ICBMEHS

International Conference of Biomedical Engineering and Health Sciences

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2nd International Conference of Biomedical Engineering and Health Sciences 2024

2024

11 & 12 SEPT 2024
VIRTUAL CONFERENCE

Department of Biomedical Engineering and Health Sciences,
Faculty of Electrical Engineering,
Universiti Teknologi Malaysia.

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ABOUT 2ND ICBMEHS 2024

This online conference organized by Department of Biomedical Engineering and Health Science, Faculty of Electrical Engineering, Universiti Teknologi Malaysia; it's a powerhouse of opportunity for researchers, educators, industry leaders, and healthcare professionals to delve into the latest trends and innovations in Biomedical Engineering & Health Sciences. Nine conference tracks offered includes Medical Electronics, Biomaterials and Tissue Engineering, IOT and Embedded system for Medical Application, Medical Imaging and Image Processing, Biomedical Signal Processing Diagnostic, Therapeutics and Rehabilitation Engineering, Medical and Health Sciences, Human Sports Performance & Biomechanics and Animal Sciences.

Over two action-packed days, participants will immerse themselves in thought-provoking discussions, absorb insightful presentations, and forge invaluable connections with peers from across the globe. And be sure not to miss out on the virtual setting – this conference is brimming with networking opportunities, collaboration potential, and knowledge exchange.

WELCOME MESSAGE

Assoc Prof Ir. Dr. Azli Yahya
Chair of ICBMEHS 2024

“It is a great pleasure for me to welcome all delegates to the International Conference on Biomedical Engineering and Health Sciences (ICBMEHS2024), here at Universiti Teknologi Malaysia, Johor, Malaysia on the 11th and 12th September, 2024. On behalf of the organizing committee, I would like to express our utmost appreciation and gratitude to Department of Biomedical Engineering & Health Sciences, Faculty of Electrical Engineering, Universiti Teknologi Malaysia, for their involvement and support.

With the aims of bringing closer the researchers, academics, and postgraduate students from all over the world, this conference wishes to be a platform that foster future collaboration, extend networking, as well as exchange ideas, findings and information on the improvised and/or new technology and invention in different kind of fields. Several key areas will be highlighted in this conference including engineering, technology, science and social science field. Thus, we strongly believe that ICBMEHS2024 is the best platform to address and discuss the issues and findings that the postgraduate students as well as academicians can share. Looking forward to meeting you at this International Conference on the 11th and 12th of September, 2024 at ICBMEHS2024”

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International Conference of Biomedical Engineering and Health Sciences

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KEYNOTE SPEAKER

Profesor Dr. Congo Tak Shing Ching
Graduate Institute of Biomedical Engineering, National Chung Hsing University, Taiwan

Impedance sensing and machine learning for detection in various fields

ABSTRACT

The development of impedance sensing technology has brought revolutionary changes in many fields and solved many problems. Impedance sensing technology typically uses the relationship between current and voltage to measure specific properties of a material or system. This technology has wide applications in medical, environmental monitoring, food safety testing and other fields. In the medical field, impedance sensing technology is used for physiological monitoring, such as body composition analysis of fat and muscle tissue. Impedance sensors can also be used to monitor breathing and movement of body parts, helping diagnosis and treatment. In terms of environmental monitoring, impedance sensing technology can be used to monitor moisture content in soil, concentration of pollutants, and fluid flow in pipelines. This helps improve agricultural production efficiency and ensures efficient use of water resources and environmental protection.

In terms of food safety testing, impedance sensing technology can be used to detect harmful substances in food, such as heavy metals, pesticide residues and additives, to ensure that food meets safety standards. In this talk, the speaker cites his own research experience applying impedance and machine learning in many different fields.

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KEYNOTE SPEAKER

Profesor Dr. Mohar Bin Kassim
Dept. of High Performance Sport, Defence Fitness Academy, National Defence Univ. of Malaysia

The Heart Of Sports Coaching In Football: Using Qualitative Approach To Create A Conceptual Model Towards Team Performance

ABSTRACT

The performance of the Malaysian sport today is not at a satisfactory level when compared to the performance of the country's sport in the 70s and 80s, especially in football, which is the sports that has seen the most significant decline. This is a study involved (n=12) respondents consists of head coaches at the national and state levels. The data analysis process was done via a qualitative method, through a semi-structured interview session. The results of this study revealed how leadership factors affect the four main components of performance, which are individual consideration, being influenced by an ideal, motivation, inspiration, and intellectual stimulation that have an enormous influence on team performance. In conclusion, this study introduced a conceptual model towards team performance.

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KEYNOTE SPEAKER

Profesor Dr. Jens Haueisen
Head of the Institute of Biomedical Eng. and Informatics, Technische Universität Ilmenau, Germany

Addressing variability in non-invasive electric stimulation of the nervous system with electrical field modeling

ABSTRACT

Transcranial electrical stimulation (TES) is a powerful tool to modulate brain activity during stimulation and produce effects that last for a relatively long time after the end of stimulation. Besides being an established therapy for major depressive disorder, TES is explored in many other clinical and basic research applications. Similarly, ocular electrical stimulation (OES) holds great potential for various vision restoration applications. However, for TES and OES as well as for other non-invasive electric stimulation techniques, considerable interindividual response variability is observed. The extent to which neurophysiological or clinical effects following electric stimulation vary depends on many variables such as methodological factors (type of stimulation, duration and intensity of stimulation, number of sessions), anatomical and physiological factors (e.g. individual skull thickness, heterogeneity in cortical folding, and variation in brain state before and during stimulation). Individual neuroimaging and computational modeling might reduce this variability to some extent by individualized protocols and dosages of the applied stimulation.

The talk will review recent advances in electric field modeling for non-invasive electric stimulation of the nervous system, specifically focusing on TES and OES. The challenges and benefits of individualized modeling will be demonstrated in studies on healthy volunteers and patients.

PROGRAM TENTATIVE

DAY 1

Programme : 2nd ICBMEHS 2024
Date: 11th – 12th September 2024
Venue: Online, P19A Faculty of Electrical Engineering, University Teknologi Malaysia, Johor Bahru, Malaysia.

11 th September 2024 (Wednesday)	8.00 am	8.30 am	Registration
	8.30 am	8.45 am	**Welcoming remark** : Chair of ICBMEHS 2024
	8.45 am	9.00 am	**Opening Speech :** The Dean of FKE
	9.00 am	10.00 am	**Keynote session 1 :** **Prof Dr Congo Tak Shing Ching** National Chung Hsing University **Keynote title: Impedance sensing and machine learning for detection in various fields**
	10.00 am	10.15 am	**Morning break**
	10.15 am	**12.45 pm**	**Parallel Session 1**
	12.45 pm	2.00 pm	**Lunch break**
	2.00 pm	3.00 pm	**Keynote 2 :** **Prof Dr. Haueisen Jens** Technische Universitat Ilmenau **Keynote title: Addressing variability in non-invasive electric stimulation of the nervous system with electrical field modeling**
	3.00 pm	**5.00 pm**	**Parallel Session 2**

PROGRAM TENTATIVE

DAY 2

Programme : 2nd ICBMEHS 2024
Date: 11th – 12th September 2024
Venue: Online, P19A Faculty of Electrical Engineering, University Teknologi Malaysia, Johor Bahru, Malaysia.

12 th September 2024 (Thursday)	8.30 am	9.00 am	Registration
	9.00 am	10.00 am	**Keynote session 3 :** Prof. Dr Mohar bin Kassim Universiti Pertahanan Nasional **Keynote title: The Heart Of Sports Coaching In Football: Using Qualitative Approach To Create A Conceptual Model Towards Team Performance**
	10.00 am	10.15 am	**Morning break**
	10.15 am	**12.45 pm**	**Parallel Session 3**
	12.45 pm	2.00 pm	**Lunch break**
	2.00 pm	3.00 pm	**Closing Speech** Chair of ICBMEHS 2024 **Winners announcement and price giving ceremony**
	3.00 pm	**End of Conference**	

PAPER ABSTRACT

(PAPER ID: 2) Prospect for Flow Occlusion into Aneurysm of Internal Carotid Artery by Stent

Ryuhei Yamaguchi*, Nadia Shaira Binti Shafii ,Makoto Ohta
*Tohoku University

Abstract

IIntroduction: The internal carotid artery (ICA) is one of important and interesting arteies in the neurosurgical field. In particular, the occlusion of inflow into aneurysm is most importance. In this prospect, we described the experimental approach to the flow characteristic of the internal carotid artery (ICA) with aneurysm. Most notification subject is how to fabricate the experimental deformable phantom model and selection stent. Using my original technique, we are trying to fabricate the thin deformable phantom model. Methods: In general, it is difficult to fabricate the phantom model with the thickness of less than 0.5 mm. The fabrication was consisted of 4 steps, i.e., the construction of stl data from DICOM data, mold production, and elastomer dipping, and finally the removal of mold from phantom. Conclusion: The fabrication for phantom are the plaster of mold, how to dip the elastomer, and how remove of mold from the phantom.

Keywords: ICA, Aneurysm, mold, dipping, phantom.

(PAPER ID: 4) DermoDetect: Skin Cancer Detection Using Deep Learning

Jayalakshmi G*
*Sahyadri College of Engineering and Management

Abstract

Skin cancer is a common yet potentially deadly condition that affects the skin's surface layers. Efforts are essential worldwide to prevent this disease and mitigate its impact on individuals and communities. This involves increasing awareness about the disease, identifying risks, and stressing the importance of an early diagnosis. In our research, we explore a groundbreaking use of deep learning techniques for early detection of skin cancer through dermatoscopy images. Types of skin cancer focused on in this research include Actinic Keratoses and Intraepithelial Carcinoma (akiec), Basal Cell Carcinoma (bcc), Benign Keratosislike Lesions (bkl), Dermatofibroma (df), Melanoma (mel), Melanocytic Nevi (nv), Pyogenic Granulomas, and Hemorrhage (vasc). The goal is to use these methods to consistently predict these types accurately. The main technology used in this Python project is Convolutional Neural Network (CNN) architecture. CNNs are highly effective because they can automatically pull important data from images, making them excellent for tasks like photo classification. Our CNN based classifier uses the HAM10000 dataset, which includes 10015 high resolution images from varied sources and methods for training. This system demonstrates remarkable results in identifying skin issues. It achieved an impressive training accuracy of 96.00% and a validation accuracy of 97.00%. Such high levels of accuracy prove that our deep learning skin cancer prediction tool is reliable for early diagnosis, aiding doctors effectively.

Keywords: Skin Cancer, Convolutional Neural Networks, Deep Learning

(PAPER ID: 5) Conceptual Model of Football at National Level: A Qualitative Inquiry

Mohar Kassim*, Ahmad Rafaie Mat, Fadhlina Che Ros
*Universiti Pertahanan Nasional Malaysia

Abstract

The performance of Malaysian sports today is not at a satisfactory level when compared to the performance of the country's sports in the 70s and 80s, especially football, which is the sports that have seen the most significant decline. This study involved (n=25) respondents consisting of head coaches, trainers, and team managers. The data collection process is done through a qualitative method, which is through a semi-structured interview session. The results of this study found that there are several factors such as leadership factors, management support system, coaches' and players' requirements, and the environment affecting four main components which are individual consideration, being influenced by an ideal, motivation, inspiration and intellectual stimulation that have an enormous influence on team and athlete performance. In conclusion, this study have two impacts, the external impact (leadership, management support system, coaches' and players' requirements and environment) referred to the development characteristics for coaching staff, sports managers, and players through interview session in future. While an internal impact (individualized consideration, idealized influenced, inspirational motivation and Intellectual stimulation) towards to excellence in team performance.

Keywords: Leadership, Coaches, Motivation, Football, Qualitative

(PAPER ID: 6) Coaches' Requirements in Athletic Model: A Qualitative Approach.

Mohar Kassim*, Ahmad Rafaie Mat, Fadhlina Che Ros
*Universiti Pertahanan Nasional Malaysia

Abstract

The performance of Malaysia especially athletics nowadays was highly questionable by most of the Malaysian if make the comparison with the performance in the 70s and 80s era, which is the athletics in Malaysia have seen the significant decline gradually. This study involved (n=8) respondents consisting of head coaches, trainers, and team managers. Qualitative method has been chosen in collecting the data, which is through a semi-structured interview session. This study found that coaches' requirements in athletics are affecting several factors such as athletes' consideration, cognitive stimulation that have a big influence on team and athletes' performance and motivational factor. In conclusion, this study produced a positive impact on the training, knowledge and education of athletics at various level.

Keywords: Coaches, Motivation, Athletics, Qualitative

(PAPER ID: 7) Cranial Electro Stimulation Review: A Safer Alternative for the Treatment of Insomnia

Maheza Irna Mohamad Salim*, Indra Gunawan, Nurhadi Ibrahim, Yosephin Sri Sutanti
*Universiti Teknologi Malaysia

Abstract

Use of Cranial Electro Stimulator (CES) for Insomnia therapy. Data from research results submitted to the Federal Drug Administration (FDA) for treatment approval are compared with data using CES therapy other than using CES. Proposed methods, actions, side effects, safety factors and efficacy of the CES device are discussed. The results show that there is enough data to show that CES technology is as effective or more effective in the treatment of insomnia therapy compared to insomnia drugs, with fewer side effects. A prospective study should be conducted to directly compare CES with drug therapy for insomnia and to compare different CES technologies with each other.

Keywords: Cranial Electro Stimulator (CES), Insomnia, Therapy,

(PAPER ID: 8) Optimal Paired Features from the O'Hara Rudy Dynamic (ORd) Ventricular Cell Model for Predicting Drug-Induced Cardiotoxicity

Vilinaa Murali, Asnida A Wahab*, Nor Nisha Nadhira Nazirun, Ali Ikhsanul Qauli, Moo Lim Ki.
*Universiti Teknologi Malaysia

Abstract

Sudden cardiac death, often triggered by ventricular tachycardia and fibrillation, is a significant public health concern. Due to cardiotoxicity, a major issue in pharmaceutical research is drug-induced Torsades de Pointes (TdP). The O'Hara-Rudy dynamic (ORd) model, a popular in silico ventricular cell model, is used to assess TdP risk from drugs, but relying on a single in silico biomarker may inaccurately classify drug risk. This study aims to find the optimal paired features from the ORd model to improve predictions of torsadogenic drug effects. Utilizing a dataset of 12 drugs (24,000 samples, 14 features), leading to 91 feature pairs, their performance was evaluated using ordinal logistic regression (OLR). Catri and qInward were found to be the most influential in determining drug risk categories, indicating these features as the optimal pair. This finding can enhance the management of torsadogenic drug adverse effects through better preventive and treatment strategies.

Keywords: ORd ventricular cell model, in-silico paired features, TdP risk, drug-induced cardiotoxicity, ventricular tachycardia

(PAPER ID: 9) Enhancing Neonatal Care Through an IoT-Based Monitoring System for Infant Incubators

Shatiskumar Sugumaran, Muhamad Amin Abd Wahab*
*Universiti Teknologi Malaysia

Abstract

This study presents an innovative prototype system for infant incubators, designed to enhance the monitoring process for medical assistants in the Neonatal Intensive Care Unit (NICU). Utilizing an ESP32 microcontroller integrated with IoT technology, the system features a Blynk mobile application interface for real-time data visualization. Addressing the challenges of understaffing and high workload in the NICU, the system offers continuous monitoring of temperature, humidity, infant position, and heartbeat in the incubator. The functionality of the device has been thoroughly established using the Rapid Application Development (RAD) methodology, covering phases such as requirements analysis, system design, testing, and delivery. Test results show minimal discrepancies in heart rate readings compared to the Samsung Galaxy Watch 5 (-0.44% to 1.72%) and the heart rate app (-0.82% to 0.67%) in terms of percentage difference. Percent error of the temperature measurements varied between -5.94% to 5.29% compared to the incubator display and -3.29% to 4.33% compared to the FLUKE Baby Incubator Analyzer, while the humidity percent error ranged from -13.69% to -7.92%. The system also effectively triggers a notification within 10 seconds when the baby manikin moves out of the safe zone. Overall, the prototype demonstrated reliable performance in monitoring critical NICU parameters, providing a user-friendly and efficient solution to improve neonatal care.

Keywords: Infant Incubator, IoT, Temperature Monitoring, Baby Positioning, Heart Rate Monitoring

(PAPER ID: 10) Optimum Machining Condition Of Electrical Discharge Machine Through Flyback Power Supply For Machining Hip Implant

Azli Yahya*, Nor Hisham Khamis, Mohd Azahar Che Abdullah,Bentantya Nugroho, Norhalimah Idris, Nazriah Mahmud, Nor Liyana Safura Hashim
*Universiti Teknologi Malaysia

Abstract

Hip joint is an important joint in human body that help in our daily movement. Wear rate is known as the major concerns for determining the lifespan of MoM hip implant. Surface texturing is now employed in implant design due to the improved lubrication performance as well as reducing wear and friction. Electrical Discharge Machining using flyback power supply is suggested since it results in no-burr formation. Optimum Machining condition of EDM process such as VGap, IGap, Ton and Toff has resulted better performance measurement such as Tool Wear Rate (TWR), Material Removal Rate (MRR), and Surface Roughness (SR) whereas, MRR is the most dominant performance measure in this study since it affects the quality of micro-dimples in term of consistency of material being removed for hip implant surface.

Keywords: EDM, Hip Implant, Machining

PAPER ABSTRACT

(PAPER ID: 11) T2DM: Designing Mobile Application for Type 2 Diabetes Self-Management

Lim Hui Si*
*Universiti Teknologi Petronas

Abstract

This paper presents the overview of developing a comprehensive and user-friendly mobile application to assist individuals with type 2 diabetes mellitus (T2DM) in managing their condition. The app is designed to objectively measure dietary consumption, physical activity, blood sugar levels, medicines, and bodyweight. Moreover, author had conducted the interview session with T2DM patients, their guardians, and health professionals to identify their needs and requirements. The paper focuses on the potential benefits of mobile apps for T2DM management, such as better patient outcomes and higher participation. It also emphasizes the increasing global prevalence of T2DM and the significance of innovative approaches to address this health condition. Problem Statement: The usage of mobile apps for diabetes management app is low. This is due to few factors such as high costs, digital illiteracy, and design issues that affect patient motivation. Objective: The main objective of this study is to develop a mobile app that can objectively track dietary intake and nutrition, physical activity, blood sugar level, medication, and bodyweight of T2DM.

Keywords: Type 2 diabetes mellitus (T2DM), mobile app, self-management

(PAPER ID: 12) Food Calorie Estimation using Computer Vision : A Review

Paula Queipo-Alvarez*, Mario Munoz-Organero, Asnida A Wahab, Mohd Shafry Mohd Rahim
*Universiti Teknologi Malaysia

Abstract

This literature review describes new developments on estimating food calories using computer vision. It benefits nutritional monitoring, food logging and dietary assessment. Monitoring the diet, glycemic indices, total calories and consumed nutrients can improve the health and fitness of everyone. Key subtasks include image segmentation, classification, category recognition, category detection, volume estimation, quantity detection and nutrients estimation. A study of 56 publications showed the promising results of pretrained convolutional neural networks and multi-task learning frameworks. Some models achieved more than 90 % accuracy in food segmentation and recognition and less than 15 % relative error in calorie estimation. However, there is still a long way to go with multi-layered dishes and homemade sauces, so categorising and annotating recipes and nutritional content in databases is still necessary.

Keywords: Calorie estimation, computer vision, food recognition, food segmentation, dietary assessment

PAPER ABSTRACT

(PAPER ID: 13) The Development and Survivability of Strongyle Free-Living Stage Larvae in Different Environment and Types of Soils in Tropical Ambiance

Fuziaton Baharudin*
*Universiti Teknologi Malaysia

Abstract
Strongyle is a harmful parasite in horses, and its infestation pose a threat to the host's health. In managing impactful parasite control program, understanding the environmental conduciveness of the shedded parasite's egg survive the full life cycle is crucial in tropical ambiance. Studies that describe these tendencies are limited to temperate countries' environments. Fresh feces droppings collected from horses were cultured in the laboratory using pasture on four types of common soils in Malaysia. The soil types are sphagnum, omnibus, saprolitic, and antisols placed in rectangular wood panels kept at different temperatures at 21±1°C, 26±1°C, 29±1°C, and 32±1°C for 30 days. The Baermann technique was used to extract larvae from fecal samples. Larvae development and survivability were viewed under a microscope (x10). Sphagnum soil has a higher survival rate for larvae at a temperature of 21±1°C (p-value = 0.027).
Keywords: Strongyle, horses, parasite, tropical ambiance, Malaysian soil

(PAPER ID: 15) Total Mixed Ration Silage for Feeding Ruminants: A Review

Guna Rangini, Mira Panadi*
*Universiti Teknologi Malaysia

Abstract
Feeding a large number of animals individually is challenging. Hence, a method of feeding known as total mixed ration (TMR) was developed, in which animals are provided with a diet consisting of concentrates and forage to provide the necessary nutrients for the animals. The roughage component of TMR comprises of fodder, hay, and silage while the concentrate component comprises grain, cereal by-products, plant and animal protein meals, and certain vitamin and mineral supplements. Currently, the TMR is one of the most widely used and effective methods for feeding livestock animals. The TMR needs to be mixed freshly before feeding to animals. However, there are certain disadvantages of using TMR, particularly when TMR is exposed to air, which will lead to aerobic deterioration. This condition not only leads to nutrient loss but also results in harmful metabolites that harm ruminants. Hence ensiling TMR not only inhibits the development of harmful microorganisms but also preserves the nutritional value of the feed resources, enhances the palatability by modifying odors and flavors, and balances the moisture content of crops. It has been a common practice to incorporate byproducts into TMR silage to improve the nutritional value of the feed composition. Farmers can reduce waste and maximize resource utilization by utilizing agriculture byproducts in TMR silage to produce feed that meets the specific needs of their livestock.
Keywords:

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PAPER ABSTRACT

(PAPER ID: 14) Protective coatings for zirconium-based alloys: improving their mechanical and biological properties

Wurood asaad Midab*, Maysam Abbood Salman, Ruaa Hatem Kadhim
*Ministry of Electricity Baghdad

Abstract

Zirconium is widely utilized in biomedical implants because of its exceptional properties, including corrosion resistance, wear behavior, and biocompatibility. However, these implants might have certain unfavorable effects since they lack surface features. Therefore, it is essential to establish the surface properties required for zirconium implants. Particularly, (8YSZ) has demonstrated potential in controlling the biological and mechanical reactions to Zr. A zirconium 705 substrate was coated with nanoparticles using a plasma thermal spray technique. The layer was seen using XRD and a scanning microscope; the coated samples (8YSZ) had a harder and more wear-resistant layer than the uncoated samples. An enhancement to the biological characteristics.

Keywords: YSZ coating, Thermal spray, Zirconium

(PAPER ID: 16) Hemodynamic Effect of Coiled Middle Cerebral Artery Aneurysm – A Preliminary Study

Aisya Nursaffiya Bt Shaharul Sadri, Ryuhei Yamaguchi, Kahar Osman, Mohamad Ikhwan Kori, Mohd Rashdan bin Saad, Makoto Ohta , Nadia Shaira binti Shafii*
*Universiti Teknologi Malaysia

Abstract

Intracranial aneurysm rupture is one of the asymptomatic diseases that could cause internal bleeding in the brain with high potentially fatal. One of the treatments for aneurysms is an endovascular coil. However, the common related issues to this treatment are recanalization and coil migration. This study aims to predict the flow behavior and thrombus development through computational simulation between the untreated and 0.7 coiled MCA aneurysm since thrombosis formation is essential for holding the coil. An experiment was conducted with only a 10.3% difference in velocity. The analyzed hemodynamic parameters that are accountable for the initiation of thrombosis showed that the coiled MCA aneurysm results in a uniform outflow velocity, 17.4% larger area of low wall shear stress (WSSlow), and 35.68% lower pressure difference compared to the untreated MCA aneurysm. Therefore, these results showed that high porosity coiling may reduce the risk of migration, rebleeding, and recurrence problems after surgery.

Keywords: Computational fluid dynamics, MCA aneurysm, Particle Image Velocimetry, coiling, porosity.

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PAPER ABSTRACT

(PAPER ID: 17) Decellularization of tissues and organs: Methods and assessments

Nursyah Fitri, Mohd Riduan Mohamad*
*Universiti Teknologi Malaysia

Abstract

The overwhelming need of organs and tissues and transplantation requires an alternative source, which is scaffold derived from decellularized extracellular matrix (dECM). The dECMs have their cellular and genetic components removed, while maintaining its structural integrity. This review discusses methods of decellularization ranging from physical, chemical, and biological techniques, with various underlying mechanisms. It also summarizes the diversity of tissues and organs that have been decellularized previously. It also mentions the physical methods such as high hydrostatic pressure (HHP) application is considered as a promising approach. Finally, it also appraises the assessment of dECM subsequent to decellularization, based on the risk of immunogenicity and mechanical properties.

Keywords: Decellularization, extracellular matrix, immunogenicity, mechanical properties

(PAPER ID: 18) Evaluation of Emotional State and Memory Performance under Exposure of Different Music Genres Based EEG on Power Spectral Density and Mean Frequency Band

Syarifah Noor Syakiylla Sayed Daud, Rubita Sudirman*, Rahman Z. M. A.
*Universiti Teknologi Malaysia

Abstract

Human mental and emotional states can be stimulated through various factors. Music engagement is among the stimulus that can affect and is easily practiced. However, confirming an efficient music genre is still unclear and needs further investigation. This work aims to investigate the relationship of music genre with mental and emotional state based on power spectral density (PSD) and mean frequency band of EEG features. Over 5000 samples of EEG signals were acquired from 30 participants during the experimental session via three affected P3, Pz, and P4 locations. The result indicated that the PSD of the alpha band for classical music was the highest contributed by increasing calm state, reducing stress, and improving working memory. Classical music provides a better-recalled score compared to other music genres. It was noted that a strong relationship exists between stable mental states and improved working memory performance in classical music.

Keywords: Brain location, electroencephalography analysis, frequency band, power spectral density, working memory.

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PAPER ABSTRACT

(PAPER ID: 19) Formulation Of Antimicrobial Toothpaste Containing Bromelain Enzyme

Noorazwani Zainol, Nur Aina Shukri, Effaliza Misran, Harisun Ya'akob*, Dayang Norulfairuz Abang Zaidel, Joko Sulistyo
*Universiti Teknologi Malaysia

Abstract

Bromelain is an enzyme abundantly can be extracted from pineapple. Bromelain holds various bioactivities, such as anti-inflammatory,wound healing, anti-microbial and anti-dematous properties. Anti-dematous activity provides benefits to the oral of consumers to faster heal the ulcer diseases. Besides the demand by the consumers on natural ingredients used in the toothpaste, its medicinal properties is also important. Therefore, this study focused on the development of toothpaste formulations with the most stable Bromelain activity whilst possesses a significant antimicrobial activity. The toothpaste developed was characterized in terms of viscosity, moisture content, antimicrobial activity and sensory evaluation. The results indicated that the component extracted from pineapples possesses antibacterial properties. The bromelain toothpaste was developed to meet all the necessary criteria for maintaining oral freshness and preventing tooth decay caused by bacteria. It was then compared to a commercially available toothpaste. Medical assessment: The color of the substance is white with a slight yellowish tint. It has a smooth texture and a pH value of 8.63 ± 0.05. The formulation has good spreadability and is stable. The assessment of the antimicrobial effects on Staphylococcus aureus indicates that the prepared bromelain toothpaste demonstrated significant activity, as evidenced by a zone of inhibition (ZOI) of 1.8 ± 0.05 cm. This study demonstrates that the develop toothpaste formulation, is equally effective in terms of results when compared to commercially available formulations.

Keywords: Bromelain, Toothpaste, Antimicrobial, oral health.

(PAPER ID: 20) Enzymatic Transglycosylation Reaction Of Polyphenol Glycoside And Its Functional Properties As Antioxidant And Antimutagen

Joko Sulistyo, Yati Sudaryati Soeka, Rini Handayani, Dayang Norulfairuz Abang Zaideli*, Umi Hartina Mohd Razali.
*Universiti Teknologi Malaysia

Abstract
This study aimed to assess the potential of Monascus purpureus as a source of crude enzymes with transglycosylation activity, using carotenoid constituents extracted from M. purpureus cell cultures as the acceptor. The mixture was then incubated with starch as the substrate to synthesize carotenoid glycosides via transglycosylation. The resulting carotenoid glycoside was purified using octa-dodecyl-functionalized silica gel column chromatography and analyzed with Thin Layer Chromatography (TLC) and High Performance Liquid Chromatography (HPLC). The antioxidant activity of the carotenoid glycoside, produced through enzymatic transglycosylation, was evaluated using the 2,2-Diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method, and its antimutagenic activity was tested using a bioassay method. The carotenoid glycoside showed an Lethal Concentration 50% (EC50) of 109.59±4.15 µg/mL, indicating stronger antioxidant activity than the carotenoid aglycon, which had an EC50 of 137.18±5.05 µg/mL. It also demonstrated a higher percentage of inhibition against mutagens at 97.1%, compared to 71.6% for the carotenoid aglycon. The findings of this study indicated that microbial carotenoids demonstrated superior antimutagenic activity compared to commercial astaxanthin and β-carotene.
Keywords: transglycosylation, carotenoid glycoside, antioxidant, antimutagen.

(PAPER ID: 21) Exploring SAR Analysis of Implantable Antenna in Biomedical Applications: An Overview

DiviyaDevi Paramasivam , Maria Alessandra S. Florida , Alvir Jamil, Raimi Dewan*, Hashimu Uledi Iddi, Nuradilah Yusri
*Universiti Teknologi Malaysia

Abstract
The exposure of the human body to continuous electromagnetic (EM) radiation emitted by the implanted antenna in biomedical devices is a crucial criterion that needs to be considered when designing one. In particular, the absorption of energy during exposure to EM radiation varies according to the body parts, and can be determined by the Specific Absorption Rate (SAR). Therefore, this paper provides a generic overview of the SAR analysis of the implantable antenna within the head, heart, breast, and limbs based on the reported studies. In addition, it was found that the reduction of maximum allowable input power from 1.00 W to 0.04 W, resulted in SAR values that are 36 % and 81 % lower than the limit for the fat and muscle layers, respectively. Thus, analyzing antennas in varying input power, body parts, and tissue layers is crucial for implantable antennas to exhibit a regulated SAR value.
Keywords: Antenna, Biomedical applications, Implantable, SAR

PAPER ABSTRACT

(PAPER ID: 22) Validation of Electronic Analogue Modelling for Pressure-Volume Loops in Normal and Hypoplastic Left Heart Syndrome (HLHS)

Mohammad Aiman Mohammad Radzman, Ahmad Zahran bin Md Khudzari*, Fitri Yakub , Muhammad Sharifuddin Abd Rahim, Jackson Godfrey Rusanyu , Azli Yahya, Sivakumar Sivalingam .
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Abstract

The cardiovascular system plays a vital role in transporting blood throughout the body. Electronic analogue modelling offers a valuable tool to simulate and analyse its physiological and pathological states, reflected by pressure-volume (PV) loops. While prior studies have investigated cardiovascular circuits, there is a gap in analysing both normal and HLHS (a critical congenital heart defect) using PV loops. This study addresses this gap by employing Multisim software to simulate and compare PV loops of normal right and left ventricles against pathological right ventricles in HLHS. Notably, the simulated PV loops exhibited high similarity to real-life patient data, validating the reliability of the circuit model. This paves the way for further application of the model in simulating diverse cardiovascular conditions.

Keywords: Pressure-volume loop, cardiovascular system, electronic analogue modelling, hypoplastic left heart syndrome, Fontan circulation

(PAPER ID: 23) Modification of 3D Printed Polylactic Acid Scaffold with Chitosan and Polyvinyl Alcohol in Enhancing Bone Mineralization

Ravathi Marathandi, Hemalatha Mariapen , Norhana Jusoh*, Murfiqah Taufiqiah Mohd Amin
*Universiti Teknologi Malaysia

Abstract

Bone tissue engineering (BTE) has advanced with 3D scaffolds that create complex, tissue-specific structures for regeneration. Polylactic acid (PLA), a common polymer in 3D printing, lacks bioactivity, biomineralization, and hydrophilicity limiting its effectiveness. To address these issues, surface modifications using polyvinyl alcohol (PVA) and chitosan (CS), known for their excellent biological properties, were explored. PLA scaffolds were 3D printed and coated with PVA and CS using dip coating and freeze-drying techniques. Characterization of the coated PLA scaffolds using scanning electron microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), Energy Dispersive X-ray (EDX), and water contact angle (WCA) measurements showed that PLA/CS/PVA scaffolds had the highest hydrophilicity with a WCA of 48.43 ± 5.55°. SEM revealed a smooth, continuous film from the PVA coating with irregular patches from CS, while FTIR confirmed the successful incorporation of PLA/CS/PVA chemical bonding. EDX analysis showed calcium (Ca) and phosphate (P) ions, with a Ca/P ratio of 2.76, close to human bone, compared to 2.07 in pure PLA scaffolds. The dual-coated PLA/PVA/CS scaffolds demonstrate promising biomineralization for bone regeneration.

Keywords: 3D Printing, Chitosan, Polylactic acid, Polyvinyl alcohol, Scaffold, Bone Mineralization

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PAPER ABSTRACT

(PAPER ID: 24) SAR performance for Breast Cancer Hyperthermia Treatment using 2.45 GHz and 0.915 GHz Circular Non-Invasive Microstrip Antenna integrated with various shapes of Water Boluses

Mazlina Mansor Hassan*, Kasumawati Lias, Norlida Buniyamin, Bibi Sarpinah Sheikh Naimullah, Mohamad Zulkarnaen Ahmad Narihan, Dzufi Iszura Ispawi
*Universiti Malaysia Sarawak

Abstract
This research presents a hyperthermia treatment procedure using a circular microstrip patch antenna integrated with a water bolus to destroy malignant tissues. Hyperthermia uses high temperatures from 41 °C to 45 °C to denaturate cancer tissues into necrotic tissues. SEMCAD X 14.8.4 is used as a software simulator to develop antenna, breast phantom, cancer cells and water boluses. Three cancer tissue diameters are considered in the research, which are 15mm, 34mm and 59mm, based on analysis of the mammogram images received from the referred Hospital. 2.45GHz and 0.915GHz antennas were used as the operating frequencies in the research to destroy the malignant tissues. Different shapes of deionized and distilled water boluses integrate with the antenna to reduce the unwanted hotspots and maintain the focus position distance. Water boluses of different shapes and antenna frequencies provide sufficient focus position distance, penetration depth and estimation times during the execution of the hyperthermia treatment.
Keywords: Hyperthermia, Circular Antenna, Water Bolus, Focus Position Distance, Unwanted Hotspots

(PAPER ID: 28) Evaluating E slot Microstrip Antenna for Breast Cancer Hyperthermia Treatment

Bibi Sarpinah, Kasumawati Lias, Ahmad Tirmizi Jobli , Norlida Buniyamin, Mazlina Mansor Hassan
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Abstract
This study aims to evaluate the performance of an E-slot microstrip antenna compared to a non-slot rectangular microstrip antenna for hyperthermia treatment in breast cancer. Hyperthermia treatment involves elevating the temperature above body temperature to denature and shrink the tumors. A small, medium, and large tumour was inserted in a breast phantom, and the chest wall was included. Both breast phantom and E-slot microstrip antenna were developed in SEMCAD X. The fitting tool determines the electrical and thermal properties based on the Gabriel database. The tumor has a higher relative permittivity and conductivity compared to healthy tissue. The results demonstrate that the E-slot microstrip antenna improves directivity, gain, return loss, and SAR spatial average. Additionally, SAR distribution with an E-slot microstrip antenna demonstrates uniform heat distribution and more focus on the tumour. These findings suggest that the E slot microstrip antenna can be applied for effective hyperthermia treatment.
Keywords: Hyperthermia, SAR, Microstrip antenna, penetration depth, Slot antenna, tumor

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PAPER ABSTRACT

(PAPER ID: 25) Modification of polycaprolactone/chitosan nanofibers with β-tricalcium phosphate in improving bone scaffold propertiess

Sharifah Raihanah Kamaruddin, Syakirah Athirah Abdulla Hamid, Norhana Jusoh*, Adlisa Abdul Samad
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Abstract

Investigation on bone tissue engineering (BTE) have been extensively conducted with the main focus is towards mimicking bone extracellular matrix (ECM) that have osteoconductive properties to restore injured or diseased bones. Thus, electrospun nanofibers have become an ideal solution in fabricating the bone scaffold. Furthermore, incorporation of calcium phosphates is one of the key strategies for enhancing the bioactivity of nanofibers. However, as compared to hydroxyapatite (HA), the limited exploration of β-tricalcium phosphate (β-TCP) in nanofibers creates a substantial gap in understanding its specific impact on the bone scaffold properties. Therefore, this study investigated the formulation and charaterization of polycaprolactone (PCL) and chitosan electrospun nanofibers incorporated with β-TCP. Characterization analyses using scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), and water contact angle (WCA) measurements revealed that PCL/Chitosan nanofibers with a 70:30 ratio have a more interconnected and porous structure compared to pure PCL, with the addition of β-TCP further enhancing this porous network morphology. WCA results indicated progressive hydrophilicity from pure PCL (110.6°) to PCL/Chitosan (84.4°) and PCL/Chitosan/β-TCP (64.9°). FTIR spectra confirmed the successful incorporation of chitosan and β-TCP into the PCL matrix, indicated by characteristic peaks for C-H, N-H, C=O, C-O-C, and PO_4^{3-} groups. These findings suggested that the PCL/Chitosan/β-TCP nanofiber scaffold with its optimised physicochemical properties holds significant potential for applications in bone tissue engineering that have potential in replicating native bone properties and promoting bone tissue formation.

Keywords: Polycaprolactone, Chitosan, β-tricalcium Phosphate , Electrospun Nanofibers, Bone Scaffold

PAPER ABSTRACT

(PAPER ID: 26) Measuring Human Blood Glucose via Infrared Sensor

Ahmed Alroud, Fazrena Azlee Hamid*, Jehana E. Jamaluddin
*Universiti Tenaga Nasional

Abstract

This study introduces an innovative method for measuring human blood glucose levels using the TCRT5000 optoelectronic sensor, which operates at a near-infrared (NIR) wavelength of 950 nm. Unlike traditional methods, this approach eliminates the need for painful real-time blood sampling, making the process non-invasive and more comfortable for patients. The sensor is designed to measure glucose levels by detecting the intensity of infrared light reflected from the patient's fingertip. Data analysis from samples of 15 patients revealed a strong linear correlation between glucose levels and sensor voltage readings, with an R^2 value of 0.9959. This result indicates high accuracy and reliability in the sensor's performance, suggesting that this method could provide a viable alternative for glucose monitoring in patients with diabetes.

Keywords: Reflexive IR Transmitter, TCRT5000, Diabetes Measurement, Infrared, Glucometer, Actual Glucose Level

(PAPER ID: 27) Malaria Parasite Detection in Thin Blood Smear Images with Rouleaux formation Morphology

Fatima Abdullahi Muhammad, Rubita Sudirman, Nor Aini Zakaria
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Abstract

Despite immense effort to eradicate malaria, it remains a global endemic disease with half of the world population at a risk of infection. Blood smear microscopy is the gold standard technique of diagnosing malaria, but this technique is highly subjective and time consuming with accuracy depending on the expertise of the technician which is highly lacking in malaria endemic regions. In Malaria endemic regions, malaria microscopy often reveals comorbidity with other diseases such as bacterial infection. The presence of such infection leads to the stacking together of red blood cells (RBC) like chains of coins, this abnormality of the RBC is termed Rouleaux formation. A lot of studies have been done to automate malaria diagnosis using deep learning techniques, but none has tackled the detection of malaria parasite with regards to rouleaux formation. Hence this study trained all variations of YOLOv8 to detect the presence of two species of malaria parasite and white blood cells in RBCs with rouleaux formation achieving a mean average precision of up to 80%.

Keywords: Malaria, Thin Blood Smear, Microscopy, Rouleaux formation, Deep learning, Object detection, YOLOv8

PAPER ABSTRACT

(PAPER ID: 31) A Preliminary Study: Optimal Caffeine Intake Variables on Cognitive Performance Increment Using Response Surface Methodology

Raymond Teoh Yong Sheng, Rubita Sudirman, Eileen Su Lee Ming, Syarifah Noor Syakiylla Sayed Daud, Nor Aini Zakaria*
*Universiti Teknologi Malaysia

Abstract
This research studies the association between caffeine intake variables with body condition and cognitive performance through Response Surface Methodology (RSM), aiming to formulate a caffeine dosage level and activation time that benefits cognitive performance without affecting body health. A modelled equation representing the caffeine intake dosage and cognitive performance increment based on data from previous research work was obtained through the modeling of RSM. Throughout this preliminary work, the optimal caffeine variable recommended by RSM was 0.727 mg/kg body mass with an activation time of 32.2 minutes post-caffeine consumption. The mean of cognitive performance increment was 25.46 % with the desirability of 1. Due to the dataset limitation, further data collection will be carried out after ethics approval, and new data will be analysed using other optimization methods.
Keywords: Caffeine, Physiological Response, Cognitive, Response Surface Methodology

(PAPER ID: 32) Electromyogram Acquisition System using aGraphene-Based Sensor

Peng Yilin, Nurul Ashikin Abdul-Kadir* , Nurizzati Mohd Daud , Syaidah Md Saleh, Mohd Azhar Abdul Razak , Siti Aisyah Mualif , Fauzan Khairi Che Harun , Keith Moey, M Khairy
*Universiti Teknologi Malaysia

Abstract
Graphene-based sensors have shown great potential in various biomedical applications due to their excellent electrical properties and biocompatibility. This study focuses on the development of graphene- based sensors for electromyography (EMG) acquisition systems. By using reduced graphene oxide (rGO) on a textile substrate, we aim to overcome and address the limitations of traditional wet electrodes, such as skin irritation and signal instability due to gel drying. The process involves fabricating dry electrodes and testing them for several key parameters, including cytotoxicity, electrical properties, and EMG signal acquisition performance. Preliminary tests have shown that rGO electrodes have good stability and biocompatibility and provide high signal fidelity. Compared with traditional wet electrodes, rGO electrodes are not only suitable for long-term use, but they also eliminate the need for the use of conductive gel, reduce skin irritation, and provide longer-lasting, stable EMG signals.
Keywords: graphene-based sensor, electromyography (EMG), reduced graphene oxide (rGO), dry electrodes, biocompatibility

(PAPER ID: 33) Electrospun Quercetin-loaded Polycaprolactone for Drug Delivery Application

Khalida Fakhruddin, Asyikin Sasha Mohd Hanif, Ahmad 'Athif Mohd Faudzi , Muadz Ahmad Mazian, Mohamad Ikhwan Jamaludin*
*Universiti Teknologi Malaysia

Abstract
Quercetin is a type of flavonoid used as potential phytochemical in treating chronic diseases due to its anti-inflammatory, antioxidant and other therapeutic effects. It is commonly taken via oral and injection approaches. However, its curative efficacy is limited by its low aqueous solubility, extensive first pass metabolism and resultant low availability. In this study, an electrospun quercetin-loaded poly (ε-caprolactone) (PCL) nanofibrous was fabricated as a potential bioactive implantable drug. The prepared nanofibers were characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), mechanical test, and thermogravimetric analysis (TGA). In vitro release of quercetin from the nanofibers was studied in a simulated physiological condition using ultraviolet-visible spectroscopy. The morphological study showed formation of nanofibers with bead-less, randomly interconnected uniform structure and porosity. The mechanical properties and thermal stability were reduced upon incorporation of quercetin indicating disruption in the polymer matrix. Quercetin release study showed the highest amount of quercetin release within 180 min period, and sustained release until day-21. Overall, the fabricated nanofibers have provided desired properties for implantable drug delivery application.
Keywords: Quercetin, polycaprolactone, electrospinning, nanofibers

(PAPER ID: 35) A Comprehensive Review of 3D Printed Moulds for Temporary Knee Arthroplasty Spacers

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*Universiti Teknologi Malaysia

Abstract
The increasing demand for total knee arthroplasty (TKA) is accompanied by a rise in subsequent revision total knee arthroplasty (rTKA) procedures, necessitating immediate, cost-effective, and personalized temporary knee spacers made from moulded bone cement. Although temporary knee spacer moulds are widely available, the potential of 3D printed moulds remains underexplored. 3D printing offers precise fabrication of custom anatomical spacers, ensuring better fit, stability, and reduced risk of failure compared to conventional methods. PLA polymer, chosen for its biocompatibility and low melting temperature, facilitates easy printing. This review synthesizes literature on knee anatomy, TKA, rTKA components, and the application of 3D printing for mould production, highlighting its potential in enhancing surgical outcomes through personalized spacer solutions.
Keywords: 3D-Printing, Knee Arthroplasty, Mould, Temporary Knee Spacers

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PAPER ABSTRACT

(PAPER ID: 36) Color Contrast Enhancement On Cervical Cell Images

Mohamed Saifuddin Shahul Hameed, Wan Azani Wan Mustafa*, Khalis Danial Nukman Khiruddin , Mohd Wafi Nasrudin ,Syahrul Junaini
*Universiti Malaysia Perlis

Abstract
Cervical cancer is a common disease that can be transmitted by women. The Pap Smear test is used to detect precancerous changes in cervical cells based on the color and shape of their nuclei and cytoplasm. Manually performing the problem can be time-consuming, and it can exacerbate inconsistencies and errors because the cervical cell itself does not differ in texture and color from normal cells. The study's objectives include discovering a new method for color contrast enhancement of cervical cell images, evaluating the method, and developing a Graphical User Interface. This research will improve the color contrast of cervical cells, allowing for faster and more accurate detection of these cells. Histogram equalization is used to improve color contrast, which is then converted to grayscale before being segmented using the threshold technique. The image obtained after histogram equalization has a higher color contrast and is more visible where cells were detected.
Keywords: Cervical cancer, CLAHE, Color Contrast, Histogram Equalization and Contrast Stretching.

(PAPER ID: 37) Selection Moment Invariants Feature Extraction Techniques of Medical Images based on Intraclass Analysis

Mohd Wafi Nasrudin*, Nur Diana Mastura Zulkifli (Hospital Tuanku Fauziah), Wan Azani Mustafa , Rashidah Che Yob, Norfatihah Bahari.
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Abstract
Medical imaging is the technique and process of imaging the interior of a body for clinical analysis and medical intervention. It becomes difficult to retrieve the related image when the images are deformed by some geometric deformation. This difficulty can be solved by using the Moment invariant technique since this technique is very useful for invariant feature extraction due to its rotation, translation, and scaling invariance properties. In this paper, two moments namely Legendre and Krawchouk moment invariants techniques have been utilized to extract the medical image and address the issues of geometric transformation. This work is conducted based on scale-invariant, rotation invariant and combined rotation and scale invariance. The selection of the best moment invariants technique is determined based on intra-class analysis. As the result, the Krawtchouk Moment Invariants able to produce the lowest error as compared to Legendre Moment Invariants based on the Total Percentage Mean Absolute Error.
Keywords: Legendre Moment Invariants, Krawtchouk Moment Invariants, Medical Image, Shape Analysis, Intra-class Analysis

(PAPER ID: 38) Effects Of Biofeedback Training On HRV, Mood State And Shooting Performance of Shooters

Huang Donghai, Muhammad Nubli Abdul Wahab*
*University Malaysia Pahang Al-Sultan Abdullah

Abstract

Cervical cancer is a common disease that can be transmitted by women. The Pap Smear test is used to detect precancerous changes in cervical cells based on the color and shape of their nuclei and cytoplasm. Manually performing the problem can be time-consuming, and it can exacerbate inconsistencies and errors because the cervical cell itself does not differ in texture and color from normal cells. The study's objectives include discovering a new method for color contrast enhancement of cervical cell images, evaluating the method, and developing a Graphical User Interface. This research will improve the color contrast of cervical cells, allowing for faster and more accurate detection of these cells. Histogram equalization is used to improve color contrast, which is then converted to grayscale before being segmented using the threshold technique. The image obtained after histogram equalization has a higher color contrast and is more visible where cells were detected.

Keywords: Cervical cancer, CLAHE, Color Contrast, Histogram Equalization and Contrast Stretching.

(PAPER ID: 39) Cardiac Health Assessment with ECG Signals Using 1D CNN Technology

Mohammed Alsalatie, Ali Rababagh , Wan Azani Mustafa*, Hiam Alquran
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Abstract

The electrocardiogram (ECG) is a powerful diagnostic tool for assessing heart function and detecting myocardial infarction and arrhythmias. The device records the electrical signals of the heart and is used for analyzing heartbeats and rhythms. Arrhythmia detection can be automated by analyzing aberrant heartbeats, which has become a popular study topic due to the time-consuming and error-prone manual inspection process. Deep learning (DL) may be a preferable option for quick and automatic classification with improved training. In order to classify cardiac arrhythmias, this study presents a unique deep learning architecture—more precisely, a one-dimensional convolutional neural network (1D-CNN). Real and noise-attenuated cardiac rhythms obtained from the MIT-BIH database were used to train and evaluate the model. Our model, which relies on raw signals, is fast, accurate, and simple, with an test accuracy of 92.6%.

Keywords: ECG, 1D CNN, deep learning, arrhythmias

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PAPER ABSTRACT

(PAPER ID: 41) Physicochemical and drug release analysis of Rutin incorporated in Polyvinylpyrrolidone (PVP) / Hydroxypropyl Methylcellulose (HPMC) film

Iliya Qasrina Idris , Raz Haziqah Hani Razali, Nurizzati Mohd Daud*
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Abstract

Administration of drug without a carrier might lead to a burst release effect which caused the drug to metabolize before it reaches the targeted site, thus reducing the effectiveness of the treatment. Polymer blending to form a thin film hydrogel can control the release of the drug, ensuring a more effective and sustained therapeutic effect. Polyvinylpyrrolidone (PVP) is utilized as a nonsurfactant suspending agent, film maker, emulsion stabilizers, binder and hair fixative. Hydroxypropyl Methylcellulose (HPMC) is easily hydrated by water, expanding well and can accelerate the release of drugs from its base. Therefore, different concentration of HPMC was mixed with PVP to form a thin film and rutin as a model drug, was incorporated into the film. The combination of these polymers will create a synergistic effect that significantly enhance drug delivery system by controlling the drug release. Fourier Transform Infrared Spectroscopy (FTIR) shows that the peak at 1650 cm-1 which represents by carbonyl groups was decreased in addition of HPMC concentration, indicates the homogeneity between PVP and HPMC. Scanning electron microscope (SEM) image shows a smooth and homogenous surface texture, indicating that both polymers were mixed successfully. PVP/HPMC4 shows high water absorption capability and still maintain the hydrophilicity of surface which is 64°. Moreover, the sample have more controlled and gradual release after 7 days immersion in Phosphate Buffer Saline (PBS) and maintain its stability in 27 °C at pH level of 7. The antioxidant analysis shows the decreased percentage of radical scavenging activity (RSA) in increasing concentration of HPMC, which shows that HPMC manage to control the rutin release of the film. Thus, the potential of rutin-loaded PVP/HPMC films as effective matrices for transdermal or tablet- based drug delivery systems, offering ease of fabrication and improved drug release profiles.

Keywords: PVP, HPMC, rutin, controlled release, antioxidant activity

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PAPER ABSTRACT

(PAPER ID: 40) Comparative Evaluation of Acoustic Properties of Bone Phantom with Different Porosities

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Abstract
Cancellous bone supports bone strength and reduces weight through its porous structure beneath the cortical bone layer. Due to ethical concerns and limited availability of human cancellous bone, this study explores 3D printed and commercial bone phantoms for educational and research purposes. Using standard Stereolithography (SLA) resin, bone phantoms with different porosity patterns were created. Ultrasound transmission techniques measured speed of sound, attenuation, and amplitude. Results showed the resin bone phantom with 31.76% porosity had an attenuation of 0.43 dB/cm, while the commercial bone phantom with 80.20% porosity had 2.00 dB/cm. The resin bone phantom had a 74.43% error difference, compared to 17.79% for the commercial bone phantom. Both materials significantly differed in speed of sound from real cancellous bone (3800 m/s). Therefore, the commercial bone phantom with 80.20% porosity more closely mimics real cancellous bone based on the error of difference for attenuation parameters.
Keywords: Bone Phantom, Attenuation, Speed of Sound, Ultrasound, Through Transmission Technique

(PAPER ID: 42) Suspension Study of Functionalised Multiwalled Carbon Nanotubes and Zinc Oxide Nanoparticles in Various Dispersion Solvents

Muhammad Faiz Md Shakhih*, Faizuan Abdullah, Asnida A Wahab, Chong Jia Qi, Siti Aisyah Mualif, Rabbilu Runka Dahiru
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Abstract
Functionalised multiwalled carbon nanotubes (fMWCNTs) and zinc oxide (ZnO) nanoparticles possess exceptional mechanical, electrical, and optical properties, making them ideal for applications in biosensor, polymer composites, electronics.. Achieving uniform and stable dispersions of these nanoparticles is important, as their strong tendency to agglomerate due to van der Waals interactions and high aspect ratios presents significant challenges. Finding the right dispersion solvent is essential to overcome these challenges and to maximize the nanoparticles' functional properties, ensuring they can be effectively utilized. This study investigates the dispersion and stability of fMWCNTs and ZnO nanoparticles in various solvents, including N,N-dimethylformamide (DMF), dimethyl sulfoxide (DMSO), ethanol, and deionized water. Magnetic stirring and ultrasonication were employed to disperse the nanoparticles, with electrostatic stability assessed via zeta potential measurements. Results showed that DMF provided excellent stability for fMWCNTs with zeta potential value 50.4 mV, while deionized water led to poor dispersion due to weak electrostatic repulsion. For ZnO nanoparticles, DMSO demonstrated the highest stability with zeta potential value -37.7 mV, attributed to strong interactions with ZnO surfaces, whereas ethanol showed low stability with zeta potential value of -1.89 mV. Achieving good dispersion of nanoparticles is important for maximizing their functional properties and ensuring uniform performance especially in biosensor fabrication. Poor dispersion can lead to particle aggregation, negatively impacting the mechanical, electrical, and thermal properties of the nanocomposites.
Keywords: Functionalized Multiwalled carbon nanotubes (fMWCNTs), Zinc Oxide,
Dispersion, Zeta Potential

(PAPER ID: 43) Tannic Acid Loaded Conductive PVA/Gelatin/NaCl Hydrogel For Adhesive Wearable Applications

DiviyaDevi Paramasivam, Fathan Khansa Arby, Raimi Dewan*, Nurizzati Mohd Daud
*Universiti Teknologi Malaysia

Abstract

The PVA, gelatin and sodium chloride (PVA/gelatin/NaCl)-based hydrogel exhibits optimal electrical conductivity, making it a promising candidate for wearable healthcare monitoring applications. However, they possess one of the crucial shortcomings, which is the lack of adhesive properties. This study aimed to enhance the adhesive properties by immersing the PVA/gelatin-based hydrogels with 0%, 10% and 20% NaCl in 1%, 3% and 5% of tannic acid (TA) solution for 24 h. The hydrogels' adhesive properties were evaluated by adhering to gloves-worn fingertips, onto a chicken's muscle, liver and bone, and on different materials, such as metal, plastic and rubber. The results revealed that the PVA/Gel/NaCl20/TA5 exhibited strong adhesion to the fingertip, muscle, PET, metal and gloves compared to the samples with other concentration of NaCl and TA. Therefore, this hydrogel is well-suited for wearable health monitoring devices, where reliable attachment to both the components and biological tissues is critical.

Keywords: Adhesive, Conductive, Hydrogel, Tannic acid, Wearable

(PAPER ID: 44) Anti-Cancer Potential of Sungkai Leaves (Peronema Canescens Jack): Network Pharmacology and Molecular Docking Insights into Apoptosis Pathway in Breast Cancer

Nadilla Hafani Putri, Dessy Arisanty*, Fauzan Syarif Nursyafi, Rayhan Haritsa Desvi , Muhammad Abdul Fateh, Hasmiwati, Rita Maliza, Gusti Revilla , Abdiana, Asnida A Wahab , Muhammad Faiz Md Shakhih
*Universitas Andalas

Abstract

Breast cancer remains the leading cause of cancer-related mortality, particularly in Indonesia. Given the limitations of current treatments, there is an urgent need for alternative therapies, such as plant-based options. This study investigates the potential of Sungkai (Peronema canescens Jack) leaves as an anti-cancer agent targeting breast cancer through apoptotic pathways, utilizing network pharmacology and molecular docking analyses. Sungkai leaf extracts were analyzed using LC-MS/MS, while in silico methods identified interactions between leaf compounds and breast cancer-related targets. Key proteins, including ESR1, AKT1, BCL2, SRC, and JUN, associated with the PI3K-Akt pathway, were targeted. Molecular docking results indicated that Sungkai compounds, such as stemocurtisinol (-6.7034 kcal/mol), norlaudanosine (-6.7235 kcal/mol), carbocromen (-7.2805 kcal/mol), chlorogenic acid (-6.6631 kcal/mol), and 4-methylphenyl dodecanoate (-6.7959 kcal/mol), exhibit strong binding affinities to Bcl-2, surpassing that of doxorubicin, a widely used cancer drug. These findings suggest that Sungkai leaves hold promise as a potential anti-cancer therapy for breast cancer, warranting further research to validate their efficacy.

Keywords: Peronema canescens, Apoptosis, Breast cancer, Network pharmacology; Molecular docking

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PAPER ABSTRACT

(PAPER ID: 45) Exploration of The Anticancer Activity of Squid Ink (Loligo sp.) As A Multitarget Therapy For Non-Small Cell Lung Cancer: In Silico Studies

Ismail Faizan Gibran, Dio Kurniawan, Ahmad Rafi, Onessy Rustan, Salsabilla Khanza , Alponsin Alponsin , Cimi Ilmiawati , Andani Putra*, Asnida A Wahab, Siti Aisyah Mualif
*Universitas Andalas

Abstract
Lung cancer is a major cause of death, with high incidence in Indonesia, especially West Sumatra. Non-small cell lung cancer (NSCLC) is the most common type of lung cancer, influenced by age, gender, genetics, smoking, and carcinogen exposure. This study explores the anti-cancer activity of squid ink on NSCLC using in a silico methods. Squid ink compounds were extracted through lyophilization and ethanol maceration, followed by phytochemical analysis and GC-MS. Molecular docking with MOE software showed that rescinnamine had the highest binding affinity to EGFR (-8.61 kcal/mol) and KIF5B-RET (-8.42 kcal/mol). Glycerol 1-palmitate strongly binds to KRAS (-8.06 kcal/mol) and MET (-7.28 kcal/mol). Octadecanoic acid, 2-(2-hydroxyethoxy) ethyl ester, binds to EML4-ALK (-7.26 kcal/mol). This study suggests squid ink as a potential chemopreventive agent for NSCLC.
Keywords: Non-Small Cell Lung Cancer, Loligo sp., molecular docking, competitive inhibitor, chemopreventive

(PAPER ID: 46) Brain functional connectivity during a mental arithmetic task measured by partial directed coherence

Norlaili Mat Safri*, Noor Syazwana Sahar, Low Lie Xin, Taha Mahmoud Abbas Al-Naimi, Nor Aini Zakaria
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Abstract
Researchers generally concentrate on executive function since it can both improve human capacities and identify cognitive impairments. A person's cognitive function can be assessed using a variety of executive function tests. Processes including inhibition, updating, and shifting are related to executive function. Mental math exercises are used as one of the updating tests. Arithmetic processing in the brain involves a network of regions. This study investigates the functional connectivity of the brain during an arithmetic problem using electroencephalogram (EEG) technology. The partial directed coherence (PDC) approach is employed since it can identify direct interactions between more than two channels. The research utilizing EEG-based PDC showed that active destination regions for brain connections during arithmetic tasks are similar to those reported using other techniques. However, the posterior region is missing in the network of regions among the subjects involved in the study.
Keywords: Mental arithmetic, partial directed coherence, executive function, updating process, brain's function

PAPER ABSTRACT

(PAPER ID: 47) Transcranial Magnetic Stimulation Evoked Electroencephalography Potential Denoising with Hampel Filter

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Abstract

Transcranial magnetic stimulation (TMS) has become a well-established non-invasive tool for cortical stimulation in neurology and psychiatry research. Combining TMS with electroencephalography (EEG) allows for the investigation of immediate and direct neuronal responses to TMS, including cortico-cortically mediated activity. TMS-evoked potentials (TEPs) are significantly impacted by large, high-frequency magnetic artifacts generated by direct interference with the EEG electrodes. These artifacts, characterized by high amplitude and frequency, persist for up to 40 milliseconds post-stimulation. Conventional filtering methods with limited sampling rates introduce ripple artifacts beyond this window, contaminating the underlying neural signals. A Hampel filter was applied to remove the magnetic artifacts, followed by a Wavelet filter to attenuate other noise components in the TEP signals. The results demonstrate the effectiveness of this approach in eliminating artifacts and revealing TMS-evoked potentials within the EEG data.

Keywords: Transcranial magnetic stimulation, electroencephalography, Denoising, Hampel filter, evoked potential, Wavelet.

(PAPER ID: 48) Comprehension Review on Techniques of Monitoring Fracture Healing

Aisyah Ahmad Shafi*, Tan Xian Huai, Musa Hamza Muhammad, Nurul Syahirah Ali
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Abstract

Fracture healing is a complex physiological process that can occur directly through bone union or indirectly through callus formation. Monitoring this intricate process is crucial for ensuring proper recovery and preventing complications. Currently, the primary method for monitoring fracture healing involves the use of radiographs, which provide infrequent and subjective snapshots of bone healing progression. This kind of monitoring method not only creates harm to the patient due to the excess radiation exposure, but the infrequent monitoring may miss to detect the complication of healing. In this review, state of the art of several technique to monitor the phase of fracture healing is reviewed.

Keywords: Bone fracture healing, monitoring of fracture healing, sensors for medical devices, physiological measurement, capacitive sensing

(PAPER ID: 49) An Integrated Wearable Nasal Humidity Sensor with Deep AI For Continuous Respiratory Assessment

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Abstract

An integrated wearable nasal based flexible humidity sensor that captures the variations from right and left nostrils, with deep-AI model to monitor the respiratory activities has been proposed in this study. Breathing is a direct indicator of the emotions of an individual as it fluctuates during different situations, hence this work presents a miniaturized sensor with electronics assembly fixed to the medical mask, using which respiratory activities such as normal breathing, deep breathing, rapid breathing and shallow breathing were assessed.An ensemble model constructed with a combination of 1D CNN, LSTM deep neural network model, and SVM was deployed to classify the breathing status during different tasks using humidity signals from right and left nostrils individually and in combination. The study was conducted with 82 healthy volunteers with 2 trials after obtaining ethical clearance. The proposed integrated framework of electronic nasal mask with deep AI model showed an overall accuracy, F1-score and MCC of “92% , .91 and 0.894” for humidity signals from right and left nostrils together over “88%,0.87 and 0.842” , “63% ,0.61 and 0.505” for right and left nostril data individually.

Keywords: Breathing Pattern, CNN, Humidity Signals, LSTM, SVM, Wearable electronics.

(PAPER ID: 50) Simulation Study for Optimizing Dimensions of Electrodes for Detecting Muscle Fatigue in Electrical Impedance Tomography (EIT)

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Abstract

This research delves into improving muscle activity detection using Electrical Impedance Tomography (EIT) by addressing muscle fatigue in athletes, workers and individuals undergoing rehabilitation. EIT, known for its non-invasive nature, relies on precise electrode setups to ensure accurate impedance measurements. Three different electrode configurations (A, B and C) were constructed using COMSOL Multiphysics software to identify the configuration that offers the sensitivity and uniformity in electric field distribution. The effectiveness of each configuration was evaluated based on its ability to provide consistent electrical field measurements for physiological monitoring. Configuration C, with its smaller size, is optimal due to its performance in uniformity and detailed measurement capabilities. This setup exhibited voltage readings and a distributed electric field making it well-suited for high-resolution imaging tasks when used concurrently with the Wiener-Back Projection (WE-BP) algorithm for image reconstruction. The research outcomes play a role in enhancing EIT systems by providing insights into optimizing electrode configurations, for enhanced detection and monitoring of muscle fatigue.

Keywords: Electrical Impedance Tomography (EIT), Muscle Fatigue Detection, Electrode Configuration, COMSOL Multiphysics Simulation, Biomedical Imaging.

(PAPER ID: 51) Simplified Computational Fluid Dynamics Model for Perforated Mitral Valve

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Abstract

Functional mitral regurgitation (Type I) could occur due to leaflet perforation or cleft (Carpentier, 1983). There are risks of functional mitral regurgitation might worsen to degenerative regurgitation and ultimately mitral valve failure. Computational fluid dynamics (CFD), an in-silico method, is proven to have the capability of modeling blood flow in cardiovascular system (Dedè et al., 2021), particularly in this case for regurgitation flow behaviour. This paper presented the application of computational fluid dynamics to evaluate the mitral regurgitation due to mitral valve leaflet perforation by simulating the hypertensive conditions and mitral valve perforation severities. The results show that the amount of blood flow to the left atrium increased with the increased perforation severity and hypertension severity. The increase of perforation severity has caused the average reduction of blood flow percentage of up to approximately 8.01% for severe perforation. Hence, the more severe the hypertension and perforation, the more complications a person may experience. With more blood flow back to the left atrium, it may lead to several complications including hypoxemia and cyanosis.

Keywords: Simplified mitral valve, mitral regurgitation, mitral valve perforation, computational fluid dynamics.

(PAPER ID: 53) Determinants of Physical Frailty In Older Adults: Logistic Regression Analysis

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Abstract

The ageing process often brings about frailty, a condition marked by reduced resilience and increased vulnerability to health risks. The present study focused on investigating the influence of age, physical performance, and lung function on physical frailty among older adults. A cross-sectional study was conducted on 27 participants aged 60 years and above from 3 different centers, assessing their frailty status, physical performance, and lung function. The results indicated that older adults with mild physical impairment significantly influenced physical frailty, while age and lung function did not show significant associations. Interventions targeting physical activity to enhance balance, walking speed, and chair stand tests may be crucial in preventing or delaying frailty onset in older adults. The study give an insight on the importance of addressing mild physical impairment with adequate medical rehabilitation program to mitigate the risk of physical frailty in the elderly population

Keywords: Frailty, Ageing, Physical performance, Lung function, Medical rehabilitation

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PAPER ABSTRACT

(PAPER ID: 52) Chitosan/Trigona Honey Drop-Casted Films For Wound Healing

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Abstract

The need of frequent changing of gauze dressings and the discomfort following removal as well as widespread cases of multidrug resistant bacteria especially in the hospital setting demands development of innovative dressings. This study aimed to fabricate chitosan/Trigona honey (CS/TH) wound dressing films and examine the physicochemical characteristics of these films for potential wound dressing applications. CS/TH films were prepared by a drop-casting method at three different concentrations of TH, particularly 10 %w/v, 20 %w/v, and 30 %w/v. Several physicochemical characterization analyses were performed including surface morphology, structural composition, wettability and in vitro drug release. The scanning electron microscopy (SEM) images of CS/TH films revealed the presence of rod-shaped bacteria, probably the Bacillus spp. which is originated from the TH. From the Fourier-transform infrared spectroscopy (FTIR) spectrum, a strong, broad peak was observed at 3000-3500 cm-1 representing O-H and N-H stretching as well as hydrogen bonding interactions contributed by chitosan and TH carbohydrates. Other prominent absorption bands include C-H stretching at 2929 cm-1, vibration of C=C in aromatic rings and C=O stretching of amide I at 1640 cm-1 and C-O stretching at 1000 cm-1. The inclusion of TH in the films decreased the contact angle, producing more hydrophilic CS/TH films. It was demonstrated that CS/TH-30 film with highest concentration of TH showed contact angle of 63.10° ± 3.63 whereas the CS film has contact angle of 77.50° ± 1.66. The in vitro drug release showed fast release of CS/TH-30 (73.8 %) after four hours of incubation compared to CS/TH-10 and CS/TH-20 which exhibited cumulative release of 9.4 % and 56.8 %, respectively. It can be concluded from this study that the CS/TH drop-casted films exhibited more favorable physicochemical properties than the CS films as wound dressings. The presence of TH may enhance the wound healing capabilities of CS/TH films.

Keywords: Trigona Honey; chitosan; wound dressing film; drop-casting; physicochemical

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