

PROGRAM BOOK

# 2024 **ISOMER**

## INTERNATIONAL SYMPOSIUM OF MEDICAL ENGINEERING RESEARCH 2024 (ISOMER 2024)

*"Innovations in Medical Research:  
Shaping the Future of Healthcare"*

DECEMBER 19, 2024 | 8AM-5PM

UNIVERSITI MALAYSIA PERLIS,  
PAUH PUTRA CAMPUS

**Main Organizer**



UNIVERSITI  
MALAYSIA  
PERLIS



**Co-Organizers**



**More information**



<https://isomer.unimap.edu.my>



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# ABOUT US

ISOMER 2024 provides a forum for presentation and discussion of the cutting-edge research in Biomedical Engineering and Healthcare Technologies. It plays a vital role in providing a platform for scientists, researchers, engineers and postgraduates to share their ideas, knowledge and experience. Papers relating to the general title of Biomedical Engineering: Driving the Future of Healthcare Industry are solicited especially including those in the areas of Bioinstrumentation, Biomedical Devices, Biomedical Signal & Image Processing, Artificial Intelligence, Bioinformatics & IoT in Healthcare, Biomaterials and Biomechanics & Rehabilitation

ISOMER 2024 marks significant milestone in Biomedical Engineering Research and our commitment to advancing Biomedical Research through discussions and sharing platforms offered by the symposium themed "Innovations in Medical Research: Shaping the Future of Healthcare".

The symposium warmly welcomes participation from researchers, scientists, academicians, students and engineers from all over the world. Your active participation and engagement are vital to the success of this event. We encourage you to seize the opportunities to learn, network, and contribute, as we celebrate the synergy among Biomedical Engineering Researchers from UniMAP, Institut Teknologi Sumatera, Al-Mustaqbal University, Sports Engineering Research Center (SERC, UniMAP) and PERANTIM.

A million thanks to the main sponsor, Koperasi Komuniti Kepulauan Tuba & Selat Berhad and Gramp's Asia for their generous support, which has made this symposium possible.

Thank you for joining us on this remarkable journey.

# SECTION 1

## WELCOMING SPEECHES





# WELCOMING SPEECH BY SYMPOSIUM PATRON



Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera

First and foremost, I would like to welcome all distinguished guests, participants, delegates, and sponsors to the International Symposium of Medical Engineering Research 2024 (ISoMER 2024). It is an honor for Universiti Malaysia Perlis (UniMAP) to host this symposium, a platform for exploring innovative ideas and fostering collaboration in integrating technology with society.

UniMAP is dedicated to advancing research and education, addressing real-world challenges through technological innovation. This symposium provides an opportunity for stakeholders, academicians, industry professionals, and policymakers to exchange knowledge and insights.

At UniMAP, we are committed to nurturing future engineers, technologists, and entrepreneurs, equipping them with the skills to thrive in a technology-driven world. Our students actively engage in industry-linked projects and research, developing innovative solutions with positive societal impact. Together, we aim to shape technology that is inclusive, accessible, and impactful.

We are looking forward to the enriching discussions and outcomes of ISoMER 2024, paving the way for meaningful knowledge transfer and transformative advancements. We collectively shape technology to be more inclusive, accessible, and beneficial to society.

Thank you.

**PROF. DATO' TS. DR. ZALIMAN SAULI**

**Vice Chancellor**

**Universiti Malaysia Perlis**

# WELCOMING REMARKS BY SYMPOSIUM ADVISOR



Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera

‘Selamat Datang’ and a very warm welcome to all speakers and participants to the International Symposium of Medical Engineering Research 2024 (ISoMER 2024) organised by the Faculty of Electronic Engineering Technology UniMAP, Institut Teknologi Sumatera, Al-Mustaqbal University, Sports Engineering Research Center (SERC, UniMAP) and PERANTIM

This symposium with its theme, "Innovations in Medical Research: Shaping the Future of Healthcare", is the premier forum for the presentation of research and experience reports on the leading issues, applications, and theories pertaining to Biomedical Engineering. Organizing an international symposium such as ISOMER 2024 must certainly require a high degree of dedication and cooperation among the members of the organizing committee. I thank them all for their dedication and diligence in ensuring that the various aspects of the symposium are put together as a harmonious whole. I would also like to thank the keynote speakers, plenary speakers, paper presenters, and participants for their enthusiasm in joining us virtually from all parts of the world to share their invaluable insights and knowledge in the field and thereby ensure the success of this symposium. On behalf of the organizers, I would like to thank you all for your continuous support and participation in this symposium. Lastly, I hope that you find this symposium enlightening and fulfilling in terms of the expectations you have of it.

Thank you.

**PROF. DR. MOHD YUSOFF MASHOR**

**Symposium Advisor ISOMER 2024**



# WELCOMING NOTES BY SYMPOSIUM CHAIR



Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera.

A very warm welcome to the International Symposium of Medical Engineering Research 2024 (ISoMER 2024). It is truly an honour and privilege to welcome all of you to this remarkable gathering in this symposium organised by the Faculty of Electronic Engineering Technology UniMAP, and Sports Engineering Research Center (SERC, UniMAP). This symposium is made possible with the support from co -organisers, Institut Teknologi Sumatera, Al-Mustaqbal

University, and PERANTIM. We are here together not only by our shared interests and passions but also by collective pursuit of knowledge, innovation and progress in making changes "Innovations in Medical Research: Shaping the Future of Healthcare". As we embark into this journey, I am thrilled with sense of anticipation and excitement. Our sessions are packed with productive presentation, insightful discussion, and the opportunity to connect with experts from various parts of the world. This symposium is a platform where diverse perspectives converge and where the synergy of minds leads to groundbreaking breakthrough. I encourage you to make the most of every moment here. Engage in dialogue, challenge conventional thinking, and foster connections that transcend geographical boundaries. Remember, the true value of this symposium lies not only in the presentations you will witness, but also in the interactions you will have and the insights you will gain.

Let us embrace this opportunity to learn, to share, and to collaborate. Together, we can push the boundaries of knowledge and collectively contribute to the advancement of Biomedical Engineering.

Thank you.

**ASSOC. PROF. TS. DR. ZULKARNAY ZAKARIA**  
**Symposium Chair ISoMER 2024**

# SECTION 2 ORGANIZING COMMITTEE & REVIEWERS





# ORGANIZING COMMITTEE

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DR. NUR FARAHYAH MOHAMMAD

DR. AHMAD NASRUL NORALI



## SECTION 3

# KEYNOTE SPEAKERS





## **KEYNOTE SPEAKER 1**

### **Assoc. Prof. Dr. Pornchai Phukpattaranont**



#### **PROFESSOR**

FACULTY OF ENGINEERING (ELECTRICAL),  
PRINCE OF SONGKLA UNIVERSITY,  
THAILAND

#### **TOPIC:**

**BIOMEDICAL  
PROCESSING  
INTELLIGENCE**

**SIGNAL  
WITH**

**AND IMAGE  
ARTIFICIAL**

#### **SHORT BIOGRAPHY:**

Pornchai Phukpattaranont received the B.Eng. (Hons.) and M.Eng. degrees in electrical engineering from the Prince of Songkla University, Songkhla, Thailand, in 1993 and 1997, respectively, and the Ph.D. degree in electrical and computer engineering from the University of Minnesota, Minneapolis, USA, in 2004. He is currently an Associate Professor of Electrical Engineering with the Prince of Songkla University. Examples of his ongoing research include the pattern recognition system based on electromyographic signal, electrocardiographic signal, and microscopic images of breast cancer cells. His current research interests include signal and image analysis for medical applications and ultrasound signal processing. Dr. Phukpattaranont is a member of the IEEE, the ECTI Association and Thai Biomedical Engineering Research Societies.



## KEYNOTE SPEAKER 2

# Professor Dr. Yoshifumi Saijo



**PROFESSOR**  
GRADUATE SCHOOL OF BIOMEDICAL  
ENGINEERING,  
TOHOKU UNIVERSITY, JAPAN

**TOPIC:**  
**THE IMPORTANCE OF HOME-BUILT  
EQUIPMENT IN NOVEL IMAGING  
RESEARCH**

### **SHORT BIOGRAPHY:**

Yoshifumi Saijo received the M.D. and the Ph.D. degrees in 1988 and 1993 from Tohoku University. He had been trained as a cardiologist in some hospitals in Sendai area. He became Assistant Professor of Institute of Development, Aging and Cancer (IDAC) at Tohoku University in 1997. He became Guest Professor at Aarhus University, Denmark in 1999 and he became Associate Professor of IDAC at Tohoku University in 2004. He has been a Full Professor of the Biomedical Imaging Laboratory of the Graduate School of Biomedical Engineering at Tohoku University. He is concurrent with Graduate School of Medicine, IDAC and Clinical Technology Department of University Hospital at Tohoku University. He has been Director of Medical Device Innovation Center since 2014. He has been Deputy Director of Graduate School of Biomedical Engineering since 2020. His main research interests include high frequency biomedical ultrasound imaging, cardiovascular blood flow analysis and photoacoustic imaging. His activity also includes practical and interactive education of medical device innovation.



## **KEYNOTE SPEAKER 3.**

### **Dr. Hyzan Mohd Yusof**



**MANAGING DIRECTOR**  
OSA TECHNOLOGY SDN. BHD.,  
MALAYSIA

**TOPIC:**  
**THE NEXT FRONTIER: CUTTING-EDGE**  
**TECHNOLOGIES IN MEDICAL RESEARCH**  
**FOR FUTURE MEDICAL DEVICES**  
**INDUSTRY IN MALAYSIA**

#### **SHORT BIOGRAPHY:**

Dr. Hyzan Mohd Yusof is an accomplished orthopaedic surgeon, academic, and entrepreneur. He is the Managing Director of OSA Technology Sdn. Bhd. and a Consultant Orthopaedic Surgeon at Sunway Medical Centre. He also serves as Vice Chairman of the Medical Technology Industry Group at the Federation of Malaysian Manufacturers and is the Honorary Secretary for PERANTIM. Dr. Hyzan holds an M.D. and a Master of Surgery in Orthopaedics from Universiti Kebangsaan Malaysia, with a sub-specialty in Trauma from the University of Alabama, Birmingham. He has received numerous awards, including the AAOS Scholarship Award and Most Outstanding Malaysian of the Year in 2005. Dr. Hyzan is also deeply committed to humanitarian work, participating in medical relief missions in conflict and disaster zones, such as Pakistan, Afghanistan, and Syria, which has garnered him international recognition for his efforts in providing healthcare to underserved populations.



## KEYNOTE SPEAKER 4,

### **Prof. Dr. Lee Sang Wook**



**PROFESSOR**

DEPARTMENT OF MECHANICAL AND  
AUTOMOTIVE ENGINEERING,  
UNIVERSITY OF ULSAN, KOREA

**TOPIC:**

**HIGH-FIDELITY IMAGE-BASED  
COMPUTATIONAL HEMODYNAMICS:  
ADVANCING PRECISION  
CARDIOVASCULAR MEDICINE**

**SHORT BIOGRAPHY:**

Lee Sang Wook is a distinguished professor in Mechanical and Automotive Engineering at the University of Ulsan, Korea. He holds degrees in Naval Architecture & Ocean Engineering from Seoul National University and a Ph.D. from the University of Illinois at Chicago. An expert in cardiovascular fluid mechanics, biofluid dynamics, and computational fluid dynamics (CFD), his research bridges engineering and biomedical applications. Over 20 years, he has advanced fluid-structure interactions and numerical simulation techniques, impacting vascular health, biomedical imaging, and marine engineering. He has conducted postdoctoral research at the University of Toronto and Robarts Research Institute, authored numerous high-impact journal articles, and holds patents in hemodynamic modeling. His work with institutions like Argonne National Laboratory has shaped CFD, parallel computing, and biofluid dynamics, influencing medical device design and cardiovascular health.



# SECTION 4

## SYMPOSIUM SCHEDULE



# SYMPOSIUM SCHEDULE

**THURSDAY, 19 DECEMBER 2024**

Time	Activities	Venue
08.00 – 09.00	Registration	Auditorium
09.00 – 09.15	Opening Speech by ISoMER Chair and Doa recitation	Auditorium
09.15 – 09.45	Keynote Speech 1: Prof. Dr. Lee Sang Wook University of Ulsan (UOU), South Korea	Auditorium
09.45 – 10.15	Keynote Speech 2: Prof. Dr. Yoshifumi Saijo Tohoku University, Japan	Auditorium
10.15 – 10.45	Morning Tea Break	VVIP Room Foyer
10.45 – 11.15	Keynote Speech 3: Assoc. Prof. Dr. Pornchai Phukpattaranont Prince of Songkhla University (PSU), Thailand	Auditorium
11.15 – 11.45	Keynote Speech 4: Dr. Hyzan Mohd Yusof PERANTIM, Malaysia	Auditorium
11.45 – 12.15	Industry's Plenary Session: Gramp's Asia	Auditorium
12.15 – 02.45	Lunch and Networking Break	VVIP Room Foyer
02.45 – 03.00	Arrival of the Honorable Vice-Chancellor of UniMAP	Auditorium
03.00 – 03.30	Inauguration Speech by the Honorable Vice-Chancellor of UniMAP : Prof. Dato' Ts. Dr. Zaliman Sauli Presentation of Souvenir to VVIP Photo Session	Auditorium
03.30 – 04.00	Afternoon Tea Break	VVIP Room Foyer
04.00 – 05.30	Parallel Session	Auditorium Meeting Room Ocean Cube Room
05.30 – 06.00	Closing Remarks Photo Session	Auditorium



# OPENING, KEYNOTE AND INAUGURATION SPEECH

<b>Assoc. Prof. Ts. Dr. Zulkarnay Zakaria</b>	Opening Speech
<b>Prof. Dr. Lee Sang Wook</b>	High-Fidelity Image-Based Computational Hemodynamics: Advancing Precision Cardiovascular Medicine
<b>Professor Yoshifumi Saijo</b>	The Importance of Home-Built Equipment in Novel Imaging Research
<b>Assoc. Prof. Dr. Pornchai Phukpattaranont</b>	Biomedical signal and image processing with artificial intelligence
<b>Dr. Hyzan Mohd Yusof</b>	The Next Frontier: Cutting-Edge Technologies in Medical Research for Future Medical Devices Industry in Malaysia
<b>Prof. Dato' Ts. Dr. Zaliman Sauli</b>	Inauguration Speech

# PARALLEL SESSION A

## TRACK:

BIOINSTRUMENTATION & BIOMEDICAL DEVICES (BBD)  
BIOMECHANICS & REHABILITATION (BR)

PARALLEL SESSION A [19 December 2024, 16:00-17:30]
Session Chair: Assoc. Prof. Dr. Shuhaida Yahud
Session Co-Chair: Dr. Noor Alia Md Zain
Venue: Auditorium

Time	Paper ID	Paper Title
16:00	9	Single Channel Magnetic Induction Tomography (MIT) For Biomedical Application
16:15	6	Evaluation of Kinetic and Kinematics Parameters on Shooting Accuracy of Woodball Players
16:30	18	A fundamental study on size mismatched interposition microvascular for vascular reconstruction
16:45	20	Effect of Thoracic Spine Deformities on the Corrective Forces of Implant Rod-Screw under Scoliosis Surgery: A Finite Element Analysis
17:00	14	Exploring AI-Based Knowledge Management Platforms in Biomechanics: A Comprehensive Review
17:15	12 (Video)	Risk Assessment of Medical Gas System and Its Maintenance: A Scoping Review
17:30	7 (Video)	Integration of Internet of Things for Haemodialysis water quality monitoring systems



# PARALLEL SESSION B

**TRACK:**

**BIOMEDICINE & BIOTECHNOLOGY (BB)**  
**BIOMATERIALS & TISSUE ENGINEERING (BTE)**

PARALLEL SESSION B [19 December 2024, 16:00-17:45]
Session Chair : Assoc. Prof. Ir. Dr. Lim Chee Chin
Session Co-Chair : Dr. Lee Hoi Leong
Venue: Ocean Cube

Time	Paper ID	Paper Title
16:00	10	Comparison study of ultrasonic-assisted extraction (UAE) and maceration method for polyphenols from Euphorbia tirucalli L.
16:15	26	Encapsulation of Chromolaena odorata and liposome for a drug delivery
16:30	11	Encapsulated Malaysian Honey with Maltodextrin using Freeze Drying for XRD Analysis
16:45	5	Supercritical Fluid Extraction of Lemongrass Essential Oil for Perfume Formulation
17:00	3	Bioplastic from Agricultural Waste with Potential Application in Medical and Pharmaceutical
17:15	19	Electrophoretic Deposition of Mesoporous Carbonated Hydroxyapatite on Ti-6Al-4V Alloy for Bone Implant
17:30	8	Detection Of Acute Intracranial Haemorrhage in CT Scans Using Deep Learning Algorithms
17:45	27	Phytochemical Analysis of Chinese Herbal Tea by a Soxhlet Extraction

# PARALLEL SESSION C

**TRACK:**  
**ARTIFICIAL INTELLIGENCE (AI)**  
**BIOMEDICAL SIGNAL & IMAGE PROCESSING (BSI)**

<b>PARALLEL SESSION C [19 December 2024, 16:00-17:45]</b>
Session Chair : Assoc. Prof. Ts. Dr. Haniza Yazid
Session Co-chair : Mr. Mohammad Shahril Salim
Venue: Meeting Room

Time	Paper ID	Paper Title
16:00	17	Enhancing Vehicle License Plate Recognition in Low-Light Conditions Using YOLOv5 and Advanced Pre-Processing Techniques
16:15	15	A Systematic Review and Analysis of Chatbot Application in Biomechanics Research
16:30	21	A Convolutional Neural Network-Based Approach for Emotion Recognition Using Facial Expressions
16:45	16	AI-Based Classification Framework for EEG Pattern Analysis Across Brain Lobes in Resting and Cognitive States
17:00	22	Comparison of Stain Normalization Methods for Leukemia Blood Slide Image
17:15	24	EEG-Based Analysis of Mindfulness Meditation: Neural Modulation of Smoking Urges Using Empirical Mode Decomposition and Machine Learning
17:30	23 (Video)	Segmentation Approaches for Cancer Detection in Histopathological Images - A Review
17:45	25 (Video)	Classification Of Noise-Free and Noise-Degraded Brain Tumour MRI Using Convolutional Neural Network



## **SECTION 5**

# **LIST OF PAPERS (ABSTRACT)**



**TRACK 1:**

**Bioinstrumentation &  
Biomedical Devices  
(BBD)**

Paper Title	Paper ID
Risk Assessment of Medical Gas System and Its Maintenance: A Scoping Review	12
Integration of Internet of Things for Haemodialysis water quality monitoring systems	7
Single Channel Magnetic Induction Tomography (MIT) For Biomedical Application	9



## **Risk Assessment of Medical Gas System and Its Maintenance: A Scoping Review**

Mariamamah Krishnasamy, Muhammad Jefri Mohd Yusof; Eddy Saputra Rohmatul Amin; Izwyn Zulkapri; Libriati Zardasti; Maheza Irna Mohamad Salim

### **ABSTRACT**

This scoping review systematically examines the existing body of knowledge regarding medical gas systems (MGS) and their maintenance, with a focus on risk assessment and regulatory standards. The review explores how different countries have adopted various standards and the importance of continuous education for maintenance personnel on emerging technologies used in healthcare facilities. As new medical technologies are integrated into these facilities, the maintenance of MGS becomes increasingly complex, necessitating ongoing upgrades and optimization to ensure reliability and safety. Additionally, the review assesses the risk classification of medical gases in relation to different classes of medical devices and provides insights into the costs associated with the registration of MGS across various countries. The findings reveal significant differences in both registration costs and risk categorizations, largely influenced by the prevailing regulatory systems. Further-more, the review highlights the involvement of multiple stakeholders in formulating and implementing MGS requirements, which complicates the monitoring and enforcement of these regulations. By organizing the literature ac-cording to specific criteria, such as MGS components and geographic cover-age, this review enhances our understanding of the current research land-scape and identifies areas where further investigation may be needed. The results demonstrate the critical need for design improvements and continuous maintenance in response to growing healthcare demands and technological advancements. This scoping study provides a valuable foundation for those involved in the regulation, maintenance, and establishment of medical gas systems, ultimately contributing to improved safety and efficacy in healthcare delivery.

# **Integration of Internet of Things for Haemodialysis water quality monitoring systems**

Kamarulzaman Bujang

## **ABSTRACT**

The Internet of Things (IoT) represents a paradigm shift in technology integration, often called Industry 4.0, revolutionising sectors by transforming operational technologies and altering expectations. In the context of healthcare, particularly in haemodialysis centres, the integration of IoT is crucial for enhancing the monitoring of water quality—a vital resource for patient treatment. This study proposes the deployment of IoT sensors at critical points within the four stages of the water treatment process: raw water intake, pre-treatment, and post-treatment phases. These sensors—measuring temperature, conductivity, pressure, flow, and turbidity—enable real-time data acquisition and analysis, facilitating predictive maintenance and allowing healthcare personnel to proactively address equipment performance issues before they impact patient care. By automating data collection and enabling remote access, IoT technology replaces outdated manual monitoring methods and significantly enhances operational efficiency and patient safety. The expected outcomes include:

- Reduced human error.
- Improved compliance with health standards.
- A marked increase in the reliability of water treatment systems used in haemodialysis.

This research demonstrate how haemodialysis centres can achieve higher operational efficiency through IoT integration and ensure the highest levels of patient safety and care quality.



# Single Channel Magnetic Induction Tomography (MIT) For Biomedical Application

Ikhwan Basri

## ABSTRACT

Magnetic Induction Tomography (MIT) is a non-invasive imaging technique that uses magnetic fields to visualize the electrical properties of biological tissues. This paper explores the development of a Single-Channel MIT system for biomedical applications. The system aims to provide a cost-effective, easy-to-use imaging conductive material without ionizing radiation. This study focuses on imaging conductivity materials using a 360-degree rotation technique, integrating both hardware and software components, including a linear back projection algorithm for image reconstruction.

# **TRACK 2:**

## **Biomechanics & Rehabilitation**

### **(BR)**

<b>Paper Title</b>	<b>Paper ID</b>
Evaluation of Kinetic and Kinematics Parameters on Shooting Accuracy of Woodball Players	6
A fundamental study on size mismatched interposition microvascular for vascular reconstruction	18
Effect of Thoracic Spine Deformities on the Corrective Forces of Implant Rod-Screw under Scoliosis Surgery: A Finite Element Analysis	20



## **Evaluation of Kinetic and Kinematics Parameters on Shooting Accuracy of Woodball Players**

Mohammad Shahril Salim, Siti Aliah Hamdan

### **ABSTRACT**

Shooting technique is an important skill in woodball. Acquiring the ideal and effective shooting technique is very critical in this sport. This research aims to study and evaluate the possible parameters that can be used to achieve the best shooting accuracy. This quantitative study involved descriptive data analysis, with several coaching points such as athlete posture and force being analyzed. The data were recorded by a motion capture system positioned in the frontal and sagittal planes and analyzed using Qualysis Track Manager (QTM) software and Visual3D software. 16 woodball athletes, categorized into novice and elite players, participated in this study. The evaluated parameters included elbow and hip angles, as well as elbow and knee forces. The findings indicated that shooting accuracy is significantly influenced by these parameters, with differences in the swing phase affecting the ball impact. The results showed that athletes with better control over these parameters exhibited higher accuracy and consistency in their movements. Training the swing is crucial to maintaining a consistent impact position. The ideal parameters for achieving shooting accuracy were identified based on the data collected, emphasizing the importance of precise control over posture and force.

## **A fundamental study on size mismatched interposition microvascular for vascular reconstruction**

Muhd Nur Rahman bin Yahya, Sang-Wook Lee; Muhammad Sofwan bin Mohamad

### **ABSTRACT**

A digital arterial disease in the upper extremity is uncommon compared to arterial disease in the lower extremity. A microvascular anastomosis is performed as a vascular reconstruction. However, mismatching in size between end-to-end anastomosis of venules-arterioles internal diameter. might cause blockage in new venules. In a previous study, internal diameter discrepancy in vessel size (small-large or vice versa) causes abnormal blood flow behavior. Then it will initiate the thrombosis formations and be supported by clinical theory. This study aims to analyze the blood flow behavior through mismatching in size anastomosis models and their flow patterns that might affect the initiation of thrombus formation in venule models. A Three-dimensional Computational Fluid Dynamic (3-D CFD) method is employed to investigate blood flow velocity, blood pressure gradient, and wall shear stress (WSS) on ideal straight (well matched between the internal diameter of venule and recipient arteriole) and internal diameter mismatched anastomosis models. In this experiment, we expect that steady-state laminar blood flow demonstrates abnormal flow patterns in mismatched internal diameter anastomosis models compared to an ideal straight model. In conclusion, any abnormal blood flow pattern will initiate the formation of a thrombus and reduce the anastomosed venules-arterioles survival.



# **Effect of Thoracic Spine Deformities on the Corrective Forces of Implant Rod-Screw under Scoliosis Surgery: A Finite Element Analysis**

Kavita Gunasekaran, Khairul Salleh Basaruddin

## **ABSTRACT**

Scoliosis is a complex, three-dimensional spinal deformity characterized by vertebral rotation and lateral curvature, typically measured by the Cobb angle. Surgical correction aims to restore spinal alignment through the implantation of devices such as rods and screws, which exert corrective forces. However, complications like rod breakage, screw pull-out, and implant loosening remain prevalent, largely due to insufficient understanding of the forces involved during surgery. This study employs Finite Element Analysis (FEA) to simulate the biomechanics of scoliosis correction, focusing on the impact of varying Cobb angles (ranging from 45° to 70°) on corrective forces and stress distribution. Six implant models were developed using SolidWorks and analyzed with ANSYS software. Results indicate a direct correlation between increasing Cobb angles and higher corrective forces, leading to greater stress concentrations on implant rods. For example, the maximum von Mises stress increased from 160 MPa at 45° to 280 MPa at 70°, indicating a higher risk of implant failure. Additionally, screws near the apex of the curvature experienced greater forces, highlighting the importance of optimal screw placement. These findings suggest that personalized, patient-specific FEMs can improve surgical outcomes by guiding implant configurations and reducing complications, thereby enhancing the safety and effectiveness of scoliosis correction surgery.



# **TRACK 3:**

## **Biomedicine & Biotechnology**

### **(BB)**

<b>Paper Title</b>	<b>Paper ID</b>
Comparison study of ultrasonic-assisted extraction (UAE) and maceration method for polyphenols from Euphorbia tirucalli L.	10
Encapsulation of Chromolaena odorata and liposome for a drug delivery	26
Encapsulated Malaysian Honey with Maltodextrin using Freeze Drying for XRD Analysis	11
Supercritical Fluid Extraction of Lemongrass Essential Oil For Perfume Formulation	5
Phytochemical Analysis of Chinese Herbal Tea by a Soxhlet extraction	27



## **Comparison study of ultrasonic-assisted extraction (UAE) and maceration method for polyphenols from *Euphorbia tirucalli* L.**

Alwani Ibrahim, Khairul Farihan Kasim; Siti Shuhadah Md Saleh;  
Nur Farahiyah Mohammad; Farah Diana Mohd Daud; Nashrul Fazli  
Mohd Nasir;  
Roy Francis Navea

### **ABSTRACT**

*Euphorbia tirucalli* L. is a medicinal plant known for its biological properties, such as antioxidant and antibacterial, attributed to its rich polyphenolic content. The extraction process may determine the recovery of the bioactive compounds in the plant, such as extraction methods and their solvents. This work focused on the comparison of extraction methods, employing maceration and ultrasonic-assisted extraction (UAE) for polyphenolic extraction from *E. tirucalli*. It was revealed that UAE was the most effective method with TPC, TFC, and antioxidant activity corresponding to  $29.26 \pm 0.15$  mgGAE/100g,  $152.85 \pm 9.04$  mgQE/100g, and  $80.37 \pm 0.59$  %, respectively. On the other hand, methanol was the best extraction solvent for TPC and antioxidant activity, while acetone was preferably the best solvent for TFC. All extracts possessed high antioxidant activity (>50%) except for petroleum ether extracts. Thus, it was concluded that *E. tirucalli* exhibits high polyphenolic content and promising antioxidant activity using the methanolic extract of UAE.



## **Encapsulation of *Chromolaena odorata* and liposome for a drug delivery**

Che Wan Sharifah Robiah Mohamad, Ee Meng Cheng, Nurul Adilla  
Mansor; Yessie Widya Sari

### **ABSTRACT**

*Chromolaena odorata* (Pokok Kapal Terbang) has significant high contents of flavonoid, phenolic and antibacterial agent. The Soxhlet extraction method was utilized using solvent ethanol and hexane. This study focused on encapsulation of *C. odorata* with liposome and particularly a crude extract as ethanol-*C. odorata* extract (COET) and hexane-*C. odorata* extract (COHE). The identification of specific fragments in COET and COHE by utilizing Thin Layer Chromatography (TLC). The result revealed that liposome-COHE and liposome-COET have a bigger size on its diameter size comparison with liposome, which is  $35.16\ \mu\text{m} > 34.89\ \mu\text{m} > 8.178\ \mu\text{m}$ , respectively. A degradation investigation demonstrated that with a liposome encapsulated, this Li-COET and Li-COHE capable to preserve releasing its active compounds after 6 hours, and capable to reach its target area notably for gastrointestinal treatment. This finding demonstrates an encapsulated Li-COET and Li-COHE is suitable for drug delivery system and a future work require to evaluate an efficiency of its activities



## **Encapsulated Malaysian Honey with Maltodextrin using Freeze Drying for XRD Analysis**

Nurlisa Yusuf, Che Wan Sharifah Robiah Mohamad

### **ABSTRACT**

This study investigates the encapsulation of Malaysian honey with maltodextrin using freeze drying. Maltodextrin preserves honey from factors that can affect its quality such as moisture, oxygen and light. The dehydration method known as freeze drying, also called “lyophilization” is performed at low temperatures to avoid thermal deterioration and maintain the crystalline structure and the bioactive compounds of the honey. The crystallinity and phase structure of the encapsulated honey are examined using X-ray diffraction (XRD) which is important to determine the stability and release characteristics of the bioactive compounds of honey. XRD analysis shows that Tualang honey has peaks similar in position to maltodextrin but generally lower in intensity. Kelulut honey showed peaks at different positions indicating it had a distinct crystalline structure compared to maltodextrin. Gelam honey exhibited the lowest peaks intensities showing that it was mostly amorphous compared to maltodextrin. Thus, the results concluded that maltodextrin could serve as carrier agent for encapsulating the honey.



# Supercritical Fluid Extraction of Lemongrass Essential Oil For Perfume Formulation

Nurizzati Mohd Daud, Noor Azwani Mohd Rasidek

## ABSTRACT

Supercritical Fluid Extraction (SFE) offers a green, eco-friendly approach, with high selectivity for the lemongrass (*Cymbopogon Citratus*) extraction of natural essential rich citral oil as a compelling choice over conventional method used in synthetic fragrances. In this study, the lemongrass essential oil (LEO) extracted in mild condition of temperature (40 to 80°C) and pressure (10 to 30 MPa) and soxhlet as a conventional method as comparison. The best condition of LEO extraction is at 49°C, 30 MPa with the highest yield of 4 %. Both interaction effects show significant to LEO yield with  $R^2 = 0.9877$ . The FTIR spectrum at 1669.42  $\text{cm}^{-1}$  was identified a citral as main compound presence in LEO. Meanwhile, the lemongrass essential oil perfumes (LEOP) were formulated from LEO at different extraction conditions leading to 7 sensory attributes (Lemony, Minty, Fresh, Fruity, Woody, Earthy, Citrussy). The sensory evaluation of LEOP was evaluated by using quantitative descriptive analysis (QDA) for 8 panelists. Presented results prove the formulated LEOP from SFE could be as sustainable perfumes for sensational smells and more delectable scent options that benefit the perfumery market industry.



## Phytochemical Analysis of Chinese Herbal Tea by a Soxhlet extraction

Che Wan Sharifah Robiah Mohamad, Chee Chin Lim

### ABSTRACT

The rise of drug-resistant bacteria in recent year has drastically increasing. The alternative antimicrobial agents have heightened interest in plant-derived natural active compound. This study to examine the phytochemical composition and assess the antimicrobial efficacy of *Camellia sinensis* (Black Tea), *Glycyrrhiza glabra* (Licorice), *Morus alba* (Mulberry), and *Zingiber officinale* (Ginger). The leaves can be mostly used as traditional medicine which includes for reducing inflammation, stress alleviation, immune system support and more. However, there is lacked information about a phytochemical content and antibacterial activity of herbal tea. The Soxhlet extraction method using methanol as its solvent was used to create an extract from the leaves of *C. sinensis*, *G. glabra*, *M. alba*, and *Z. officinale*. Total Phenolic Contents (TPC), Total Flavonoid Contents (TFC), and Antioxidants Activity (AOA) are expected to attain elevated levels with significant antibacterial efficacy. A finding of this study shown *C. sinensis*, Chinese Herbal tea mixed, *Z. officinale*, *M. alba*, *G. glabra* had shown a TPC values at  $180 \mu\text{g GAE/g}$  <  $160 \mu\text{g GAE/g}$  <  $65 \mu\text{g GAE/g}$  <  $50 \mu\text{g GAE/g}$  <  $40 \mu\text{g GAE/g}$ . The Total Phenolic Contents (TPC) of *C. sinensis* extract at  $0.58 \mu\text{g GAE/g}$  more than mixed Chinese herbal tea. However, *Z. officinale* and mixed Chinese herbal tea potent antibacterial activity compared with other extract. The future work such as encapsulation of samples and increasing the amount of solvent utilised for the extraction.



# TRACK 4: Biomaterials & Tissue Engineering (BTE)

Paper Title	Paper ID
Bioplastic from Agricultural Waste with Potential Application in Medical and Pharmaceutical	3
Electrophoretic Deposition of Mesoporous Carbonated Hydroxyapatite on Ti-6Al-4V Alloy for Bone Implant	19



## **Bioplastic from Agricultural Waste with Potential Application in Medical and Pharmaceutical**

Ivan Seow, Che Wan Sharifah Robiah Mohamad

### **ABSTRACT**

Rice husk (RH), a significant by-product of rice milling, is a rich source of cellulose, offering potential for bioplastic fabrication to address agro-waste pollution. This study utilizes RH to extract cellulose through alkaline and bleaching treatments, resulting in a yield of 30.8%. The cellulose content varied with particle sizes: 75 microns (23.80%), 150 microns (42.60%), and 1410 microns (18.50%). Fourier-transform infrared (FTIR) spectroscopy and scanning electron microscopy (SEM) were employed to analyze the composition and morphology of untreated RH, RH cellulose (RH-C), and commercial RH. The extracted cellulose was incorporated into polylactic acid (PLA) at varying cellulose concentrations (0.006g, 0.018g, and 0.03g) to produce bioplastics. Analysis of these bioplastics showed increased thickness and weight with higher RH-C content. FTIR confirmed the removal of lignin and hemicellulose, evidenced by the disappearance of the O-H stretching peak. SEM revealed fragmented cellulose structures in treated bioplastics, while untreated bioplastics retained intact cellulose. Moreover, the addition of RH-C decreased the bioplastic degradation rate, indicating its potential for durable, sustainable applications. These results highlight the value of RH as a renewable resource for bioplastic production, offering both environmental and functional benefits.



## **Electrophoretic Deposition of Mesoporous Carbonated Hydroxyapatite on Ti-6Al-4V Alloy for Bone Implant**

Nur Farahiyah Mohammad, Nur Dhiya Liyana Masri, Siti Shuhadah Md Saleh, Nashrul Fazli Mohd Nasir, Farah Diana Mohd Daud, Eugene Tan

### **ABSTRACT**

The Ti-6Al-4V alloy is widely used in implant applications due to its excellent mechanical properties, including high strength for load-bearing, elasticity comparable to human bone, non-toxicity, and biocompatibility. However, its bioactivity is limited because titanium is biologically inert, making it less effective in promoting bone tissue growth and achieving strong osseointegration. To address this, mesoporous carbonated hydroxyapatite (Meso-CHA) was selected as a coating material for Ti-6Al-4V due to its superior biocompatibility and bioactivity. This study demonstrates that combining the mechanical advantages of Ti-6Al-4V with the bioactivity of Meso-CHA can result in a more effective implant. Meso-CHA powder was successfully synthesized using the precipitation method. It was observed that increasing the concentration of nitric acid roughened the alloy surface, enhancing the adhesion of Meso-CHA. Optimal deposition conditions were identified as 10 volts for 10 minutes. While higher voltages and longer deposition times produced thicker Meso-CHA coatings, these coatings exhibited surface cracks. In vitro bioactivity tests confirmed the formation of apatite, indicating that the Meso-CHA coating significantly enhances the alloy's bioactivity and promotes improved osseointegration.



# **TRACK 5:**

## **Artificial Intelligence**

### **(AI)**

<b>Paper Title</b>	<b>Paper ID</b>
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Exploring AI-Based Knowledge Management Platforms in Biomechanics: A Comprehensive Review	14
Detection of Acute Intracranial Haemorrhage In CT Scans Using Deep Learning Algorithms	8
A Systematic Review and Analysis of Chatbot Application in Biomechanics Research	15
A Convolutional Neural Network-Based Approach for Emotion Recognition Using Facial Expressions	21
Classification Of Noise-Free And Noise-Degraded Brain Tumour Mri Using Convolutional Neural Network	25

# **Enhancing Vehicle License Plate Recognition in Low-Light Conditions Using YOLOv5 and Advanced Pre-Processing Techniques**

Swee Kheng Eng, Jin Yao Chew

## **ABSTRACT**

The implementation of a vehicle license plate recognition system for low light environment is discussed in this project. The main goal is to increase the detection and recognition accuracy in low light. To achieve robustness, the YOLOv5 object detection technique was trained on a dataset with a range of lighting conditions using the YOLOv5 object detection technique. Pre-processing techniques such as image scaling, grayscale conversion and contrast enhancement were used to improve the image clarity. Before Optical Character Recognition (OCR), the images were enhanced by advanced techniques such as de-noising and homomorphic filtering. The YOLOv5 was 96% accurate in detection phase, detecting 96 out of 100 license plates correctly. The system then achieved an overall OCR accuracy of 88%. Future recommendations include using infrared or thermal imaging in low light conditions, better de-blurring algorithms, and optimization for high-speed vehicle identification and real time processing. The changes that these bring intend to make the system more robust and versatile so that the license plate identification is dependable in any demanding setting.



# Exploring AI-Based Knowledge Management Platforms in Biomechanics: A Comprehensive Review

Suhizaz Sudin, Rafikha Aliana A Raof; Saidatul Ardeenawatie Awang;  
Nurhidayah Omar; Raja Haslinda Raja Mohd Ali; Mohammad Shahril  
Salim

## ABSTRACT

This review aims to explore the role and impact of AI-based knowledge management platforms in the field of biomechanics. Advances in artificial intelligence have led to the development of innovative platforms that can effectively manage and analyse the vast amounts of data generated in biomechanics research and practice. The review process involved a comprehensive search of major scientific databases, including PubMed, Web of Science, and Scopus, using keywords related to biomechanics, AI, and knowledge management. Relevant articles were selected based on predefined inclusion criteria, and a systematic analysis was conducted to identify trends, advantages, and challenges associated with the implementation of AI-based platforms in biomechanics. The review revealed a growing interest in the application of AI-based knowledge management platforms in biomechanics. These platforms have demonstrated the ability to streamline data management, facilitate knowledge discovery, and enhance decision-making processes. Key advantages include improved data organization, automated analysis, and personalized recommendations for rehabilitation and training. However, the review also highlights challenges related to data privacy, ethical considerations, and the need for interdisciplinary collaboration to bridge the gap between biomechanics and AI expertise. This review underscores the significant potential of AI-based knowledge management platforms in advancing the field of biomechanics. Future research should focus on developing robust and user-friendly platforms that can seamlessly integrate with existing biomechanics workflows, while addressing ethical and regulatory concerns.



# Detection of Acute Intracranial Haemorrhage In CT Scans Using Deep Learning Algorithms

Azian Azamimi Abdullah, Xue Fen Goh

## ABSTRACT

Intracranial hemorrhage (ICH) refers to bleeding within the skull, affecting millions of individuals. It encompasses various subtypes based on their brain location, including epidural hemorrhage (EDH), subdural hemorrhage (SDH), subarachnoid hemorrhage (SAH), intraventricular hemorrhage (IVH), and intraparenchymal hemorrhage (IPH). Prompt detection and management of ICH are crucial, as it is a life-threatening emergency with high morbidity and mortality rates. Computed Tomography (CT) imaging is the primary tool for identifying and diagnosing neurological disorders. Rapid and accurate diagnosis of the presence, type, and location of an ICH is essential for timely medical intervention. However, the complexity of brain anatomy and variability in hemorrhage appearance make this task challenging. MobileNetV3 Large is an ideal CNN model for mobile devices because of its reduced number of parameters and compact model size. However, it requires improvements to better capture critical features. On the other hand, Xception, derived from InceptionV3, is highly effective at feature extraction with fewer but highly efficient parameters. This research proposes a double-branch model based on the Xception and MobileNet architectures. This model extracts spatial and temporal features, concatenating them and feeding them into a decision tree classifier for final predictions. The project involves training and validating deep networks from both Xception and MobileNet V3 Large branches. Our results indicate that the double-branch Xception-MobileNet V3 Large model outperforms both the double-branch Xception and the double-branch MobileNet V3 Large models individually. The performance of the double-branch Xception and the doublebranch Xception-MobileNet models is approximately the same, highlighting Xception's significant contribution to overall performance. Meanwhile, MobileNet V3 Large contributes complementary features that enhance the model's generalizability. The combined model strikes a balance across various metrics, demonstrating superior performance.



# **A Systematic Review and Analysis of Chatbot Application in Biomechanics Research**

Suhizaz Sudin, Rafikha Aliana A Raof; Saidatul Ardeenawatie Awang;  
Nurhidayah Omar; Raja Haslinda Raja Mohd Ali; Mohammad Shahril  
Salim

## **ABSTRACT**

This paper explores the growing role of chatbots in biomechanics research. The systematic review aims to investigate the current applications and potential of chatbot technology in this field. A comprehensive search was conducted across various databases to identify relevant studies on using chatbots in biomechanics. The review methodology involved a stepwise process to screen, select, and analyse the literature. A comprehensive literature search was conducted across multiple databases, following the PRISMA framework, to identify relevant studies on using chatbots in biomechanics research. The review identified a range of chatbot applications in biomechanics, including data collection, exercise monitoring, and patient-clinician communication. Key findings suggest that chatbots can enhance data accuracy, patient engagement, and the efficiency of biomechanics research and clinical applications. Key applications include chatbots assisting in biomechanical assessments, providing interactive tutorials, and facilitating remote rehabilitation. The integration of chatbots in biomechanics research holds significant promise, offering opportunities for enhanced data gathering, patient engagement, and the delivery of personalized biomechanical interventions. Chatbots have significant potential to streamline and improve biomechanics research and clinical practice. Further development and integration of this technology could lead to more personalized, accessible, and scalable solutions in the field of biomechanics



# **A Convolutional Neural Network-Based Approach for Emotion Recognition Using Facial Expressions**

Mohanad Qubtan

## **ABSTRACT**

Facial emotion recognition (FER) serves as a significant link that connects human to computer interaction and concerns of affective computing and mental health since it is possible for the machine to understand and react to human feelings in real time. A deep convolutional neural network was constructed as part of this research to distinguish anger, contempt, disgust, fear, happiness, sadness, and surprise which are the seven target inner feelings present in pictures from the CK+ dataset. Specifically, the original and final implementation of the CNN architecture can be described as comprising a sequence of multiple convolutional layers and a sequence of dense layers that are used for high reliability emotion class predictions. 48 by 48 pixels were used on the train test validation images during model training. Various forms of dropout regularization were used in order to reduce overfitting and enhance model robustness. F1 scores, precision and recall metrics along with other evaluation metrics were deploy to assess model performance with all the categories achieving a reasonable classification success ratio. Therefore, the CNN model can be regarded as a quite dependable tool for emotion recognition with also extending to practical FER primary operations.



# Classification Of Noise-Free And Noise-Degraded Brain Tumour MRI Using Convolutional Neural Network

Lih Poh Lin, Weng Seen Yong

## ABSTRACT

The early detection and treatment of brain tumours are essential, but diagnosing brain tumours accurately remains a significant challenge. This study presented a brain tumour classification model that utilized three convolutional neural network (CNN) models, namely VGG-16, SqueezeNet, and Inception-ResNet-V2, to classify brain tumour magnetic resonance images (MRI). The models were evaluated using established performance metrics such as precision, recall, F1 score, Matthew's correlation coefficient (MCC), and accuracy. The models were executed using images from a Kaggle dataset, which included three types of brain tumours and one class of healthy brain images. The study identified the optimal hyperparameters, including a training time of 50 epochs, an SGD optimizer and a learning rate of 0.001, based on accuracy, loss, and other performance metrics. The VGG-16 and Inception-ResNet-V2 models achieved an accuracy of 99%, while SqueezeNet achieved 97%, alongside excellent precision, recall, F1 score, and MCC. The study also evaluated the impact of noise on the models' performance, where image degradation in the form of self-introduced noise was included in addition to the original MRI dataset. The Inception-ResNet-V2 model was identified as the best-performing model due to its higher accuracy. The application of a filter to denoise the MRI image was also demonstrated in this work. In summary, the study's findings highlighted the potential of AI-based systems to improve medical diagnostics.



# **TRACK 6:**

## **Biomedical Signal & Image Processing (BSI)**

<b>Paper Title</b>	<b>Paper ID</b>
AI-Based Classification Framework for EEG Pattern Analysis Across Brain Lobes in Resting and Cognitive States	16
Comparison of Stain Normalization Methods for Leukemia Blood Slide Image	22
Segmentation Approaches for Cancer Detection in Histopathological Images – A Review	23
EEG-Based Analysis of Mindfulness Meditation: Neural Modulation of Smoking Urges Using Empirical Mode Decomposition and Machine Learning	24



# **AI-Based Classification Framework for EEG Pattern Analysis Across Brain Lobes in Resting and Cognitive States**

Saidatul Ardeenwatie, Hidayah Omar; Rafikha Aliana Raof; Mohammad Shahril Salim; Suhizaz Sudin

## **ABSTRACT**

This study uses EEG to investigate the neural processes behind critical thinking by comparing brainwave activity in resting and critical thinking states. It aims to identify EEG patterns, especially in the alpha, beta, and gamma bands, that correlate with critical thinking abilities. A total of 10 healthy subjects, male and female, between 20 to 27 years old participated in this study. The four activities the subjects completed are as follows: a rest task in which they must close their eyes and move very little; three tasks (Sets A, B, and C) consisting of ten brain teaser questions each. The 14-channel mobile EEG device, EMOTIV EPOC+, was used to gather EEG data. In the preprocessing stage, EEG data were filtered using a Butterworth bandpass filter. The feature extraction stage involved using signal processing tools, Power Spectral Density (PSD) Welch and Burg methods for linear methods, and Convolution Operation for non-linear methods to obtain maximum, minimum, mean, median, mode, standard deviation, and variance as statistical features. Finally, in the classification stage, the data were classified by applying Decision Tree (DT), K-Nearest Neighbor (KNN), and Multi-Layer Perceptron (MLP). The results show that the best classification accuracy across all brain lobes, especially for beta and gamma signals, is obtained when Welch is used for feature extraction in conjunction with three statistical characteristics and KNN as a classifier. Notably, the gamma signals from the frontal lobe shows the best accuracy, with a value of 89.7%. This indicates that the frontal lobe is the most effective region for critical thinking activities.



## **Comparison of Stain Normalization Methods for Leukemia Blood Slide Image**

Muhammad Adham Aswan, Yusoff Mashor; Rafikha Aliana A Raof;  
Razan Hayati Zulkeflee; Rosline Hassan; Siti Nurul Aqmariah Mohd  
Kanafiah; Nazahah Mustafa; Khairul Syakir Ab Rahman

### **ABSTRACT**

Color normalization is a crucial pre-processing method used in histopathological image analysis. The objective of this method is to reduce the color variations caused by staining procedures, which can affect the performance of automated image analysis algorithms. These color variations may occur from the inconsistency in protocols across laboratories during slide preparation. Besides, differences in the type and calibration of microscopes and cameras may cause discrepancies in image color. Inconsistent image acquisition settings, such as exposure time, white balance, and contrast adjustments, can also lead to variations in color representation. This paper provides a comparative analysis of three conventional color normalization methods: Reinhard, Macenko, and Vahadane. Reinhard approach uses mean and standard deviation normalization in the LAB color space to create a target image with the same color distribution as the reference image. Macenko uses SVD to separate stain vectors and then projects the picture onto a reference distribution to further normalize it. Vahadane approach combines non-negative matrix factorization with sparse stain separation for more robust and accurate stain normalization. The current study evaluates these methods based on five quantitative measurements which comprises of structural similarity index (SSIM), mean squared error (MSE), image entropy, correlation coefficient, and peak signal-to-noise ratio (PSNR). Our findings indicate that although Reinhard is the oldest color normalization method, it still provides the best result compared to other methods to normalize leukemia blood slide image.



# **Segmentation Approaches for Cancer Detection in Histopathological Images – A Review**

Haniza Yazid, Chun Wai Chin, Hoi Leong Lee

## **ABSTRACT**

Medical image analysis serves as a tool to assist clinicians in diagnosing diseases rather than replacing them. While many imaging modalities, such as mammography, MRI, and CT, have been utilized in cancer diagnosis, histopathological analysis remains the gold standard for cancer detection. However, the accuracy of cancer diagnosis heavily depends on the pathologist's experience, making the results potentially subjective and prone to errors. This highlights the need for developing assistive tools. Segmentation plays a pivotal role in medical image processing, particularly in histological analysis, as irregular changes in cell structures are often indicative of disease. Over the years, numerous segmentation approaches have been developed to identify cell structures, specifically nuclei. Many of these approaches employ deep learning-based methods. However, a trade-off exists among computational complexity, processing time, cost, and accuracy when comparing deep learning-based segmentation methods with conventional approaches, such as thresholding. The paper discusses the current deep learning-based segmentation methods and their evaluation results for histopathological images used in cancer detection and evaluates their respective advantages and disadvantages. Finally, the paper identifies existing gaps in the field and provides suggestions for future improvements.



# **EEG-Based Analysis of Mindfulness Meditation: Neural Modulation of Smoking Urges Using Empirical Mode Decomposition and Machine Learning**

Chee Chin Lim, Sithradevi Jaya Maren; Vikneswaran Vijean; Xiao Jian Tan;

Sin Chee Lim

## **ABSTRACT**

Smoking poses significant health risks and is strongly associated with addiction and relapse due to impaired response inhibition. Mindfulness meditation has shown promise in mitigating smoking urges, yet the underlying neural mechanisms remain poorly understood. This study investigates the effects of mindfulness meditation on smokers using electroencephalography (EEG), a non-invasive tool for analyzing brain activity. EEG data were collected from 10 male smokers using a 32-electrode system with a sampling frequency of 1024 Hz. Participants abstained from smoking, caffeine, and medications for five hours before the experiment to minimize external influences. Preprocessing involved noise reduction using a Butterworth 4th-order bandpass filter, isolating five frequency bands: delta (0–4 Hz), theta (4–8 Hz), alpha (8–16 Hz), beta (16–32 Hz), and gamma (32–64 Hz). Empirical Mode Decomposition (EMD) was employed to extract key features—mean, kurtosis, skewness, and entropy—from the first two Intrinsic Mode Functions (IMFs), which capture significant non-linear and non-stationary neural patterns. Feature selection using the Chi-Square test identified 20 critical features, primarily from delta and theta bands, associated with emotional regulation and cognitive control. Classification models, including Support Vector Machine (SVM) and Ensemble methods, achieved the highest training accuracy of 80% and a testing accuracy of 77.8%, effectively distinguishing between high and low smoking urges. Post-meditation EEG analysis revealed increased delta and theta activity, reduced beta activity, and behavioral improvements such as enhanced relaxation, reduced stress, and improved logical reasoning among participants. These findings underscore the potential of EEG-based analyses in understanding the neurobiological impact of mindfulness on smoking behavior. Future research should include larger sample sizes, longer meditation durations, and additional classifiers to enhance predictive accuracy and deepen insights into mindfulness as an intervention for smoking cessation.



# SECTION 6

## ACKNOWLEDGEMENTS



## ACKNOWLEDGEMENTS

The organizing committee of the International Symposium of Medical Engineering Research 2024 (ISoMER 2024) extends its deepest gratitude to all individuals and organizations that have contributed to the success of this event. We are thankful to Universiti Malaysia Perlis (UniMAP) for unwavering support and commitment to advancing the field of biomedical electronic engineering development.

We express our sincere appreciation to the distinguished speakers, researchers, and industry experts for sharing their invaluable insights and expertise. Your participation has enriched the symposium and sparked meaningful discussions that will inspire future advancements in biomedical innovation.

We are grateful to the main sponsor, Koperasi Komuniti Kepulauan Tuba & Selat Berhad and Gramp's Asia for their generous support, which has made this event possible. Your belief in our mission to promote sustainable and ethical practices in the biomedical industry is greatly valued. A special thank you goes to the dedicated organizing team, volunteers, and technical staff for their hard work and coordination, ensuring a seamless and engaging virtual experience for all participants. Your effort, creativity, and dedication have been the backbone of this symposium.

Lastly, we thank all the attendees from across the globe for joining us and contributing to this event. Your engagement, ideas, and enthusiasm are what make ISOMER 2024 a platform for impactful change and innovation. With your continued support and collaboration, we look forward to creating more opportunities for growth and innovation in the years to come.

Thank you for being a part of ISOMER 2024.



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**THANK YOU!!**

**See you again next time**

