them. However, checking each change in the features of a body part in motion, such as the position, orientation, movement speed, and rotational speed, is labor intensive. In this study, we propose a method for visualizing simultaneous changes in mul-tiple features of one body part in one input motion with the spatial volume and flat arrows. In our method, the changes in the three-dimensional (3D) position and one-dimensional (1D) movement speed of a body part are simultaneously visualized as a spatial volume along the trajectory of the body part, the radius of which varies with the movement speed. In addition, changes in the 3D orientation of the body part and 1D rotational speed are visualized using flat arrows, the size of which changes according to the rotational speed. By generating these volumes and arrows for each motion of beginners and experts, users can easily check for changes in the features of body parts during these motions. In addition, users can identify problems in their own motion by comparing these. Finally, we present experimental examples of tennis shot and baseball batting motions.

Keywords:
Human Motion, Motion Feature, Visualization.

Paper ID: 57

SMARTPHONE-CONNECTED PORTABLE SYSTEM FOR AUTOMATED EXERCISE REPETITION TRACKING

Afrizal Nehemia Toscany, Mohd Yazid Idris, M. Irwan Bustami, Yovi Pratama

The increasing prevalence of smartphone technology has opened new avenues for health and fitness monitoring, particularly through portable systems designed for exercise tracking and repetition counting. This paper designs, develops, and evaluates a camera-based portable exercise monitoring system realized on an ESP32-CAM module integrated with a smartphone. Advanced pose estimation algorithms in the system automatically detect and count the repetition in push-ups, sit-ups, and squat jumps. It captures real-time data to raise user engagement and accuracy with immediate feedback in an exercise routine without intrusive wearable devices. The portable nature of this solution makes it accessible for a wide range of users, particularly in personal fitness and rehabilitation contexts. Such a portable solution provides practical and accessible tools to apply in the areas of personal fitness monitoring and rehabilitation, so that adherence to exercise regimens is improved in order to improve health outcomes. Therefore, future work will be invested toward optimization of algorithms within the system and extending its abilities to a set of exercises or different user environments.

Keywords:
Pose Tracking, Portable System, Exercise Tracking, Smart Health.

Paper ID: 50

EFFECTIVENESS OF ADVANCED TRACKING MODELS FOR SHUTTLECOCK AND COURT LINE DETECTION IN SMALL-SCALE BADMINTON MATCHES

Low Chew Sim, Pang Yee Yong, Sim Hiew Moi, Choo Yen Lee, Fong Cheng Weng, Teo Pei Kian

Badminton is a popular and fastest racquet sport that is played in the world. The current methods that are available for analyzing badminton matches can be costly and are not suitable for the small-scale badminton matches. Hence, there are a lot of techniques or methods that are used to track and detect the badminton shuttlecock in badminton matches. As a result, the machine learning methods have the potential to automate and enhance the analysis the badminton shuttlecock tracking and line detection. The low-cost implementation of data collection, which involves recording badminton videos using a phone camera, provides an affordable option for analyzing small-scale badminton matches. This research proposed an affordable badminton shuttlecock tracking and line detection approach specifically designed for small-scale badminton matches. In this research, the performance of the TrackNet Model I and TrackNet Model II are compared in badminton shuttlecock tracking and line detection. The accuracy, precision and recall are metrics used to evaluate and compare performance in this study. This research uses a structured technique that includes the collecting of dataset, model architecture, identification of badminton court lines, and model implementation. According to the performance metric, TrackNet Model II achieves 100% recall accuracy, precision accuracy of 95.45%, and accuracy of 95.45%. With the custom dataset, the TrackNet Model II performs better when tracking the badminton shuttlecock.

Keywords:
Badminton, TrackNet, Line Detection, Shuttlecock Tracking, Convolutional Neural Network.

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Parallel Session 4D

Paper ID: 113

FLUORESCENT CONTRASTED NEURON/TUMOR TISSUES DURING BRAIN TUMOR SURGERY BASED ON CELL LINES' STUDIES

Syed Muhammad Peroz Ali, Kuo-Chih Liao

Fluorescence-guided surgery has emerged as a transformative technique in neurosurgical oncology, particularly for distinguishing malignant tissues from healthy neural structures during brain tumor resections. This approach aids in enhancing surgical precision and improving patient outcomes. In this study, the effectiveness of a novel near-infrared carbocyanine dye, SIDAG, was evaluated. SIDAG was designed to improve the contrast between tumor tissues and surrounding healthy neural tissue, allowing for better visualization during surgery. The research included experiments with two cell lines: the GBM–8401 cell line, representing glioblastoma multiforme (GBM) cells, and the SK-N-MC cell line, representing neuroblastoma cells that resemble neuron-like structures. Initial findings demonstrated that SIDAG exhibits good biocompatibility and preferential binding to neuron-like cells, suggesting its potential for real-time, high-resolution imaging in surgical settings. These results highlight SIDAG's ability to help neurosurgeons more accurately differentiate between malignant and healthy tissues, enabling more precise tumor resections while minimizing the risk of damaging critical neural structures. The incorporation of SIDAG into fluorescence-guided surgery holds the promise of significantly reducing post-operative neurological deficits, improving surgical outcomes, and accelerating patient recovery. This advancement could ultimately reshape the landscape of neurosurgical treatment for brain tumors, providing better long-term results for patients.

Keywords:
Fluorescence-guided Surgery, Brain Tumor Resection, Near-infrared Carbocyanine Dye, Tumor Differentiation, Neural Preservation.

Paper ID: 114

POTENTIAL OF CONTRAST MEDIUM INDUCED NEPHROPATHY PREVENTION BY LIPOSOME ENCAPSULATION: IN VIVO MICE STUDY

Fang-Yu Liu, Kuo-Chih Liao

The objective of this research is to examine how liposome encapsulation affects the accumulation kinetics of a clinical iodinated computed tomography (CT) contrast medium (CM) in the kidneys. Preliminary findings suggest that encapsulating the CM in liposomes significantly reduces the mean accumulation concentration in the kidneys, particularly in the time window between 30 and 300 minutes, where reductions of 50-76% were observed. Furthermore, the study found that liposome encapsulation led to a 64-86% reduction in the distribution of harmful CM dosages (>9 mg/ml) within the kidneys, especially during the 10-90 minute period. This change in distribution resulted in the contrast medium being more concentrated in the renal pelvis, rather than the renal medulla, an area typically unaffected by nephropathy. These results suggest that liposome encapsulation may offer a strategy for reducing the adverse impact of CT contrast agents on kidney tissues, potentially improving the safety profile of iodinated CM in clinical imaging procedures. The findings provide valuable insights into how altering the pharmacokinetics of contrast media through liposomal formulations may enhance the clinical application of CT imaging while minimizing kidney-related side effects.

Keywords:
Liposome, Computed Tomography, Iodinated Contrast Medium, ephropathy.

Paper ID: 39

STABILITY ANALYSIS OF MORINDA CITRIFOLIA EXTRACT ENCAPSULATED NIOSOME BY USING PROPYLENE GLYCOL

Siti Noor Suhaila Zulkifeli, Zarin Mesbah, Roslina Jamaludin, Liza Md Salleh, Mariani Abdul Hamid, Nurizzati Mohd Daud

Morinda citrifolia L. is widely used in pharmaceuticals for its antidiabetic, antioxidant, and anti-inflammatory properties. Niosomes, non-ionic surfactant vesicles were combined with Propylene Glycol (PG) as a stabilizing agent to enhance the bioavailability of poorly water-soluble drugs. M. citrifolia extract loaded into niosomes to facilitate drug delivery. The extract was obtained using Subcritical Water Extraction (SWE) at 140°C. Niosomes were prepared with Thin Film hydration method and PG concentrations ranging from 1-10%, followed by homogenization and ultrasonication for size reduction. The niosomes were analyzed for stability by evaluating encapsulation efficiency (EE) using centrifugation, pH, particle size, and zeta potential over 15 days. The highest PG concentration of 10 ml showed the best EE (99.13% at 4°C and 99.15% at 25°C for scopoletin, and 98.84% at 4°C and 98.9% at 25°C for rutin), alkaline pH, and optimal particle size (363.6 nm). Drug release tests using the dialysis membrane method over 8 days revealed that the formulation with the highest PG demonstrated controlled release with Korsmeyer-Peppas Model, whereas formulations without PG had fast release. In conclusion, M. citrifolia extract encapsulated in niosomes with PG shows high stability and controlled release, making it a potential candidate for oral antidiabetic administration.

Keywords:
Morinda Citrifolia L., Propylene Glycol, Stability, Drug Release Test.

Paper ID: 56

PARAQUAT AND GLYPHOSATE RESIDUES IN TEA SAMPLES DETECTION USING SPECTROMETER

Thien-Luan Phan, Nguyen Van Hieu, Peng-Ta Liu, Minh-Khue Ha, Ha Anh T. Nguyen, Ngoc Luan Tran, Hai Dang Nguyen Tran, Hsing-Ju Wu, Pei-Yi Chu, Trung Nghia Tran, Congo Tak Shing Ching

For decades, pesticides have been a fundamental tool in agriculture, used to control pests and safeguard crops from various harmful agents. Although this practice plays a crucial role in preserving large quantities of produce, it also has significant downsides. One of it huge impact on human should be mentioned is food poisoning. When food poisoning occurs, the contaminated samples are usually sent to specialized agencies for testing and analysis. Identifying the exact substance responsible for the poisoning can be a lengthy process, often taking several days or even weeks. Contributing to the matter, this study investigate the possibility of utilizing spectrometer on the fast detection of pesticide residue in tea sample. Initial results indicates that the absorbance value of samples can be used to detect the existence of and distinguished two different kind of pesticide with concentration as low as 100ppm in tea sample at 430 nm ($p = 0.014$, $p < 0.05$).

Keywords:
Spectrometer, Pesticide Residues, Food Poisoning, Tea.

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Parallel Session 5A

Paper ID: 99

A STUDY OF INTERACTIVE VISUALIZATION LITERATURE BROWSER REUSABILITY USING COMPONENT-BASED SOFTWARE ENGINEERING APPROACH

Najwa Ayuni binti Jamaludin, Farhan bin Mohamed, Vei Siang Chan, Arvind Jelani, Mohd Shahrizal bin Sunar

Designing software tools from the ground up can be complex and resource-intensive. Reusing existing components or designs offers a solution by saving time and allowing them to be applied across various domains. This adaptability is particularly crucial in data analytics and visualization, where effective management of complex datasets is essential. Besides, classification and taxonomy systems are important concepts in data visualization as they facilitate a deeper understanding of topics such as research synthesis and literature reviews. Existing tools such as the Locomotion Vault demonstrate the way an interactive literature browser can improve the accessibility and comprehensibility of complex information. This work investigates the reusability of Locomotion Vault beyond its original scope and evaluates its effectiveness in a new domain by highlighting the reusability approach and evaluation of the system's usability. The related works, methodology, and preliminary results are discussed, and the paper concludes with suggestions for future works and development.

Keywords:
Data Visualization, Data Analytics, Interactive Literature Browser, Graphical User Interface, Pilot Study, Usability Study

Paper ID: 36

DEEP LEARNING APPROACHES FOR FACIAL LANDMARK LOCALIZATION IN NIQAB-OCCLUDED FACE RECOGNITION: A SURVEY

Muteb S. Alamarshadi, Mohd Shahrizal Sunar, Satria Mandala, Abdulaziz Alashbi, Zieb Alqathani

Facial recognition and landmark localization in niqab-wearing individuals pose challenges for computer vision systems due to occlusions. Traditional facial recognition systems rely heavily on visible facial features for accurate identification. When these features are partially or fully obscured, as with niqabs, models struggle to extract key landmarks, resulting in reduced accuracy. This is largely because most deep learning models are trained on non-occluded faces, making it difficult for them to generalize to occluded scenarios. Recent approaches, such as aware face alignment algorithms, ensemble regression trees, and CNN-based features, have improved accuracy under these conditions. The review also highlights the effectiveness of multi-task learning, attention mechanisms, and generative adversarial networks (GANs) in enhancing detection accuracy. Additionally, it explores applications in security, healthcare, and human-computer interaction, as well as recent advances in kinship verification, feature fusion methods, and the impact of ageing on facial verification. The ongoing need for continuous improvement in handling occlusions, particularly with niqab-wearing individuals, is emphasized to develop more reliable facial recognition systems.

Keywords:
Facial Recognition, Landmark Localization, Deep Learning, Occluded Face Detection.

Paper ID: 71

MITIGATING NATIONAL INSECURITY AND ECONOMIC ISSUES USING FACE DETECTION APPROACH

Mohammed Ali Bizi, Mohd Shahrizal Sunar, Farhan Mohamed, Shamsul Mohamad, Abdulsamad Yusuf Yakubu

Security is a global concern that requires the attention of governments, stakeholders, corporations, and individuals to establish effective protection mechanisms. Installing surveillance systems for detection and monitoring is crucial. However, facial recognition becomes increasingly difficult due to lighting variation, poses of the face, and occlusion caused by face mask. This paper introduces face detection to enhance national security and promote economic development in Nigeria. The system is designed using background subtraction for denoising and YOLO for detection, and the new face detection and recognition algorithm is implemented in Python. The proposed system underwent evaluation, and the experimental results, based on performance metrics, demonstrate that the algorithms significantly improve processing time with an accuracy of 79.3%. Additionally, the proposed work offers an accurate and effective method for monitoring and detecting moving objects, making it suitable for applications where security is a primary concern.

Keywords:
Face Detection, Background Subtraction, YOLO.

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Parallel Session 5B

Paper ID: 43

MULTI-USER INTERACTION IN COLLABORATIVE AUGMENTED REALITY INTERFACE FOR BLOOD FLOW SIMULATION IN CORONARY ARTERY

Fatin Syazliana Nazri, Goh Eg Su, Hau Yuan Wen, Farhan Mohamed

Augmented Reality (AR) is the most recent and widely used technology in a variety of industries, including tourism, the arts, business, industrial manufacture and restoration, education and healthcare. Development of AR is important for students to practice and improve the skills of stent placement to prevent the risk of artery rupture during actual procedure. Therefore, the study aims to develop a multi-user interaction in collaborative AR interface blood flow simulation in coronary artery where students can learn about the blood flow simulation and practice the stent placement together with lecturer. This work aims to study the related requirements for blood flow simulation in aneurysm blood vessels, to propose an AR-based solution that could help students to practice the stent placement using collaborative AR platform and to evaluate the functionality and usability of the proposed solution. The proposed solution uses multiple markers and touch screen inputs with UI buttons as tools to do the stent placement. The methodology of this study has four stages; analysis, design, implementation and evaluation. The multi-user interaction and collaborative AR interface have been implemented during implementation phase. This study has been evaluated by 20 users from biomedical engineering background using the System Usability Scale (SUS) and the mean SUS score is 70.875, which above the average system usability that shows the system is acceptable. The significance of this study is to help biomedical students to build confidence and proficiency in stent placement, ultimately enhancing their preparedness for real-life clinical situations.

Keywords:
Augmented Reality, Blood Flow Simulation, Collaborative Interaction, Multiple Markers.

Paper ID: 32

THE IMPACT OF DEEP LEARNING IN COMPUTATIONAL BIOLOGY

Sayang Elyiana Amiera Helmey, Azurah A Samah, Yee Yong Pang, Hairudin Abdul Majid, Hui Wen Nies

Deep learning has transformed and enhanced data analysis and interpretation across various applications in bioinformatics and computational biology. By refining transitions, this review aims to provide a more comprehensive understanding of deep learning's capabilities and challenges in gene-disease classification and protein structure prediction. Also, this review outcomes reveal deep learning's ability to improve predictive accuracy, feature extraction, and data transformation in genomics and drug discovery. Recurrent Neural Networks (RNNs) excel in analyzing sequential data, while Deep Neural Networks (DNNs) and Convolutional Neural Networks (CNNs) support image and text analysis. RNNs analyze each element in a sequence while maintaining information from previous steps, making them ideal for understanding gene sequences and identifying patterns within genetic data. CNNs have been particularly implemented in identifying cellular structures in medical imaging, while DNNs are effective in interpreting genomic text data and annotations, thereby enhancing insights into biological relationships. Generative Adversarial Networks (GANs) enable data augmentation to address data scarcity. However, training instability and high computational demands remain challenges. GANs expand the chemical space available for exploration, enabling researchers to augment datasets, enhance training, and increase the robustness of predictive models in identifying potential drug candidates. This review emphasizes the potential of deep learning in biomedicine while advocating for real-world case studies and balanced comparisons to enhance its practical impact.

Keywords:
Deep Learning, Bioinformatics, Computational Biology.

Paper ID: 22

EVALUATING HUMAN-CENTRIC MACHINE LEARNING CLUSTERING TECHNIQUES FOR SELECTING EVENT SEQUENCE TEST CASES

Nik Ilhami Nik Ibrisam, Nadiah Mohd Hanim, Johanna Ahmad, Goh Eg Su

In both human-centric and software-driven projects, ensuring the stability of systems after changes is essential. Regression testing verifies that recent modifications don't negatively affect existing functionalities. This mirrors human processes, where workflow or policy changes must be tested for smooth operations. Test Case Selection (TCS) is critical in optimizing regression testing by identifying and prioritizing relevant test cases, reducing redundancy. Integrating Machine Learning (ML) algorithms can enhance TCS, selecting cases most likely to detect faults, saving time and resources, much like streamlining human decision-making. This research evaluates two ML clustering techniques for TCS: Execution-Spectra-Based Sampling (ESBS) and Weighted Attribute-Based Strategy (WAS), focusing on their human-centric implications in selecting event-sequence-based test cases. The research follows a five-phase framework: literature review, problem formulation, data collection, examination, and conclusion. Our findings show that the WAS technique significantly outperforms ESBS in identifying issues in event-sequence test cases. Specifically, WAS achieved a 100% failure detection ratio for two programs, Circular Queue (CQ) and Bank, while ESBS achieved 76.92% and 57.14%, respectively. These results indicate that WAS is more effective at prioritizing test cases with higher failure detection, improving the efficiency and accuracy of event-sequence selection. Centering the role of human testers in using these ML techniques, this research aims to boost both efficiency and decision-making in software testing teams. The goal is to empower teams to integrate advanced ML techniques while preserving the human insight needed for effective software quality assurance.

Keywords:
Test Case Selection, Software Testing, Machine Learning, Event-Sequence-based Test Cases, K-mean Clustering.

Paper ID: 28

USER EXPERIENCE (UX) ISSUES AND STRENGTHS ON KEY INTERNATIONAL AND KEY MALAYSIAN E-COMMERCE WEBSITES

Beatrice Lim Pei Ying, Layla Hasan

The development of the Internet and the increasing number of e-commerce website caused many website owners and designers to begin to focus their attention on whether their platforms can produce good user satisfaction through good User Experience (UX). The impact of COVID-19 has also changed users' habits as users find out the convenience of e-commerce during the pandemic. This research investigated user experience issues and strengths on key international and key Malaysian e-commerce websites. The four websites investigated in this research were: Amazon, Alibaba, Shopee and Lazada. This research employed the User Experience Questionnaire (UEQ), which focuses on hedonic and pragmatic attributes to collect quantitative data. Also, open-end questions were used to collect qualitative data. The data collected from each e-commerce website analyzed and the analyzed results for each e-commerce website compared with each other to identify issues and strengths of each e-commerce website. The results showed that Amazon had the highest scores for almost all the attributes except for two attributes; which related to: familiarity and simplicity. However, the results showed that Lazada had the highest score in the familiarity attribute and Shopee had the highest score in the simplicity attribute. The results of this research also highlighted issues and strengths on the tested e-commerce websites which affect the user experience of these websites

Keywords:
User experience, UX, E-commerce Websites, Hedonic, Pragmatic, Issues, Strengths.

Paper ID: 12

EXPLORING HUMAN-TECHNOLOGY INTERACTION: KEY FEATURES IMPACTING USER EXPERIENCE (UX) ON E-COMMERCE MOBILE APPLICATIONS

Layla Hasan

This research explored human-technology interaction on e-commerce mobile applications by investigating the important features which affect User Experience (UX) on e-commerce mobile applications from users' perspectives. Specifically, the importance of the availability of specific UX metrics on achieving positive user experiences on e-commerce mobile applications was examined from users' points of view. A questionnaire was designed for the purpose of this research based on specific UX criteria for e-commerce websites adapted from earlier research; this consisted of 40 metrics. Students from one of the universities in Malaysia were asked to indicate their level of agreement with 40 statements related to the 40 UX metrics regarding the importance of the availability of the specific metrics on achieving a positive experience on e-commerce mobile applications from their point of view. A total of 255 students participated in this research and the results showed that the participants considered all the criteria metrics, which related to both utilitarian and hedonic features, were important considerations on e-commerce mobile applications to accomplish positive UX. The results also showed that the most important metrics, those which had the highest Likert scores, that should be considered on e-commerce mobile applications, were all related to utilitarian metrics/features. Moreover, the results showed that the least important metrics, those which had the lowest positive Likert scores, were related to hedonic metric/features.

Keywords:
User Experience, UX, Mobile, Application, E-commerce, Malaysia, Utilitarian, Hedonic, Feature.

Paper ID: 41

IN-VISIBLE ISLAND: COLLABORATIVE CREATIVITY AT THE CORE OF INCLUSIVE CHILDREN'S TANGIBLE INTERACTION

Ruhiyati Idayu Abu Talib, Predrag K. Nikolic, Mohd Shahrizal Sunar

This paper presents the development of the In-Visible Island platform's second prototype, a tangible user interface (TUI) designed to provide an inclusive learning experience for visually impaired children. The research employed a user-centered design approach, incorporating feedback from the first prototype to enhance the platform's design, reduce weight, and update the storytelling system. The storytelling system leverages the Akka framework to enable real-time, interactive experiences with features like background sounds. Expert interviews with a technologist, designer, and artist provided valuable insights on inclusive design, interactive technologies, and the challenges and opportunities of social innovation in education. The findings highlight the importance of complex storylines, data security, affordability, and creative approaches for inclusive design. The In-Visible Island project demonstrates the potential of TUI for creating engaging and accessible learning environments for visually impaired children.

Keywords:
Human-computer Interface, Tangible User Interaction, Children Collaborative Creative Interaction, Inclusive Education, Visually Impaired Children.

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Parallel Session 5C

Paper ID: 11

DL-SCDDS: ACCURATE SKIN CANCER DETECTION AND DIAGNOSIS SCHEME BASED ON AN IMPROVED CONVOLUTIONAL NEURAL NETWORKS MODEL

Abbas Luaibi Obaid, Nabeel Mahdy Haddad, Mustafa Sabah Taha

One of the worst types of cancer is skin cancer. Unrepaired deoxyribonucleic acid (DNA) in skin cells results in genetic errors or mutations on the skin, which is the cause of skin cancer. Skin cancer is best diagnosed early because it is more treatable in its early stages and tends to spread gradually to other body areas. Early diagnosis of skin cancer signs is imperative due to the disease's rising incidence, high death rate, and cost of care. The accuracy of traditional skin cancer diagnostic techniques, especially those that depend on visual examinations, is limited and not accurate, which could endanger the patient. As a result, the use of Deep Learning (DL) has aided researchers in creating a variety of early detection methods for skin cancer. These methods employed characteristics of the lesion, such as color, size, shape, symmetry, etc., to identify skin cancer and differentiate it from melanoma. This paper proposes a new DL-based skin cancer detection and diagnosis scheme (DL-SCDDS) that uses the Human Against Machine 10,000 (HAM10000) dataset, a large and diverse dataset, to ensure an accurate yet effective diagnosis through the implementation of DL techniques, specifically Convolutional Neural Networks (CNN). Before testing, the suggested CNN model underwent training, and it achieved remarkable results, accurately diagnosing seven different types of skin lesions with 96.9% accuracy. Additionally, the results obtained were contrasted with those of other studies that suggested a slightly different methodology; in these comparisons, the suggested model proved to be superior.

Keywords:
Skin Cancer Detection, Deep Learning, CNN, Diagnoses, Normalization. Augmentation

Paper ID: 34

A REVIEW OF AN ENHANCE U-NET CNN FOR IRIS SEGMENTATION TOWARDS OFF-ANGLE AND NON-IDEAL IRIS IMAGES

Leo Ming Wu, Sim Hiew Moi, Pang Yee Yong, Rohayanti Hassan

Iris recognition continues to be the pinnacle of biometric security systems, but it is still facing challenges and issues with iris images with noisy factors or commonly known as non-ideal iris images. In recent years it has gained significant attention to the development of a robust and dependable iris recognition system. However, the accuracy of iris segmentation is often affected by off-angle and non-ideal iris images, remains a challenging task. In this paper, we are going to review the enhanced segmentation method to deal with off-angle and non-ideal iris images. The development is crucial to overcome the challenges faced in accurately identifying both off-angle and non-ideal iris images, which is of paramount importance for the security and identification applications that heavily rely on iris recognition technology. Even so, it is still facing major issues such as occlusions, gaze/off angle, specular reflection, presence of contact lenses and eyeglasses, motion blur etc. The review method incorporates enhancements and deep learning method strategies that improve the segmentation accuracy, particularly on off-angle and non-ideal iris images to enhance the overall performance of iris recognition. We also review various public datasets that were used to train and test in literature such as CASIA, and UBIRIS along with the types of non-ideal iris images.

Keywords:
Iris Segmentation, Iris Localization, Iris Recognition, Non-ideal Iris Images

Paper ID: 64

3-DIMENSIONAL ECG VISUALISATION AND ARRHYTHMIA DETECTION VIA CONVOLUTIONAL NEURAL NETWORK ALGORITHM

Ahmad Thariq, Mohd Shahrizal Sunar, Herman Tolle

Current methods for arrhythmia detection often lack accessible, educational tools for understanding heart conditions. This study addresses that gap by developing a minimalist, user-friendly arrhythmia detection system, particularly suited for educational purposes, utilizing a three-dimensional human heart model in a Unity environment. The model receives electrocardiogram (ECG) data from a CSV file containing timestamps and mV values from two leads (based on the MIT-BIH arrhythmia database) and visualizes the heart's beat-by-beat activity. The system can detect four types of arrhythmias, although the visualizations currently focus on Premature Atrial Contractions (PAC) and Premature Ventricular Contractions (PVC). A convolutional neural network (CNN) is used to detect arrhythmias with an overall accuracy of 99.7%. This tool enhances understanding of cardiac activity, offering a more engaging, educational alternative to traditional ECG readings, helping users visualize and learn about heart function more effectively.

Keywords:
Arrhythmia, Convolutional Neural Network, Unity.

Paper ID: 109

SMART TRAP: AI-ENHANCED MONKEY RECOGNITION SYSTEM FOR HUMAN-CENTERED WILDLIFE MANAGEMENT

Leong Jin Ye, Mohd Hasrul Che Pa, Wan Azlee Wan Abdullah, Mazlan Mohamed, Khairul Nizar Syazwan Wan Salihin Wong, Muhammad Iqbal Ahmad, Tse Guan Tan, Hazizi Husain, Muhammad Luqman Nordin, Aainaa Amir, Kamarul Hambali

The "Smart Trap: AI-Enhanced Monkey Recognition System" revolutionizes wildlife management by combining high-resolution imaging and advanced AI. Utilizing the YOLOv8 model, the system precisely detects and identifies long-tailed macaques, ensuring high precision and recall rates. A real-time notification feature via Telegram alerts wildlife authorities when a monkey enters the trap, enhancing operational efficiency and minimizing animal suffering. By integrating human-centered technology, this system enables proactive and humane interventions in wildlife management. The system's adaptability and real-time functionality underscore its versatility. Future improvements will expand species coverage, integrate multi-modal sensors, and enhance user interfaces. This research sets a new standard for humane, efficient wildlife management and lays a solid foundation for future AI-driven advancements in human-wildlife interaction.

Keywords:
Smart Trap, Recognition System, Artificial Intelligence, Wildlife Management, Automated Detection, Species Identification, Intelligent Monitoring.

Paper ID: 27

NUMERICAL SIMULATION OF ARTERIAL PRESSURE VARIATION DUE TO ATHEROSCLEROSIS AND ITS EFFECTS USING FLUID STRUCTURE INTERACTION

Rimsha Binte Jamal, Urooba Zubairi, Manal Naushad , Ayesha Raheem, Habiba Akhtar, Rashid Khan, Umair Bin Asim, Syafiqah Saidin, Madeeha Sadia

In many regions, the percentage of cardiovascular diseases (CVDs) cases is beyond the alarming level. Most of the CVDs are due to arterial accumulations (atherosclerosis) which is a progressive stiffening of the artery. Although a huge experimental, analytical, and numerical work is dedicated to understand the accumulation phenomenon and its effects on the arterial wall, there is plenty of room available to estimate the deformation behavior of flexible arteries in the presence of accumulation. Present study is dedicated to the numerical modeling of arterial pressure variation due to accumulation and its effects on the structure integrity of arteries. The objective of this study is to predict the response of partially blocked artery due to pulsating blood flow. The Fluid Structure Interaction (FSI) is incorporated in the developed model as it plays a major role in governing the deformation of arteries. Due to highly elastic nature of arteries, two- and three-dimensional hyper-elastic material model is developed via ANSYS Workbench software to define deformation behavior of arteries while blood is assumed as non-Newtonian fluid. Pulsating blood flow condition is applied through piece wise periodic function. Finite element simulations are performed for different geometrical and loading parameters such as thickness of arterial wall, geometry of accumulation to simulate different levels of atherosclerosis and blood pressure. Obtained results from numerical simulations, distribution of wall shear stresses, pressure variation, and equivalent stresses in the artery are investigated. Present study could be utilized to understand atherosclerosis and its effects on the deformation behavior of arteries.

Keywords:
Cardiovascular Diseases, Atherosclerosis, Arteries, Fluid Structure Interaction, Finite Element, Blood Pressure.

Paper ID: 49

EXPERT SURVEY ANALYSIS ON THE RISK MITIGATION FOR AGILE GLOBAL DEVELOPMENT FRAMEWORK: A VALIDATION STUDY

Hidayatul Nadhirah Mohamed, Zuriyaninatasa Podari, Adila Firdaus Arbain, Noraini Ibrahim

"Global Software Development" involves creating software with teams located around the world. Agile development was introduced to help software companies innovate beyond traditional methods. Agile practices focus on short development cycles and iterative improvements. This research explores how companies are increasingly using agile methods to produce high-quality software more quickly than before. The purpose of this paper is to gather expert opinions of a specific evaluation model value and relate it with artificial intelligence (AI) for better risk management. A questionnaire with Likert-scale questions was developed to assess this model. The research methodology included expert analysis and validated the survey using Cronbach's Alpha, which measured reliability. A total of 41 IT professionals were interviewed. The reliability score obtained was 0.85, based on four items. AI also can be used to improve decision-making by analyzing past data and current project conditions, helping teams prioritize tasks and allocate resources effectively. Future research may explore integrating AI into the Agile framework to improve risk management in software development globally.

Keywords:
Global Software Development, Risk Management, Distributed Teams, AI in Software Development, AI-Enhanced Agile.

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