DSS
DEFENCE, SECURITY AND SUSTAINABILITY EXHIBITION
2024

DEFENCE, SECURITY AND SUSTAINABILITY EXHIBITION 2024

HUMAN-CENTERED DISCOVERY AND INNOVATION

DATE: 24 - 25 APRIL 2024
VENUE: DEWAN ZULFAQAR

KEMENTERIAN PENDIDIKAN TINGGI

UPNM
National Defence University of Malaysia

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SCS

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FOREWORD

VICE CHANCELLOR

In The Name of Allah, Most Gracious, Most Merciful.

Assalamualaikum Warahmatullahi Taala Wabarakatuh and Blessings.

All praise be to Allah, The Lord of both the worlds, and Salawat and Salam to Rasullullah the final messenger. Firstly, I would like to convey my heartiest congratulations to the Universiti Pertahanan Nasional Malaysia (UPNM) and specifically to Research and Innovation Department under the Deputy Vice Chancellor (Research and Innovation) Office, UPNM for being able to organize an event Defence, Security and Sustainability Exhibition 2024 (DSS 2024).

Innovation contributes to the development of our social and economic capital because it motivates people to seek out opportunities, boosts creativity, and instills confidence in their ability to generate new ideas that benefit society. The Ministry of Higher Education (MOHE) is dedicated to encouraging research and innovation in order to boost economic and global competitiveness. The Minister of Higher Education Malaysia has unveiled an ambitious vision for 2024, focusing on fundamental principles that will shape the success and efficacy of educational endeavors. Thus, research and innovation are important components of the roadmap to achieve these objectives.

DSS 2024, with the theme "Human-Centered Discovery and Innovation," creates a conducive environment to innovation that provides an excellent platform for researchers to present and showcase their research projects, as well as exchange ideas, information, and findings in a variety of fields, not just in defence and security. Furthermore, this event serves as a platform for strengthening industry-academic collaboration by encouraging internships, industry-sponsored projects, and joint research ventures.

Finally, I'd like to congratulate all students, participants, and committee members who helped make DSS 2024 a success. Hopefully, this event will propel research and innovation development to a higher level.

Thank you.

YB Datuk Ts. Mustapha Sakmud
Deputy Minister of Higher Education

FOREWORD

VICE CHANCELLOR

Assalamu'alaikum warahmatullahi wabarakatuh.

I am deeply grateful to Allah, the Most Gracious and Most Merciful, for granting us this invaluable opportunity to gather at this momentous event at the Defence, Security, and Sustainability Exhibition 2024 (DSS 2024), organized by Universiti Pertahanan Nasional Malaysia (UPNM).

Defence, Security, and Sustainability (DSS) is a biennial event organized by the Research and Innovation Department under the Deputy Vice Chancellor (Research and Innovation) Office, UPNM. It serves as a vital platform for researchers to present and showcase their works, particularly in the field of defence and security.

DSS 2024 marks the fifth edition of this esteemed event, bringing together academics, industrial practitioners, researchers, students, and administrators to exchange ideas, information, and findings. With the theme "Human-Centered Discovery and Innovation," this year's exhibition underscores the importance of placing human needs and aspirations at the forefront of our research and development endeavors.

I extend my heartfelt gratitude to all participants from various institutions, including universities, schools, government agencies, and the Malaysian Armed Forces, for their contributions to the success of this event. It is a privilege to witness the culmination of efforts from diverse sectors in advancing knowledge and innovation.

I would like to extend my congratulations to all students, participants, and committee members for their dedication and hard work in ensuring the success of DSS 2024. May this event inspire further research and innovation, guiding us toward a more advanced and sustainable future.

Thank you.

Lieutenant General Datuk Mardzuki bin Muhammad
Vice-Chancellor
Universiti Pertahanan Nasional Malaysia

FOREWORD

DEPUTY VICE CHANCELLOR (RESEARCH AND INNOVATION)

Assalamu'alaikum warahmatullahi wabarakatuh.

Alhamdulillah, praise be to Allah, the Most Merciful and the Most Gracious and Salutations upon Rasulullah S.A.W., the final messenger. It is by His grace that we gather here today for the Defence, Security, and Sustainability Exhibition 2024 (DSS2024). As the advisor, I am delighted to extend a warm welcome to all participants of this esteemed event and express my gratitude for its successful organization of the event.

The theme of DSS2024, "Human-Centered Discovery and Innovation," aligns with our mission to nurture a first-class mentality among our human capital in research and innovation. This occasion provides a platform for researchers, students, and industry players to exchange insights, experiences, and expertise across various research fields, fostering stronger relationships and promoting collaborative research efforts.

DSS2024 encompasses ten (10) key research fields, including Food Safety and Security, Energy and Water Security, Industrial Revolution 4.0/Cyber Security/Data Analytics/Artificial Intelligence, Climate Change, Environment and Sustainability, Humanitarian Assistance Disaster Relief, Medical and Healthcare, Education, Community Development and Social Science, National Security, Science, Technology, Engineering and Mathematics Education (STEM) and Frontier Technology, Defence Technology and Defence Infrastructure. These fields represent innovative pathways towards a sustainable future.

In conclusion, I hope that DSS2024 will serve as a catalyst for the generation of new ideas and solutions that contribute to a new landscape of better innovation tomorrow. I extend my heartfelt appreciation to the organizing committee for their dedication and outstanding efforts in bringing this event to fruition.

Thank you.

Prof. Ts. Dr. Azizi bin Miskon
Deputy Vice Chancellor (Research and Innovation)
Universiti Pertahanan Nasional Malaysia

INTRODUCTION

Defence, Security and Sustainability (DSS) exhibition is a biennial event organised by Research and Innovation Department under the Deputy Vice Chancellor (Research and Innovation) Office, UPNM which provide a platform for researchers to present and showcase their research works espicially, but not limited to, in the defence and security field.

DSS2024 is held for the fifth time to gather all academics, industrial practitioners, researchers, students and administrators to exchange ideas, information and findings. The theme of DSS 2024 is "Human Centered Discovery and Innovation". In addition, this event also provides a platform to strengthen the relationship in sharing of our research findings with the research community.

DSS2024 has listed 10 research fields for this exhibition, which are:

> **Food Safety and Security**
> **Energy and Water Security**
> **Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent**
> **Climate Change, Environment and Sustainability**
> **Humanitarian Assistance Disaster Relief**
> **Medical and Healthcare**
> **Education, Community Development and Social Science**
> **National Security**
> **Science, Technology, Engineering and Mathematics Education (STEM)**
> **Frontier Technology, Defence Technology and Defence Infrastructure**

The following are the objectives of DSS 2024 exhibition:
- To provide an opportunity for academic staffs and students to showcase their research works.
- To give an exposure and inspire young researcher on research activities in generating new research idea.
- To expose researchers on the importance of protecting research patent and copyrights.
- To encourage knowledge sharing on research and innovation.
- To build a networking and potential collaboration on research and innovation.
- To provide a platform for researchers to compete in an international exhibition.

MAIN COMMITTEE

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Mr. Mohamad Fuad bin Abdullah Bada
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Mr. Muhamad Farid bin Mazlan
Mr. Muhammad Danial Fitri bin Zahar
Mr. Kan Aan bin Hassan

PROGRAMME EVENTS

DATE	TIME	ACTIVITY
23th April 2024	2.00 PM – 6.00 PM	Registration and booth preparation
24th April 2024	8.00 AM	Arrival of exhibitor
	9.00 AM – 5.00 PM	DSS 2024 exhibition
	9.00 AM – 3.00 PM	Evaluation session
	3.30 PM – 4.00 PM	Evaluation committee convenes
25th April 2024	8.00 AM	Arrival of exhibitor
	9.00 AM – 5.00 PM	DSS 2024 exhibition
	10.00 AM – 11.00 AM	Knowledge Sharing Session - Dr Soo Wincci
	DSS 2024 CLOSING CEREMONY	
	11.00 AM – 11.30 AM	Arrival of UPNM management/ invited guest
	11.30 AM – 11.35 AM	Arrival of VVIP
	11.35 AM – 11.40 AM	Negaraku and Capai Gemilang
	11.40 AM – 11.45 AM	Recitation of Doa
	11.45 AM – 11.50 AM	Gimmick
	11.50 AM – 12.00 PM	Speech by the Vice Chancellor of UPNM
	12.00 PM – 12.15 PM	Opening speech by the Deputy Minister of Higher Education
	12.15 PM – 1.00 PM	Awards Presentation

DEFENCE, SECURITY AND SUSTAINABILITY (DSS) 2024

ABSTRACT

CATEGORY A : FUNDAMENTAL RESEARCH

THE LEADERSHIP SURVIVAL TOOLKIT FOR WOMEN: GENDER EQUALITY AND INCLUSIVITY IN DEFENSE AND SECURITY

INVENTOR	Masdini Harina Ab Manan
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Najjah Salwa Abd Razak, Dr. Belinda Marie Balraj
CORRESPONDING E-MAIL	masdini@upnm.edu.my

Abstract

This study aims to tackle the obstacles that women face when holding leadership positions, in the defense and security sectors. Despite increasing recognition of the importance of gender diversity in these fields women still encounter barriers that impede their progress. The objective of this research is to create a Leadership Survival Toolkit specifically designed for women in defense and security roles. This toolkit will provide them with strategies and skills to navigate the landscape and succeed as leaders. To achieve this our methodology includes conducting an examination of existing literature interviewing women leaders in defense and security and conducting surveys to gain insights into the challenges they encounter. The toolkit will encompass elements such as mentorship programs, skill building workshops and awareness campaigns to foster an inclusive and supportive environment. The toolkit's key components will focus on growing resilience in the face of hardship, effective communication strategies to overcome biases, and strategic network development to advance your career. Furthermore, the study will investigate the role of mentorship and sponsorship in assisting women leaders, drawing on successful case studies from both military and civilian settings. This study aims to contribute to the greater discussion of gender equality and diversity by examining the special barriers that women experience in defense and security leadership posts. The Leadership Survival Toolkit aims to empower women by giving them the tools they need to overcome challenges, excel in their professions, and contribute to the progress and effectiveness of defense and security organizations on a worldwide level.

DEVELOPMENT OF ERGONOMIC DATA SHEETS (EDS) ON THE APPROACH OF PARTICIPATORY ERGONOMIC INTERVENTION PROGRAM FOR IMPROVING CONSTRUCTION INDUSTRY WORK ENVIRONMENT ON MUSCULOSKELETAL HEALTH IN MALAYSIA

INVENTOR	Mrs. Siti Maisarah binti Amdan
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Siti Nurhafizah Saleeza binti Ramlee, Assoc. Prof. Dr. Dian Darina Indah binti Daruis
CORRESPONDING E-MAIL	maisarah_amdan@yahoo.com

Abstract

Participatory ergonomics is defined as a process of solving ergonomic problems that involves the collaboration of the workers as well as the input from other stakeholders in the workplace. Interventions in ergonomics, especially participatory ergonomics (PE) has been shown to be a promising strategy to decrease Work-related musculoskeletal disorders (WMSD) risk factors or ergonomic risk factors. To guarantee that workers are effectively receiving the knowledge, the participatory ergonomic intervention's tools are crucial. The purpose of this research is to create a new tool called an Ergonomic Data Sheet (EDS) for work tasks performed by construction workers in replacing the conventional tools used in the Participatory Ergonomic Intervention Using the EDS toolkit, this study will assess the impact of participatory ergonomics intervention on behavioral modifications and the prevalence of musculoskeletal health. A total of 120 respondents from the construction industry took part in this study. The data was gathered using the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), Rapid Entire Body Assessment (REBA), Knowledge, Attitude, Practice (KAP) survey and on the tools development Focus Group Discussion (FGD) from expert view will be conducted. The respondent will be randomly assigned to two group of ergonomic intervention and will undergo pretest and posttest assessment. On the basis of the observed variables, descriptive analysis and inferential analysis were performed. It is anticipated that the results would demonstrate a strong correlation between the EDS and PE intervention, indicating that the new instrument is successful in lowering WMSD and encouraging behavioral modifications in construction workers.

INNOVATIONS IN ELECTROMAGNETIC DEFENSE: UNVEILING ADVANCED MICROWAVE ABSORPTION TECHNOLOGIES

INVENTOR	Dr. Ismayadi Ismail
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Putra Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Raba'ah Syahidah Azis, Assoc. Prof. Dr. Khamirul Amin Bin Matori, Dr. Mohd Hafiz Mohd Zaid
CORRESPONDING E-MAIL	ismayadi@upm.edu.my

Abstract

This study focuses on developing radar-absorbing materials through the synthesis of spiral-like carbon nanofibers using cost-effective mill scale waste as a catalyst. The research strives to achieve a balance between cost-effectiveness, sustainability, and superior microwave absorption properties. By employing mill scale, a byproduct of steel mills, as a catalyst, a novel approach to radar-absorbing materials is introduced. The carbon nanofibers, synthesized through chemical vapor deposition, exhibit exceptional radar absorption capabilities. When integrated into epoxy resin matrices, these nanofibers create lightweight materials with outstanding absorption performance, especially at higher frequencies, absorbing over 99% of incident energy. This positions them as promising candidates for military defense applications. In the broader context of electromagnetic absorbing materials, the study explores factors influencing absorption capabilities, scrutinizing traditional materials like ferrites, carbon black, metal powder, poly-crystal fibers, and conductive polymers, highlighting their limitations. Emphasizing the importance of integrating magnetic and dielectric properties to enhance microwave absorption, the study introduces a strategic combination of magnetic absorbers, both soft and hard magnets, with dielectric absorbers to broaden the absorption spectrum. The incorporation of these properties into polymer matrices results in advanced composite materials. The study presents a cohesive approach to microwave-absorbing materials by combining innovative carbon nanofibers synthesized from mill scale with advanced composite strategies. The successful integration of cost-effective catalysts and strategic filler combinations in polymer matrices demonstrates promising results, offering lightweight, efficient, and wideband radar absorption materials. This research holds potential applications in defense, aerospace, and diverse electromagnetic shielding scenarios.

ERGONOMICS RISK ASSESSMENT AND PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDER (WMSD) AMONG MILITARY AIRCRAFT MAINTENANCE PERSONNEL

INVENTOR	Dr. Siti Nurhafizah Saleeza binti Ramlee
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Hari Krishnan, Mr. Megat Azman, Nurhana Mohammad Rafiudin, Mejar Khairul Nizam
CORRESPONDING E-MAIL	saleeza@upnm.edu.my

Abstract

Background: Work-related Musculoskeletal Disorders (WMSDs) are a typical health problem and a significant cause of disability among workers from various fields across the industrialized world. Although aircraft mechanics and maintenance technicians experience high rates of workplace injuries, there is scarce evaluation of injury risk exposures from the various jobs/tasks in this industry. Aims: This study was conducted to investigate the prevalence of work-related musculoskeletal Discomfort/pain and ergonomic risks faced among Military Aircraft maintenance personnel. Materials and Methods: A total of 40 aviation maintenance personnel (Engineering department) from the Royal Malaysian Air Force (RMAF) located in RMAF Base Subang, Selangor, were randomly selected via the simple random sampling method for this research. Relevant data were collected using ergonomics assessment tools comprising Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) and ergonomic factors risk assessment via the Quick Exposure Check (QEC) method. Statistical analysis: Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 25.0, and the preliminary action levels for the QEC score were analyzed. Results: Based on the 12-month prevalence of WMSDs, the lower back region recorded the highest percentage of body discomfort and pain (77.5%) (CI 95%: 64.0–91.0), followed by the neck region (70%) (CI 95%: 55.0–85.0). The results from the QEC showed that one task needs immediate change (red), four task needs to be changed soon (orange), and one task needs to be further investigated (yellow). Conclusion: Workers in the aviation maintenance industry, particularly those working in the engine bay, were exposed to a high risk of back, shoulder, and wrist region injury, which affected their well-being and productivity. Hence, aviation maintenance workers were recommended to perform routine physical exercises as an alternative ergonomic intervention.

STABLE AND VERSATILE POLYMER THIN FILM COATING AS FIRST LINE OF DEFENCE AGAINST LASER

INVENTOR	Assoc. Prof. Dr. Siti Zulaikha binti Ngah Demon
RESEARCH FIELD	National Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mrs. Nursaadah Ahmad Poad, Prof. Ts. Dr. Norhana Abdul Halim, Dr. Ganesan a/l Krishnan, Mrs. Nurul Syahirah Nasuha binti Saa'ya
CORRESPONDING E-MAIL	zulaikha@upnm.edu.my

Abstract

Significant advancements in lasing technology have increased the feasibility of the high energy laser class which has resulted in renewed military interest. Optical limiters, in the form of coatings and thin films are systems designed to protect objects such as sensors, critical components, or human eyes from high intensity irradiance above a set threshold. It is anticipated that critical components such as sensors will be targeted by the lasers. Strong nonlinear optical properties of these thin films enable passthrough of low-intensity irradiance but inhibit transmittance of high intensity irradiance whereas typical reflectors or opaque coatings would impact sensor functionality by preventing signal transmission. Poly(3-hexylthiophene-2,5-diyl) nanowires were chosen for its processibility, stability and surface roughness over other 1D or 2D organic materials. Its versatility was achieved by AuNP doping to extend its bandwidth within the range of 400 – 680 nm. This work demonstrated the fabrication of non-linear optical limiters with high absorbance and bandwidth exceeding 500 nm. It was demonstrated that the coatings can be applied to a variety of substrates, including ceramic, semiconductor, and metallic.

FUNCTIONALIZED CELLULOSE AS ANTIMICROBIAL MATERIALS

INVENTOR   Dr. Noor Aisyah binti Ahmad Shah

RESEARCH FIELD   Medical and Healthcare

INSTITUTION   Universiti Pertahanan Nasional Malaysia

CO-INVENTOR   -

CORRESPONDING E-MAIL   aisyah@upnm.edu.my

Abstract

The development of biocompatible and biodegradable materials with great and permanent antibacterial activities has still a number of challenges that, despite the impressive advancements in the field, need to be addressed. These challenges call for more research and advancements. The earth's most prevalent biopolymer, cellulose, offers a lot of promise to solve these problems. Despite the fact that cellulose lacks inherent antibacterial qualities in its purest form, the large concentration of hydroxyl groups on the surface of cellulose fibres offers a platform for modification which could bind antibacterial molecules to produce cellulosic antibacterial compounds. Sulphate, carboxyl, aldehyde, phosphate, amino, and thiol groups are some of the most common functional groups that may be used to functionalize cellulose. Computational and molecular docking were used to evaluate the reactivity and stability of various functionalized cellulose against Gram-positive and Gram-negative bacteria. These computational results are important to explore all possible binding sites between functionalized cellulose and those protein or enzymes of the bacteria walls, so that it would help to give idea in future of what kind of functionalized cellulose to synthesize for antibacterial purpose. LibDock and CDOCKERS molecular docking methods (Biovia Discovery Studio software) were used to determine the most stable binding/interaction energy for this purpose.

RISK FACTOR IDENTIFICATION IN HELICOPTER DITCHING ON WATER

INVENTOR	Ms. Adenen Shuhada binti Abdul Aziz
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ts. Dr. Mohamad Abu Ubaidah Amir bin Abu Zarim, Ts. Dr. Roshamida binti Abd Jamil, Dr. Mohd Iqbal bin Shamsudheen, Lt Mohammad Hanafie bin Mohd Yasir RMN (Pilot Fennec Skuadron 502)
CORRESPONDING E-MAIL	adenen@upnm.edu.my

Abstract

Helicopters play a pivotal role in maritime activities. However, the absence of consistent landing platforms over vast ocean expanses increases the risk of accidents during emergency ditching. Current incident reports highlight the severity of consequences, necessitating an in-depth examination of risk factors. The primary objective is to employ the Fuzzy Analytic Hierarchy Process (FAHP) and Fuzzy Comprehensive Evaluation (FCE) methodologies to pinpoint and comprehend key risk factors in helicopter operations. Specific goals include establishing a hierarchical risk structure, calculating risk levels, and proposing effective risk mitigation tools. The method adopts a case study approach, analysing incident data from the National Transportation Safety Board (NTSB) database. This framework involves the establishment of a hierarchical structure, weight calculation using FAHP, risk level determination through FCE, and proposing risk mitigation tools. The method have broader implications for national and global aviation safety standards.

A NOVEL NETWORK OPTIMIZATION FRAMEWORK BASED ON SOFTWARE-DEFINED NETWORKING (SDN) AND DEEP LEARNING (DL) APPROACH

INVENTOR	Assoc. Prof. Dr. Mohd Rizal bin Mohd Isa
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Muhammad Fendi bin Osman, Muhammad Alif Ikhwan bin Zainuddin, Dr. Mohammad Adib bin Khairuddin, Prof. Ts. Gs. Dr. Mohd 'Afizi bin Mohd Shukran, Assoc. Prof. Dr. Noor Afiza binti Mat Razali, Ts. Dr. Nur Diyana binti Kamarudin, Marini binti Mansor
CORRESPONDING E-MAIL	mfendi@gmail.com

Abstract

A Novel Network Optimization Framework based on Software-Defined Networking (SDN) and Deep Learning (DL) Approach is a network Dynamic Quality of Service (Dynamic QoS) which designed and developed to automatically modify the QoS Bandwidth Queues Rate-Limit of the network devices for network improvement by guaranteeing high priority given for sensitive traffic to travel under limited Local Area Network (LAN)/Enterprise Network Infrastructure/Campus network capacity. The proposed framework is designed to provide adequate/guaranteed bandwidth for sensitive traffic when the network utilization is high or congested.

The motivation for these inventions is that by monitoring the sensitive traffic queue's jitter, the proposed framework will automatically adjust the bandwidth allocation. If the value of the jitter increases, it indicates there is much sensitive traffic in the buffer waiting for the queue and may cause a potential delay. To overcome this issue, if the average jitter exceeds 30 milliseconds (ms), the framework will automatically provide more guaranteed bandwidth for the sensitive traffic queue by reducing the QoS Bandwidth Queue Rate-Limit of the best-effort queue. By doing this, the rest of the total capacity of the transmission medium's bandwidth will be provided as guaranteed bandwidth for sensitive traffics queue. The reduction of the QoS Bandwidth Queue Rate-Limit of the best-effort queue will give greater guaranteed bandwidth for the sensitive traffic queue. The 30 milliseconds (ms) is a threshold as mentioned by Ciscopress, the average jitter should be less than 30 ms to gain good video and voice quality. The configuration of the network devices will automatically return to its default configuration if there is no/less sensitive traffic in the network.

ENHANCING CONGESTION MANAGEMENT: A TOPOLOGY-BASED APPROACH TO STRATEGIC TRAFFIC SENSOR PLACEMENT

INVENTOR	Dr. Ruzanna Mat Jusoh
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	PKdt Amirah Akma binti Ghazali TUDM, Ts. Dr. Fazilatulaili Ali, Dr. Sharifah Aishah Syed Ali, Ts. Dr. Nur Diyana Kamarudin, Ts. Dr. Mohd Sidek Fadhil bin Mohd Yunus
CORRESPONDING E-MAIL	ruzanna@upnm.edu.my

Abstract

Effectively managing traffic congestion in urban areas poses a significant challenge, necessitating innovative approaches for optimizing traffic flow. A critical factor influencing congestion management is the strategic placement of traffic sensors. Conventional methodologies often fall short, leading to suboptimal congestion monitoring and response strategies. This study introduces a novel approach to enhance the utility of the Network Fundamental Diagram (NFD) as a valuable tool for monitoring urban traffic conditions. The methodology employs a topology based strategy to strategically position traffic sensors, establishing a meaningful connection between average flow and density within an urban network. To gain insights into the network's structure and identify critical links, measurements such as Degree, Betweenness, Closeness, Degree and Edge Betweenness were utilized. This aimed to reduce the number of measurements while preserving the representativeness of the NFD. The performance of the method was evaluated using real loop-detector data from the urban network in Chania. The findings reveal that centrality measures effectively contribute to selecting important links in the network, resulting in a well-defined subset of NFD with consistently low error values. The integration of topology elements in this study provides a significant contribution to the advancement of methodologies for constructing a subset NFD. Tackling the identified problem of suboptimal sensor placement head-on, this approach offers a promising avenue for enhancing the efficiency and effectiveness of congestion management strategies in urban environments.

ASSESSING ENERGY AND CO$_2$ EMISSIONS EFFICIENCY IN ASEAN COUNTRIES USING A MODIFIED TWO-STAGE NETWORK RUSSELL WITH UNDESIRABLE OUTPUT MODEL

INVENTOR	Mr. Ahmad Shafiq bin Abdul Rahman
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Sharifah Aishah binti Syed Ali, Dr. Fazilatulaili binti Ali, Ms. Nurrul Faqihah binti Rosni, Ms. Nur Bazilah Natasya binti Mohammad Noor Hisham
CORRESPONDING E-MAIL	ahmadshafiq@upnm.edu.my

Abstract

This project develops a performance measurement model, specifically a modified two-stage network Russell model incorporating undesirable outputs. The model will be used for the comprehensive evaluation of energy production, distribution, and CO$_2$ emissions efficiency in ten ASEAN countries during the year 2011. This study will particularly impact the energy sector, especially electricity providers. The electricity providers will be able to assess the performance level of their electricity supply at generation, transformation, and distribution systems with undesirable outputs for a particular region. Besides, the findings will help them improve their systems based on the benchmarking unit. Other than that, government bodies, local authorities, and policymakers will gain better insight into the current performance of the electricity supply network in Malaysia. Regarding the impact on academia, the findings will contribute to the body of knowledge in terms of the development of new frameworks and models. Additionally, the proposed model has potential for use in complex sectors like healthcare, agriculture, finance, and other sectors, making this project important.

CO-SPUTTERED Al/N-ZnO-BASED DMS/p-Si HETEROJUNCTION DIODE AND ITS CHARACTERIZATION

INVENTOR	Assoc. Prof. Dr. Siti Nooraya binti Mohd Tawil
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Nur Amaliyana Binti Raship
CORRESPONDING E-MAIL	nooraya@upnm.edu.my

Abstract

Using a co-sputtering technique, undoped ZnO and (Gd, Al) co-doped ZnO films were grown onto p-type Si (1 0 0) substrates to create heterojunction structures of n-ZnO/p-Si. The Gd-doped ZnO films' optical and structural characteristics were examined in relation to various Al doping concentrations. According to the X-ray diffraction profiles, the films featured a ZnO nanocrystalline structure with a preferential orientation of (0 0 2). The (0 0 2) diffraction peak intensity decreased as the Al doping concentration increased. The transmittance measurements in the UV–Vis wavelength range showed that an increase in Al doping concentration resulted in an increase in the optical gap of the film. The fabricated n-ZnO/p-Si heterostructure was characterized using current–voltage (I–V) measurements under dark and room temperature conditions in order to determine the heterojunction parameters. These measurements revealed that, in comparison to the n-Gd-doped ZnO/p-Si and n-undoped ZnO/p-Si heterojunction diodes, the n-ZnO-based DMS/p-Si heterojunction diode using (Gd, Al) co-doped ZnO film had the lowest leakage current of 1.28×10^{-8} A and an ideality factor η of 1.11, which was near to the ideal diode behavior of $\eta = 1$.

KNOWLEDGE, ATTITUDE, AND PRACTICES (KAP) OF UNIVERSITI PERTAHANAN NASIONAL MALAYSIA (UPNM) STAFF REGARDING THE USE OF A FACE MASK DURING THE CORONAVIRUS DISEASE 2019 (COVID-19) PANDEMIC

INVENTOR	Ts. Dr. Nik Noorul Shakira Mohamed Shakrin
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Mohammad Wisman Abdul Hamid, Dr. Nor Haliza Mohamad Najib, Dr. Azimah Ahmad, Dr. Nur Aishah Che Roos, Dr. Marami Mustapa, Dr. Nursiati Mohamad Taridi, Prof. Dr. Victor Feizal Knight Victor Ernest @ Abd. Shatar, Dr. Badrul Hisham Abd Samad
CORRESPONDING E-MAIL	shakirashakrin@gmail.com

Abstract

During the COVID-19 pandemic, wearing a face mask is crucial as part of personal protective equipment (PPE) against the causative virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This study aims to assess the knowledge, attitude, and practices (KAP) of Universiti Pertahanan Nasional Malaysia (UPNM) staff regarding face mask usage. A cross-sectional online survey was conducted from March to June 2021 involving UPNM staff (N=171), who responded to structured questionnaires on socio-demographics and KAP related to face mask wearing and disposal. The majority of participants were in the 30-39 age group (n=90, 52.6%), predominantly women (n=99, 57.9%), residing in Selangor (n=105, 61.4%), married (n=138, 80.7%), non-academic and non-medical professionals (n=97, 56.7%), with a bachelor's degree (n=48, 38.1%), and from families with household incomes ranging from RM10971 to RM15040 (n=26, 15.2%). The overall correct answer rate for KAP exceeded 90%, indicating a commendable understanding and adherence to face mask usage during the COVID-19 pandemic. A significant portion of respondents strongly agreed that they were knowledgeable about and adhered to the correct steps for wearing a face mask (n=83/48.5%, n=93/54.43% respectively). Participants (60.8%) used surgical face masks/N95 respirators or non-medical face masks (43.3%) in public areas, ensuring coverage of their nose, mouth, and chin (n=154/90.1%). However, only 39.8% knew and followed the correct procedure for removing a face mask. A concerning finding revealed that 34.5% of participants discarded used surgical face masks into open bags or unlidded containers/waste bins. Encouragingly, 45.6% of participants responsibly discarded medical face masks or washed non-medical face masks after a single use, irrespective of their condition. Overall, the study indicates that the majority of participants exhibited commendable KAP regarding face mask wearing and disposal throughout the COVID-19 pandemic.

CRAFTING PERFORMANCE: INNOVATING NITROCELLULOSE PROPELLANTS FROM OPMF WITH PRECISION NITROGEN CONTROL FOR ENHANCED MUZZLE VELOCITY

INVENTOR	Dr. Alinda binti Samsuri
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. ChM. Dr. Siti Aminah Mohd Nor, Dr. Siti Hasnawati Jamal, Dr. Khoirul Solehah Abdul Rahim, Dr. Siti Nor Ain Rusly, Nur Shazwani Abdul Latif, Hafizah Ariff
CORRESPONDING E-MAIL	alinda@upnm.edu.my

Abstract

Against the backdrop of a dynamically evolving global economy characterized by fluctuating market trends and growing sustainability concerns, there arises a pressing need for innovative solutions that not only bolster economic resilience but also address environmental challenges. This study investigates synthesis strategies aimed at tailoring nitrogen content and muzzle velocity in nitrocellulose (NC) propellants derived from biomass, specifically oil palm mesocarp fibre (OPMF). Various synthesis methods were explored, and their effects on nitrogen content and ballistic performance were analysed. The study utilized four batches of NC synthesized under different conditions, including optimization using a hot plate magnetic stirrer and water bath, with variations in temperature and duration, at a rotation speed of 130 rpm. The results unveiled significant variations in nitrogen content and ballistic performance among the diverse synthesis conditions. Moreover, all synthesized propellants exhibited consistent burning characteristics, with minimal smoke and residue, emphasizing their potential for application in sustainable propulsion systems.

THE ENHANCEMENT STABILITY OF OIL PALM MESOCARP FIBER (OPMF) NITROCELLULOSE

INVENTOR	Dr. Siti Hasnawati Jamal
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Siti Nor Ain Rusly, Dr. Alinda Samsuri, Assoc. Prof. Dr. Siti Aminah Mohd Noor, Dr. Khoirul Solehah Abdul Rahim
CORRESPONDING E-MAIL	hasnawati@upnm.edu.my

Abstract

Nitrocellulose (NC) is derived from Oil Palm Mesocarp Fiber (OPMF) and subsequently mixed with stabilizer such as Diphenylamine (DPA) and centralite. The stability and ballistic performance of the stabilized nitrocellulose were investigated through a comprehensive analysis involving Heat Flow Calorimetry (HFC) and firing test. Our study aims to demonstrate that the incorporation of stabilizers enhances both the stability chracateristics and ballistic properties of nitrocellulose, thereby improving NC propellant shelf life.

VIBRATION TEST RIG FOR ELECTROMAGNETIC DAMPER

INVENTOR	Ts. Mohd Fazli bin Mohd Yusoff
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Prof. Dato' Ts. Dr. Ahmad Mujahid bin Ahmad Zaidi, Dr Azharudin Mukhtaruddin, Dr MF Md Din, Dr Ir. Mohd Zaid bin Othman
CORRESPONDING E-MAIL	fazli@upnm.edu.my

Abstract

Electromagnetic damper has been given special attention by many researchers and thus is among the important research areas in vibration system.A vibration test rig incorporating a simple electromagnetic damper is designed and tested to examine the impact of electromagnetic force.The vibration system test rig can be operated as free vibration system.It can be categorized under a linear electrodynamics concept. The basic idea applied on the test rig is to create a magnetic flux interaction between the permanent magnet which is moving vertically through stator (aluminum or nylon).The basic components of the test rig are electromagnetic damper, sensor, spring, linear bearing, permanent magnet, LMS Data Acquisition System and LMS Test Express Software. The spring and linear bearing make the system oscillate vertically once it has been excited. A permanent magnet has been attached at the end of the shaft. The dimensions of the ferrite magnet are 22mm (inner diameter), 45mm (outer diameter) and 8 mm (thickness of each magnet). The vibration response of the system was taken through the accelerometer sensor, which connected to LMS DAQ and LMS Test Express Software. The electromagnetic damper, as a subject of investigation, has been located at the bottom of the test rig such that it will interact with the permanent magnet, which oscillates as the system is excited. The acquired response was the acceleration response of a mass spring damper system, which can be integrated to obtain the velocity and displacement response of the system.Then, a logarithmic decrement method has been deployed to calculate the damping ratio and damping coefficient of the system. The results indicate that aluminum exhibits a superior damping coefficient value of 2.8 kgs-1 compared to Nylon, which has a damping coefficient of 1.9 kgs-1.

UNVEILING THE CHEMOPREVENTIVE POTENTIAL OF SHOGAOLS ON CERVICAL CANCER CELL LINES

INVENTOR	Dr. Marami binti Mustapa
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Unwaniah binti Abdull Rahim, Dr. Nur Aishah binti Che Roos, Dr. Armania binti Nurdin, Ts. Dr. Nik Noorul Shakira binti Mohamed Shakrin, Dr. Nursiati binti Mohamad Taridi, Ts. Dr. Mariam Firdhaus binti Mad Nordin, Prof. Dr. Yasmin Anum binti Mohd Yusof
CORRESPONDING E-MAIL	marami@upnm.edu.my

Abstract

Cervical cancer is the fourth leading cancer incidence in women worldwide. The most common cause of cervical cancer is the infection of cervix with human papillomavirus (HPV) subtypes 16 and 18. These subtypes are found in the SiHa and HeLa cell lines, respectively. Bioactive compounds, shogaols exhibit potent anti-inflammatory and anti-tumour characteristics. This study primarily focuses on investigating the potential chemopreventive effects of 6-/10-shogaols on cervical cancer cell lines, HeLa and SiHa, using MTT and apoptosis assays. The result shows that in Hela cells, the treatment with 10-shogaol (36.3 ± 3.2 µM) resulted in lower IC50 value compared to 6-shogaol (68.8 ± 2.4 µM). Conversely, in SiHa cells, the IC50 value was lower with 6-shogaol (54.5 ± 10.6 µM) compared to 10-shogaol (72.0 ± 19.2). Further analysis using flow cytometry showed that 10-shogaol induced the highest apoptotic activity on both HeLa and SiHa cells, with 13.5% and 38.3% total apoptotic cells, respectively. These findings suggest that shogaols exhibit efficacy in inhibiting cell proliferation and induce apoptosis in HeLa and SiHa cell lines.

6-GINGEROL AND 6-SHOGAOL AS PROMISING CHEMOPREVENTIVE AGENTS IN CERVICAL CANCER: A SYSTEMATIC REVIEW

INVENTOR	Dr. Nur Aishah binti Che Roos
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Unwaniah binti Abdull Rahim, Dr. Marami binti Mustapa, Ts. Dr. Nik Noorul Shakira binti Mohamed Shakrin, Dr. Armania binti Nurdin, Dr. Nursiati binti Mohamad Taridi, Ts. Dr. Mariam Firdhaus binti Mad Nordin, Prof. Dr. Yasmin Anum binti Mohd Yusof
CORRESPONDING E-MAIL	nuraishah@upnm.edu.my

Abstract

Cervical cancer (CC) is the second most prevalent cancer and the fourth leading cause of death among women aged between 15 to 44 years in Malaysia despite the establishment of cervical cancer screening and vaccination programs. It affects women during a critical period in life and imposes emotional suffering and financial hardship associated with CC to affected families. Both 6-gingerol and 6-shogaol, the bioactive compounds of fresh and dried ginger respectively, have exhibited a range of biological activities including anticancer activities. This systematic review aims to identify and evaluate the recent evidence on the chemopreventive mechanism of 6-gingerol and 6-shogaol in cervical cancer. Study search was performed using electronic databases including Scopus, PubMed and Science Direct from inception until May 2022 for English publication. Only preclinical studies that investigate the effects of 6-gingerol and 6-shogaol in human cervical cancer cell lines and/or rodent animal models were included. The anticancer activity of the bioactive compounds studied were assessed by its cytotoxicity, molecular pathways, gene and/or protein targeted by them. Overall, nine studies were included in this review (six and three studies on 6-gingerol and 6-shogaol correspondingly). Evidence has shown that both 6-gingerol and 6-shogaol induced apoptosis and reduced cervical cancer cells viability. Their anticancer effects are exerted by disruption of the Pi3K/Akt/mTOR pathway and by targeting genes and proteins expression such as caspases-3, -9, p53, Tnf-α, and Bax/Bcl2 expression. In conclusion, 6-gingerol and 6-shogaol have potential to be developed as anticancer agents for the treatment of cervical cancer, hence warrants further investigation.

ENHANCING DUCTILITY OF Sn-0.7Cu LEAD-FREE SOLDER JOINTS FOR HIGH-RELIABILITY INTERCONNECTIONS IN ELECTRONIC MILITARY DEVICES

INVENTOR	Dr. Maria binti Abu Bakar
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Kebangsaan Malaysia
CO-INVENTOR	Azman Jalar
CORRESPONDING E-MAIL	maria@ukm.edu.my

Abstract

The evolution from manual to the digital era in defence devices has been a significant transformation driven by technological advancements. Lead-free solder joint is the backbone of the electronic devices and play a critical role in ensuring its reliability and performance especially for military devices. This is because the military devices are expected to perform consistently over extended periods, often in extreme conditions as compared to commercial devices that focus on performance within normal operating parameters. Solder joint failure leading to cracks is often arisen from low-ductility solder joint. Therefore, this work is aimed to explores the significance of enhancing ductility in Sn-0.7Cu lead-free solder joints through thermomechanical processing to achieve high-reliability interconnections. The solder joint is subjected to thermomechanical processing involving mechanical compression with range of 20-80% and temperature range of 30-180°C. The findings show that suitable thermomechanical processing parameters such as compression percentage and temperature can produce microstructure of small and equiaxed grain Sn-0.7Cu lead-free solder joints. Micromechanical properties from nanoindentation testing have shown that the thermomechanical solder joints are having low hardness, low reduced modulus, and higher plastic work. This indicates that the thermomechanical processing can produce Sn-0.7Cu lead-free solder joints with high ductility. This work highlights the innovative way to improve the solder joint properties to achieve more durable interconnection for military applications.

ASSESSING PEERS AS A PREDICTOR ON YOUTH POLITICAL BEHAVIOUR IN ENHANCING MALAYSIAN POLITICAL STABILITY

INVENTOR	Assoc. Prof. Dr. Wan Norhasniah binti Wan Husin
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Hj Noor Azmi bin Hj Mohd Zainol, Siti Juwairiah binti Zainurin
CORRESPONDING E-MAIL	hasniah@upnm.edu.my

Abstract

The role of youth in the political system has become increasingly important worldwide. In Canada, youth can engage directly with the Prime Minister on issues pertinent to them through government-implemented programs like the Prime Minister's Youth Council. Similarly, youth activism in South Korea and Tunisia has led to political changes, prompting governments to include youth in decision-making processes and promote their participation in politics. Malaysia has also witnessed significant developments, such as the implementation of Undi18, which is expected to increase the number of voters by 50%, adding approximately 7.8 million new voters. Therefore, this study investigates the effects of peer, family, and social media on youth political behavior (aged 18–25) within the Klang Valley area. Employing a quantitative approach, the study distributed a questionnaire survey to 525 youth. Data analysis was conducted using SPSS and SmartPLS. The findings reveal statistically significant indirect effects through political knowledge. However, the direct effect of the family on youth political behavior did not reach significance ($\beta=0.048$, $p=0.313$). The proposed model highlights political knowledge as a mediator, strengthening the influence of peers ($\beta=0.056$, $p<0.001$), family ($\beta=0.074$, $p<0.001$), and social media ($\beta=0.050$, $p<0.005$) on youth political behavior. This suggests that while the direct relationship between family influence and youth political behavior may not be significant, there is a significant indirect relationship mediated by political knowledge. In other words, the influence of family on youth political behavior operates through its impact on political knowledge. The findings underscore the importance of considering mediating factors, such as political knowledge, in assessing the influence of social components on youth political behavior. This study offers practical implications for policymakers seeking to promote civic education and engage youth in democratic processes.

REMOVAL OF FTO: ADSORPTION MECHANISM FROM AQUEOUS ENVIRONMENT

INVENTOR	Dr. Nor Laili-Azua Jamari
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Wan Nursyafiqah Wan Zamri, Prof. Dr. Ong Keat Khim, Dr. Norherdawati Kasim, Ts. Syed Mohd Shafiq Syed Ahmad
CORRESPONDING E-MAIL	azua@upnm.edu.my

Abstract

Fluorotelomer aroused global concern when it was introduced into industry to replace perfluoroalkyl substances (PFAS) compounds due to its extensive dispersion and attributes of persistence, bioaccumulation, and toxicity. Adsorption has been known to be an efficient approach for eliminating fluorotelomers from water. Until today, the removal of PFAS only focuses on anionic type of compounds, but no study has been conducted on neutral PFAS. Fluorotelomer olefin (FTO) is a neutral PFAS used in a variety of industries including food packaging, textiles, and stain-resistant surfactants. The main issue with using FTO in manufacturing is that it produces harmful emissions that can cause harm to the environment and living beings which can biodegrade into toxic compounds such as PFOA and other PFCAs. There was still limited study of how FTO transport affected the environment, making it challenging to understand its behaviour. In this project, the adsorption of different FTO concentrations (50 mg/L – 500 mg/L) on granular activated carbon (GAC) with 5 hours contact time were investigated and the adsorption data were plotted onto two different models: kinetics and isotherms. These models could predict the mechanism involved in the adsorption process during the removal of FTO. The result from this project indicated that pseudo-second-order kinetic and Freundlich isotherm are the two main models fitted-well with the adsorption. These models predicted that the chemisorption and multilayer are the adsorption mechanism involve during the removal of FTO. Apart from that, there is no change on the morphological surface of GAC indicating the adsorption process did not affect the surface of GAC. Findings from this research has the potential to contribute to public and civil society to improve the quality of treated water and reduce the exposure of the harmful effect of neutral PFAS towards humans.

GRADED BANDGAP DEVICE ARCHITECTURE TO ENHANCE EFFICIENCY OF SOLAR CELLS

INVENTOR	Assoc. Prof. Ts. Dr. Nor Azlian binti Abdul Manaf
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Wan Yusmawati binti Wan Yusoff, Dr. Azuraida binti Amat, Dr. Nurul Hazwani binti Aminuddin Rosli, Dr. Nurazlin binti Ahmad
CORRESPONDING E-MAIL	azlian@upnm.edu.my

Abstract

This product invented the idea of device architecture using graded bandgap solar cell to maximize the solar spectrum and efficiency of the device. The graded design in photoactive layer was implement using n- i- p graded structure by carefully fabricated three BiOI layers with various iodin concentration started with BiOI layer with half concentration of iodine (BIOI 0.5), same concentration of iodine (BiOI 1.0) and double concentration of iodine (BIOI 2.0). This configuration structure has created a strong built-in electric field that enhance the separation of the charge carriers and speeds up the photo-generated electron to the bottom electrode. This work is evident that the multilayer PSCs structure produces cells with desirable performance that effectively absorb the photons in almost all parts of the solar spectrum and produce good output current and better power conversion efficiency. The PSCs with graded bandgap n-i-p absorbance layer was measured with good Jsc, Voc and efficiency. This innovation provides new device structure based on the idea of graded bandgap to improve performance in PSCs.

ALGORITHM FOR JOINT IMAGE SEGMENTATION AND REGISTRATION USING GENERALIZED MEAN AND NORMALIZED GRADIENT FIELD FOR 2D MULTI-MODAL IMAGES

INVENTOR	Dr. Mazlinda binti Ibrahim
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Hoo Yann Seong, Ms. Nurul Asyiqin Mohd Fauzi, Dr. Abdul Kadir bin Jumaat
CORRESPONDING E-MAIL	mazlinda@upnm.edu.my

Abstract

Medical imaging plays a critical role in clinical decision-making and patient care. However, the presence of high levels of noise in medical images can significantly impact the accuracy of diagnosis and subsequent analysis. In recent years, joint segmentation and registration models have emerged as an effective alternative approach for enhancing medical images. Nevertheless, traditional methods, such as the Chan-Vese model, face challenges when dealing with images with high levels of noise. To address this limitation, we introduce a different approach that incorporates generalized mean into the joint model. Our joint model combines the generalized mean-based image segmentation which utilizes the fuzzy-membership function, modified normalized gradient fields and linear curvature for registration task. The proposed joint model improved by 60% according to the numerical results when tested on images with high level of noise.

NEWLY SYNTHESIZED GLYCOLIC ANHYDRIDE KAPPA-CARRAGEENAN AS GEL POLYMER ELECTROLYTE

INVENTOR	Dr. Intan Juliana binti Shamsudin
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Norherdawati Kasim, Dr. Nurul Hazwani binti Aminuddin Rosli, Dr. Mohd Saiful Asmal bin Abdul Rani, Dr. Hussein bin Hanibah, Assoc. Prof. Dr. Siti Aminah binti Mohd Noor, Ms. Priyatharshiny Pongali
CORRESPONDING E-MAIL	intanjuliana@upnm.edu.my

Abstract

Kappa-carrageenan (κCar) is a great candidate as polymer host in an electrolyte system. Other than its biodegradability, non-toxicity, renewability, low production cost and the growing concern on the environment, κCar is a great candidate as a polymer host in an electrolyte system due to its low crystallinity, outstanding water retention, high gel strength and most essentially the presence of electron-donating groups that enabled dative interactions with cations/analyte assimilated in the electrolyte system. However, the ionic conductivity of κCar is low. Improvement in the ionic conductivity is crucial in order to be applied as electrolyte in electrochemical devices. Thus, synthesis of glycolic anhydride-kappa-carrageenan (GA-κCar) is proposed. GA-κCar is synthesized following previously developed acid anhydride-κCar synthesis method. Formation of new chemical bonds showed in the FTIR spectra and increase number of degrees of substitution suggests that the GA-κCar is successfully synthesized. The chemical mechanism of the synthesis is proposed. The originality of this study is on the novel theories on the synthesis of GA-κCar. The GA-κCar produced has potential to be applied in electrochemical devices.

SYNERGISTIC EFFECT OF SULFUR-DOPED REDUCED GRAPHENE OXIDE CREATED VIA MICROWAVE-ASSISTED SYNTHESIS FOR SUPERCAPACITOR APPLICATIONS

INVENTOR	Dr. Nurul Hazwani binti Aminuddin Rosli
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Kam Sheng Lau, Prof. Dr. Tan Winie, Dr. Siew Xian Chin, Prof. Dr. Chin Hua Chia
CORRESPONDING E-MAIL	n.hazwani@upnm.edu.my

Abstract

We demonstrate a fast and facile method for rapid production of reduced graphene oxide (rGO) through a microwave-assisted reaction using the green reducing agent sodium cholate at temperatures between 120 and 180 °C for 1 h. Characterization with ultraviolet–visible, Fourier-transform infrared, and Raman spectroscopy confirmed that reduction occurred at each tested temperature. Higher temperatures resulted in greater removal of oxygen-containing functional groups from the graphene oxide (GO). The morphology of GO and rGO samples was observed by field emission scanning electron microscope. The electrochemical properties and cycle performance of rGO samples were evaluated by cyclic voltammetry, galvanostatic charge-discharge, and electrochemical impedance spectroscopy. The rGO sample reacted at 140 °C achieved specific capacitance values of up to 293% those of samples reacted at other temperatures. Furthermore, rGO-140 °C demonstrated remarkable capacitance retention, maintaining at 104.1% after 5000 cycles, suggesting that it can be used as a promising electrode material for supercapacitor applications.

EVALUATION OF EXTREME RAINFALL OCCURRENCES USING STANDARD PRECIPITATION INDEX (SPI)

INVENTOR	Assoc. Prof. Dr. Ummul Fahri binti Abdul Rauf
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Nurul Dayana binti Razuki, Assoc. Prof. Dr. Zuraini binti Zainol
CORRESPONDING E-MAIL	3231781@alfateh.upnm.edu.my

Abstract

The main objective of this research is to investigate The Standard Precipitation Index (SPI), a commonly used method for determining extreme rainfall occurrences as well as gauging the duration and severity of droughts. To pinpoint exceptional rainfall events in a specific area, a methodology was provided in this paper for calculating the SPI for different periods of time and thresholds. Overall, the study highlights the potential of using the SPI to improve our understanding of extreme rainfall events. The Standard Precipitation Index (SPI) is utilized to analyze the monthly precipitation data of more than 30 years for several selected rain gauge stations. The goal of this study is to keep an eye on the extremely moist conditions that may eventually result in floods. Precipitation index data from several rain gauge sites in Peninsular Malaysia are used to calculate SPI time series. Additionally, SPI readings for 3 months or less may usually be used for basic drought monitoring, values for 6 months or less may be useful for monitoring agricultural impacts, and values for 12 months or more may be useful for monitoring hydrological impacts. From this study, statistics of occurrence for dry and wet events in specified areas were determined based on the SPI readings for 3-month, 9-month, 12-month and 24-month. There is a distinct difference that can be seen between graph of SPI values for 3-month and 24-month for selected rain-gauge stations. The statistics shows that some area had a past drought since it has more dry occurrences over time compared to other stations, which are more likely to have repeated flooding over the course of several years. For several other stations, the region selected had more wet occurrences throughout time, and it may be inferred that this is an area that could be vulnerable to significant flooding for a long time if it experiences ongoing rainfall seasons.

SUSTAINABLE NANOFLUIDS: rGO in WASTE COOKING OIL-BASED

INVENTOR	Assoc. Prof. Ts. Dr. Norli Abdullah
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Khairunnisa Waznah Baharin, Noor Aisyah Ahmad Shah, Mohd Nurazzi Norizan, Hidayati Hamdan, Norherdawati Kasim, Safura Taufik, Mohd Afzanizam Mohd Rosli, Nurfarhana Salimen, Nurul Izzati Akmal Muhamed Rafaizul
CORRESPONDING E-MAIL	norli.abdullah@upnm.edu.my

Abstract

With a focus on environmental sustainability, the integration of reduced graphene oxide (rGO) into waste cooking oil presents a promising avenue for the development of green nanofluids. This blend not only taps into the exceptional properties of rGO but also capitalizes on the ubiquity and underutilization of waste cooking oil. Nanofluids, composed of a base fluid such as waste cooking oil and rGO as nanoscale particles exhibit enhanced thermal and mechanical properties compared to conventional fluids. By dispersing rGO nanoparticles within waste cooking oil, the thermal conductivity of the resulting nanofluid can be significantly enhanced. This improved thermal conductivity makes waste cooking oil-rGO nanofluids suitable for applications requiring efficient heat transfer, such as heat exchangers, cooling systems, and thermal management in electronics. Therefore, our innovation utilized the use of waste cooking oil mixed with reduced graphene oxide as nanofluids. The effects of temperature and concentration on thermal conductivity of nanofluids were investigated. In result, adding nanoparticles in the waste cooking oil, which effectively improved the solution of heat transfer rate. Repurposing waste cooking oil for nanofluid synthesis contributes to environmental sustainability by providing a value-added use for a typically discarded resource. Instead of disposing of waste cooking oil, which can pose environmental hazards if not managed properly, converting it into a high-performance nanofluid helps reduce waste and minimize environmental impact. In summary, the synergistic combination of waste cooking oil and rGO in nanofluid formulations presents a sustainable, cost-effective, and versatile solution with wide-ranging applications in thermal management, lubrication, and beyond. This innovation will be conducive to the study in nanofluids, environmental protection and waste recycling.

ELA: LEARNING ENGLISH AND BEYOND

INVENTOR	Mrs. Afifah Quraishah Abdul Nasir
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Erda Wati Bakar, Surinder Kaur A/P Satwant Singh
CORRESPONDING E-MAIL	afifah@upnm.edu.my

Abstract

Technology-assisted language learning can greatly enhance language learning beyond the classroom. It offers flexibility in terms of learning pace and schedule. ELA (English Language Activities) is introduced at Universiti Pertahanan Nasional Malaysia (UPNM) by the Language Centre as part of EcoELL (The Ecosystem for English Language Learning), where the learning process is involved not only in the classroom but beyond the classroom. It is part of the alignment of English courses and activities to the Common European Framework of Reference (CEFR) to meet the requirements issued by the Ministry of Education Malaysia (MOE). The selection of activities and tasks for ELA are based on the CEFR language specifications. The formulation of ELA is informed by several references. Goal 4 of Sustainable Development Goal that aims to provide quality education and lifelong opportunities to all students from different backgrounds is considered as the overarching umbrella. Additionally, constructs from Language Beyond Classroom (Benson, 2011) and Technology assisted language learning (Thorne et. al., 2009) are also adopted. ELA, which foster self-regulated and autonomous learning, offers students opportunity to use English language outside classroom informally within a non-threating setting. Students work in groups to complete the tasks which help to enhance their interpersonal skills. The activities of ELA consist of Movie Review (ELA0010), DIY Project (ELA0020), Breaking News (ELA0030), CSR Project (ELA0040), Pitch (ELA0050), Skit (ELA0060), and Inspire Me! (ELA0070). Through these beyond-the-classroom language activities, students get to experience a holistic English language learning environment, thus enabling them to be English language competent and employment-ready graduates.

MODEL OF FACE MANAGEMENT STRATEGIES FOR HANDING PRESS CONFERENCE DURING EMERGENCY, CRISIS AND DISASTER

INVENTOR	Mrs. Asniah binti Alias
RESEARCH FIELD	National Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Kdr Ts. Dr. Haliza Mohd Zahari, Dr. Hasrul Kamarulzaman
CORRESPONDING E-MAIL	asniah@upnm.edu.my

Abstract

A press conference is a media event that demands active responses in which the face or self-image of the speakers is usually appraised by the way they present themselves and communicate with the audience. The idea of people managing their responses, and the responses of others, implied a conscious awareness of something vital for face management (Goffman, 1963) in which facework strategies are highly warranted at work. Thus, this study sought to explore facework strategies used by the government spokesperson to manage his face as well as national face throughout a series of press conferences on the MH370 Malaysian Airlines accident. A descriptive approach was used where 28 video recordings of the press conferences collected for 82 days were transcribed and analysed by conducting a content-analysis procedure. The study found that the spokesperson employed various strategies of facework (i.e dominating, avoiding, integrating, defensive, and restorative) to manage his face and/or the national face in countering the face-threatening acts of the journalists. The employment of the strategies was motivated by situational factors and the face concerns of the spokesperson has on the media and audience. The findings of this study provide important insights for countrymen, mediators, and diplomats to reflect in order to improve the effectiveness of crisis communication, especially in the high-stakes media event.

SYNERGISTIC ADVANCEMENTS IN NANOFLUID TECHNOLOGY: EXPLORING THE INTEGRATION OF METAL OXIDE NANOPARTICLES-ENHANCED PERFORMANCE IN ANIONIC NANOCELLULOSE

INVENTOR	Dr. Mohd Nurazzi bin Norizan
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Sains Malaysia
CO-INVENTOR	Mrs. Mageswari A/P Manimaran, Assoc. Prof. Dr. Mohamad Haafiz Mohamad Kassim, Dr. Mohd Ridhwan Adam, Assoc. Prof. Dr. Norli Abdullah, Dr. Mohd Nor Faiz Norrrahim
CORRESPONDING E-MAIL	mohd.nurazzi@usm.my

Abstract

In 2022, Malaysia stood out as a significant palm oil exporter in the world, second only to Indonesia. Despite its prominence in palm oil production, only 10% of the entire oil palm tree is utilized for this purpose. The remaining 90% is transformed into oil palm biomass, including empty fruit bunches (OPEFB), mesocarp fibers (MF), fronds (OPF), trunks (OPT), and kernel shells (OPK). The significant annual production of 50 to 70 tonnes of oil palm biomass has captured the interest of researchers due to its potential applications, aligning with the National Advanced Materials Technology Roadmap 2021-2030 prioritized nanocellulose from local biomass as high priority for advanced materials technologies or transforming waste into valuable resources. In this research, nanocellulose is synthesized from OPEFB, which possesses unique properties such as large surface area to volume ratio and abundance of functional groups for surface functionalization to be used as nanofluids. Coolants are essential for heat transfer in such systems. Conventional nanofluids include water, propylene glycol, ethylene glycol, refrigerants, and oil exhibit low thermal conductivity and stability. Consequently, nanofluids have been developed in various engineering systems by adding nanoparticles, such as metal oxide nanoparticles (MONPs), to enhance thermal performance. Nonetheless, MONPs possess a high surface area, leading to a tendency to agglomerate. Hence, the concept of hybrid nanofluids is introduced, aiming to immobilize anionic cellulose nanoparticles from OPEFB with MONPs in water as a suspension medium. Nanocellulose is easy to agglomerate and has low thermal stability characteristics. To mitigate this, the chemically tunable hydroxylated and carboxylated groups in the nanocellulose can act as strong anchoring sites for immobilized metal species. This is expected to overcome the issues of attractive van der Waals force, repulsive electrostatic force, low thermal stability, aggregation, poor dispersion and stability of nanoparticles, especially using water as suspension media.

MIGRAINE DIAGNOSIS SYSTEM USING FUZZY LOGIC ALGORITHM

INVENTOR	Dr. Yuhanim Hani binti Yahaya
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Nadiawati binti Dato' Abdul Razak, Nur Zulaikha Asyiqin binti Zuraini
CORRESPONDING E-MAIL	yuhanim@upnm.edu.my

Abstract

Migraine is one of a type of headache that is focused on the side of the head either left or right that stabs. The initial symptoms will be experienced by the patient before the migraine attack occurs. Many migraine sufferers among the students of Universiti Pertahanan Nasional Malaysia (UPNM) lack exposure to the types and levels of migraine they may experience. Patients also find it difficult to get initial treatment recommendations and ways to avoid the symptoms that trigger migraine pain easily and then have to do their own research on the internet. This process takes a long time to understand and can cause confusion in the understanding of migraine. The main goal of this study is to develop a Migraine Diagnosis System to help patients diagnose the type and level of migraine based on the symptoms encountered. This system makes it easier for students to get quick access when a migraine attack occurs. The Waterfall model is used as a methodology for the development of a Migraine Diagnosis System that use Fuzzy Logic algorithm. Fuzzy Logic algorithm can provide decision support to human experts. Diagnostic software can use fuzzy logic algorithms to suggest potential diagnoses or recommend further tests or actions. This algorithm offers a reasoning method that is able to make fuzzy inferences based on a Degree of Membership between 0 and 1. This system is able to produce diagnosis results instantly based on answer choices, which is input by the patient through a questionnaire. The system will visually display the type of migraine experienced along with the level, initial treatment recommendations and the patient's daily routine that needs to be followed to avoid migraine triggers.

PREVALENCE AND CORRELATED FACTORS OF NOISE-INDUCED HEARING LOSS AMONG MARINE TECHNICIANS OF THE ROYAL MALAYSIAN NAVY AT LUMUT NAVAL BASE, PERAK

INVENTOR	Dr. Khairul Anwar bin Zarkasi
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mej Dr. Wan Mohd Muizzuddin Wan Mohamed, Dr. Siti Hajar Adam, Kol Dr. Siti Zulaili Zulkepli
CORRESPONDING E-MAIL	khairul.anwar@upnm.edu.my

Abstract

The prevalence of occupational NIHL in Malaysia has been increasing since the past decade, which involves manufacturing, transportation, and construction sectors, excluding the military. Marine technicians working on Royal Malaysian Navy (RMN) ships are exposed to hazardous noise, particularly within the engine rooms' enclosed spaces. Given the sparse information regarding occupational NIHL among Malaysian military personnel especially the RMN marine technicians, the study aimed to investigate the prevalence and correlated factors of occupational NIHL among this understudied population. Participants with normal otoscopic findings (n=127) responded to a self-administered questionnaire regarding sociodemographic and socioeconomic characteristics, lifestyle behaviours, and occupational characteristics, followed by pure tone audiometric (PTA) assessments. Occupational NIHL was diagnosed when there was high-frequency hearing loss at 3 kHz–6 kHz, with subsequent recovery at 8 kHz. The participants' mean age was 32.1±0.45 years. The prevalence of occupational NIHL was 22.7%, 31.4%, and 70.0% among junior able, petty officers, and warrant officers, respectively, with an overall prevalence of 29.9%. On unadjusted analysis, correlated factors for occupational NIHL comprised age (β=0.097, p=0.015), middle household income (β=1.025, p=0.023), military rank especially the warrant officer (β=2.071, p=0.006), and years of service (β=0.075, p=0.034). From all these four variables, military rank emerged as the sole significant predictor for occupational NIHL in both forward and backward conditional logistic regression (p for trend=0.021). Warrant officers had 7.93 times higher odds of being diagnosed with occupational NIHL compared to junior able (95% CI=1.82–34.50). The prevalence of occupational NIHL among RMN marine technicians was higher compared to the global prevalence as well as data from previous studies among Malaysian Armed Forces personnel. Regular audiometric assessments and implementation of the Hearing Conservation Programme should be targeted for this population.

THE OVERVIEW OF THE REQUIREMENT FOR DEFENCE TECHNOLOGY ADVANCEMENT OF A COUNTRY

INVENTOR	Mr. Mohamad Arsad bin Nazal
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Security Plus Academy
CO-INVENTOR	Mr. Alexander Amping Anak Nelson, Mr. Low Soon Leong, Mr. Muhammad Haqeem bin Mohd Nasir
CORRESPONDING E-MAIL	haqeem@smartcollege.edu.my

Abstract

Historically, humanity has tried to protect itself from various dangers. An appropriate level of protection is a crucial factor in order to maintain its security and stability. Security is a broad concept and different approaches. From international security to national security levels, the impact of a threat reflects the stability of the community. Therefore, defence technology plays a huge role in order to maintain the stability. This technology will help mitigate the threat before it can even happen. This research provides an insightful overview on defence technology issues for different countries. These insights will be useful in highlighting the essential requirements for advancement of defence technology of a country. For example, Turki, India, Brazil, and Saudia Arabia use defence offset to reduce the gap in the supply of materials and technology for aircraft fighters. The results show that a country must consider the context and requirements of each country and involve the relevant stakeholders, particularly in the formulation and implementation of defence offset strategies in minimizing the material and technology gap in fighter aircraft development. On the other hand, a country also can learn from Indonesia's Vision, Understanding, Courage and Adaptability (VUCA) approach to analyze the strategy in the field of defence technology. For Vision, a country needs to strengthening the defence technology by focusing on autonomous weapons systems and improving sensors. For Understanding, a country needs to understand that they need competent people to use defence technology in the future. For Courage, a country needs to adopt the concept of digitizing defence technology in order to improve the quality of main weapons system productions. Lastly, for Adaptability, a country needs to have a long-term defence investment policies systemically and consistently.

ENHANCING NATIONAL SECURITY THROUGH THE USE OF ARTIFICIAL INTELLIGENCE SOLUTIONS IN THREAT DETECTION AND MITIGATION

INVENTOR	Mazlan bin Abdullah
RESEARCH FIELD	National Security
INSTITUTION	Security Plus Academy (SPA)
CO-INVENTOR	Darshini D/O Anbalagan, Chanthira Suddharat D/O Kew. Nur Amelia binti Md Lailatul Hadri
CORRESPONDING E-MAIL	nuramelia@smartcollege.edu.my

Abstract

Advancements in artificial intelligence (AI) have revolutionized strategies for detecting and mitigating threats, especially in the domain of national security. This paper investigates the utilization of AI-driven solutions to enhance capabilities in identifying and addressing threats, specifically focusing on their application in military and security settings. Through an extensive literature review, the paper synthesizes key methodologies, outcomes, and implications to offer insights for practitioners and policymakers.

Real-world deployments have shown that AI-driven solutions result in improved accuracy in threat detection, early warning capabilities, decreased instances of false positives, and increased operational efficiency. Additionally, these systems provide scalability, adaptability, and ongoing enhancements, thereby bolstering security resilience and leading to cost savings.

In summary, the adoption of AI-driven approaches for threat detection and mitigation presents significant opportunities for strengthening national security endeavors. By harnessing AI technologies, security agencies can efficiently pinpoint and respond to various threats, thereby protecting critical assets and infrastructure from evolving security risks. Nonetheless, careful attention must be given to ethical, legal, and technical considerations to fully realize the potential benefits of AI while managing associated risks.

CYBER SECURITY AWARENESS IN MALAYSIA: A CASE STUDY

INVENTOR	Syarifah Qistina Huda binti Syed Ahyattudin
RESEARCH FIELD	Industrial Revolution 4.0/ Cyber Security/ Data Analytic/ Artificial Intelligent
INSTITUTION	SMART College
CO-INVENTOR	Vesagan A/L Aron, Muhammad Baihaqi bin Mohd Hadi, Fauzan Iliya Binti Khalid
CORRESPONDING E-MAIL	fauzan@smartcollege.edu.my

Abstract

In the rapidly evolving digital landscape, cybersecurity awareness has emerged as a critical aspect of safeguarding sensitive information and preserving the integrity of systems. This paper presents the cybersecurity awareness within the context of Malaysians, aiming to assess current levels of understanding among the civilians. Besides, the objective is also to identify knowledge gaps and challenges, and propose strategies for improvement. Through a combination of surveys, interviews, and observations, the study uncovers varying levels of awareness among stakeholders and identifies challenges such as limited resources for training and lack of community awareness emphasis on cybersecurity as a core competency. Its novelty lies in the examination of cybersecurity awareness practices, challenges, and initiatives specifically within the Malaysian socio-cultural and regulatory framework. Based on these findings, recommendations are presented for enhancing cybersecurity awareness within the Malaysians, including the development of tailored training programs for public and the implementation of updated information to measure progress and identify emerging threats. By addressing these challenges and implementing the proposed strategies, Malaysia can strengthen its cybersecurity posture and better equip its community members with the knowledge and skills needed to navigate the digital landscape safely and securely, thus contributing to the advancement of cybersecurity awareness in Malaysian community.

FRAMEWORK FOR SUSTAINABLE COMMUNITY CHICKEN FARMING BY RURAL COMMUNITY @ PT SULONG : SECURING LOCALITY FOOD SOVEREIGNTY

INVENTOR	Nadirul Hasraf Mat Nayan
RESEARCH FIELD	Food Safety and Security
INSTITUTION	Universiti Tun Hussein Onn Malaysia
CO-INVENTOR	Mr. Wan Muhammad Idham Wan Mahdi, Mr. Mohd Syahir Anwar Hamzah, Mr. Adlil Ikram Shahruddin
CORRESPONDING E-MAIL	drnadirulhasrafmatnayan@gmail.com

Abstract

Sustainable Community Chicken Farming framework was introduced to secure a stable supply of chicken at the community level and to ensure that the supply of chicken is not interrupted in the community. This model also stimulates a culture of self-reliance and resilience to the current situation, in addition to being sustainable for the environment. The strategy behind this model promotes responsible and environmentally friendly chicken farming within a community or local setting. It focuses on ensuring that chicken farming is not only economically viable but also socially and environmentally sustainable.

Therefore, Parit Sulong, Batu Pahat, Johor have been chosen as the location to implement this framework where 12 new small farmers were selected from 100 candidates by UTHM with Pertubuhan Peladang Kawasan (PPK) Parit Sulong (PPK) where this project is fully funded by MoF. The farmers have been trained by poultry champions from Anak Kampung Agro Farm (AKAF) and Batu Pahat District Veterinary Officer to enhance their knowledge and skills. The farmers have generated a new alternative income of around RM 500 – RM 1500 for the 1st training cycle. Up to date, there is no project demonstrating the success story of implementing the sustainable chicken framework at the community level whereas this could be the first one.

EFFECT OF SCOUR AND SEISMICITY ON THE BRIDGE'S RESPONSE

INVENTOR	Ts. Dr. Nordila Ahmad
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Prof. Ts. Dr. Edy Tonnizam bin Mohamad, Assoc. Prof. Dr. Badronnisa Yusuf, Ir. Dr. Siti Khadijah Che Osmi, Dr. Jestin Jelani, Dr. Zuliziana Suif, Elwin Kuan Yu You, Amir Syauqi
CORRESPONDING E-MAIL	nordila@upnm.edu.my

Abstract

Bridges play a critical role in maintaining transportation networks, and their resilience to natural disasters is of utmost importance. The bridges' vulnerability to multiple hazards particularly seismic activities and flood-induced scour is not fully understand. This study focuses on evaluating how bridges respond to the simultaneous threats of earthquakes and flood-induced scour, particularly in very dense sandy soil conditions. The research employs specialized finite element modelling software (CSI Bridge) to derive fragility curves, providing crucial insights into bridge vulnerability in these challenging circumstances. The study utilized a dedicated numerical model to simulate earthquake ground motions and various scour depth condition in very dense sandy soils. This comprehensive approach allows for a thorough assessment of bridge vulnerability which primarily contribute to the development of fragility curves for minor, moderate and extensive damage. These curves quantify the probability of bridge damage or failure across varying levels of hazard intensity. Nonlinear time history analyses were conducted by 5 earthquakes data from the past events by scaling it within the range of 0.25 g to 1.5 g. The scour depth was defined from the foundation depth (Df) at the pile cap which ranges from no scour, 1Df, 1.5Df and 2Df. The findings highlighted those bridges exposed to both earthquake and flood-induced scour in very dense sandy soils heightened the risks of damage and the median threshold value of the earthquake intensity measure (IMmi) will show a lower value when the probability of damage is higher. Results demonstrate that the higher the depth of scour, the higher the probability for the bridge to undergo minor, moderate as well as extensive damage in very dense sandy soil type. Thus, it was concluded that the probable multi-hazard impacts of earthquake and scouring in river crossing bridges should be considered in bridge substructure design.

BENDABLE CONCRETE USING OPTICAL FIBER

INVENTOR	Assoc. Prof. Ts. Gs. Dr. Muhamad Azani Yahya
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Prof. Ir. Dr. Mohammed Alias Yusof, Lt Col (R) Ts. Ir. Dr. Vikneswaran Munikanan
CORRESPONDING E-MAIL	azani@upnm.edu.my

Abstract

Bendable concrete, also known as "engineered cementitious composites" (ECC), is a type of concrete that exhibits enhanced ductility and flexibility compared to traditional concrete. This material often contains polymer-based cement, dispersed throughout the concrete matrix, which provides it with the ability to deform and bend without fracturing under strain. This makes bendable concrete particularly useful in applications where flexibility and crack resistance are important, such as earthquake-resistant structures, infrastructure repairs, and pavements. Bendable concrete, an innovative material in the realm of construction, has garnered significant attention for its remarkable ductility and flexibility. Engineered Cementitious Composites (ECC), as they are technically known, represent a paradigm shift from conventional concrete by using plastic cement in the concrete mix. The high cost of bendable concrete has made it unpopular. However, in defense structures, bendable concrete is needed to absorb blast loading from explosives. This research shows that integration with optical fibers can provide a deflection of normal concrete, thus creating bendable concrete

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PERFORMANCE NANO FLUID OF PALM OIL (PO) UNDER MAGNETIC FIELD APPLIED AND DIFFERENT CONCENTRATION (GRAPHENE) IN TRANSFORMER APPLICATION

INVENTOR	Dr. Muhamad Faiz Md Din
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Stephanie Azlyn Anak Felix, Amirul Rafiq Razak, Mohd Salman Mohd Sabri, Nazrul Fariq Makmor
CORRESPONDING E-MAIL	faizmd@upnm.edu.my

Abstract

This research project aims to investigate the possibility of adopting Palm Oil (PO) as a medium for insulating transformers by analyzing its dielectric characteristics. The study will evaluate the effects of doping different concentrations (0.01%, 0.1%, 0.2%, 0.4%, 0.5%) of Graphene (Gp) nanoparticles and the influence of a magnetic field (0.01T) on the electrical properties of PO. The test will be done through the evaluation of AC breakdown, tan delta test, and Raman measurement. Findings suggest that the dielectric characteristics of PO can be improved by making it appropriate for use in transformer oil applications. This fact was demonstrated when the doping of 0.1% Gp nano particle with PO showed the greatest voltage breakdown value in comparison to mixtures with different Gp concentrations. Therefore, it exceeds pure PO in terms of magnitude. Moreover, it has been noted that the voltage breakdown of all samples is greater in the context of a magnetic field, when compared to the samples without any applied magnetic field. It is important to mention that the relationship between the magnetic field and voltage breakdown might differ based on the characteristics of the material and the experimental arrangement. Nevertheless, more investigation is necessary to examine essential parameters such thermal stability, compatibility with transformer materials, and sensitivity to oxidation of palm oil, in order to confirm the use of palm oil as an effective insulator medium.

MALIK: A NEW MODULE ON ISLAMIC FAITH EDUCATION FOR CHILDREN OF MUSLIM CONVERTS IN MALAYSIA

INVENTOR	Dr. Redwan bin Yasin
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Sayuti Ab. Ghani, Mohd al-Adib, Nurhafilah Musa, Muhammad Khairi Mahyuddin
CORRESPONDING E-MAIL	redwan@upnm.edu.my

Abstract

The issue of faith weakness is increasingly affecting Muslims, including children who were converted to Islam when they were underage, especially among Muslim converts families in Malaysia. The absence of a specific Islamic teaching module for children who convert is one of the main contributing factors to their lack of understanding of religious fundamentals, thus failing to attract their interest in learning about religion. The effect is that the value of faith that is sown is always fragile and easily influenced by non-Islamic elements. Therefore, this research aims to study the core components and also appropriate approaches for developing new modules for the sustainability of Islamic faith education for children of Muslim converts in Malaysia. Library research and semi-structured interviews was implemented for the purpose of data collection. All the collected data will be analyzed using the content analysis method to produce a strong conceptual framework in the construction of the module. The outcome of this research is very significant in strengthening the Islamic faith of every child who converts to Islam and also in realizing the sustainability of religious education for them.

ENHANCING FLOOD PREPAREDNESS IN MALAYSIAN COMMUNITIES THROUGH INNOVATIVE E-BOOK TRAINING PROGRAMS

INVENTOR	Mrs. Wan Farizatul Shima binti Wan Ahmad Fakuradzi
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Prof. Dr. Adlina Suleiman, Mrs. Wan Nor Aziemah Wan Zainulddin
CORRESPONDING E-MAIL	wanfarizatul@upnm.edu.my

Abstract

Amidst the challenges posed by climate change, Malaysia faces annual floods exacerbated by monsoon seasons, highlighting the urgent need for improvement on community preparedness and response capabilities. A novel approach has been introduced in the form of an eBook that contains training modules specifically designed to boost flood disaster resilience. This eBook was developed from the ground up through collaborative workshops involving NGO volunteers and government officials, covering critical areas such as health, food safety, Water, Sanitation, and Hygiene (WASH), shelter, communication, and logistics. During a pilot session with 20 volunteers involved in flood relief, there was a consensus on the eBook's effectiveness in enhancing knowledge, achieving goals, and fulfilling expectations. The volunteers showed keen interest in promoting and distributing the eBook within their networks, underscoring its potential for widespread impact. Currently positioned as a foundational tool for community readiness, there are ambitions to expand the eBook into intermediate and advanced training levels. The adoption of the Flood Disaster Training eBook in Malaysia offers several advantages, including content customization, language accessibility, reach to isolated communities, multimedia content, self-directed learning, cost efficiency, the ability to monitor progress, and opportunities for collaborative learning. By capitalizing on these strengths, Malaysia aims to bolster its flood preparedness efforts, preparing individuals and communities to effectively manage and recover from flood incidents. Future enhancements to the eBook will focus on providing Malaysians with the vital knowledge and skills needed for efficient flood response, mitigation, and recovery. This innovative eBook strategy is poised to cultivate a resilient Malaysian society well-equipped to tackle the adverse effects of flooding.

CLEARSIP – DRINKING WATER PURITY WITH CSNF WATER FILTRATION SYSTEM

INVENTOR	Dr. Norherdawati Kasim
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Athirah Fatanah Bahardudin, Siti Hasanah Abdul Jabar, Dr. Intan Juliana Shamsudin, Assoc. Prof. Ts. Dr. Norli Abdullah, Assoc. Prof. Ts. Dr. Noor Azilah Mohd Kasim
CORRESPONDING E-MAIL	herdawati@upnm.edu.my

Abstract

The utilization of toxic solvents in membrane fabrication can adversely impact human health, environmental integrity, workplace safety, regulatory adherence, and consumer well-being. Hence, there is an increasing focus on cultivating greener and more sustainable alternatives that reduce or eradicate the dependency on hazardous solvents while upholding membrane effectiveness and dependability. Dimethyl sulfoxide (DMSO) offers a promising avenue for sustainable membrane fabrication in reducing environmental impacts while enhancing membrane performance. In this study, casting solution comprising polysulfone (PSf), kappa-carrageenan (ƙ-car) and silver nanoparticles decorated on graphene oxide (Ag-GO) was prepared by dissolution in dimethyl sulfoxide (DMSO). Employing the innovative technique of phase inversion, membranes were precisely fabricated at the thickness of 0.2 mm. The membranes performance is identified by analysis of viscosity, hydrophilicity and metallic ions removal. An observation shows 1800cP high viscosity in casting solution. Notably, the contact angles of 57.32° provided evidence of the membrane's hydrophilic surface characteristics. Remarkably, the membrane porosity, reaching 81%. Thus, showing result of removal of iron and manganese removal of ~94.7% and ~92.5% that reach to water drinking standard by the Ministry of Health Malaysia (MOH). Thus, utilizing DMSO as a greener solvent displays potential for enhancing membrane performance and promoting sustainable membrane fabrication methods towards producing greener membrane for water treatment industries. Its adaptable characteristics and beneficial influence on membrane properties emphasize its importance in the realm of membrane technology.

MODEL BIMBINGAN TRANSFORMASI MUALAF KEPADA MUKALAF

INVENTOR	Dr. Redwan bin Yasin
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ustaz Muhammad Jais Mariappan Abdullah, Prof. Dr. Sayuti bin Ab Ghani, Mrs. Nur Shafiqah binti Badlihisham
CORRESPONDING E-MAIL	nurshafiqahbadlihisham@gmail.com

Abstract

Setiap umat Islam yang bergelaf mualaf mempunyai hak dan tanggungjawab yang telah digariskan oleh Islam. Dewasa ini kita melihat kadar pemelukan agama Islam dalam kalangan mualaf meningkat saban tahun. Merujuk kepada statistik dari Bahagian Dakwah, Cawangan Kefahaman Islam JAKIM menunjukkan bahawa di Malaysia jumlah mualaf dianggarkan 10 ribu orang setiap tahun yang mana negeri Sabah dan Selangor pula merekodkan pengislaman yang tertinggi di Malaysia iaitu seramai 20,246 dan 16,708 bagi tahun 2010-2018. Namun begitu, di samping pertambahan bilangan tersebut, terdapat cabaran dalam melaksanakan syariat Islam dalam kalangan mualaf bermula seawal proses pengislaman mereka. Dalam masa yang sama, mualaf juga mempunyai kewajiban untuk melaksanakan tanggungjawab syariat apabila mereka telah bergelar mukalaf iaitu apabila mualaf telah memenuhi tiga kriteria utama. Tiga kriteria tersebut ialah mualaf telah mencapai dewasa (baligh), berakal dan faham terhadap sesuatu hukum yang ditetapkan. Justeru, pengurusan bimbingan Islam yang bersistematik penting bagi mualaf setelah memeluk Islam bagi menjamin kesejahteraan akidah Islam yang baru sahaja bertunas. Justeru, objektif pengenalan Model Transformasi Mualaf kepada Mukalaf adalah suatu inovasi pengurusan bimbingan untuk dijadikan panduan yang komprehensif dalam proses menerapkan kefahaman Islam secara lebih berkesan. Metodologi pembinaan model adalah melalui pengenalpastian terhadap domain-domain yang membentuk kerangka asas model berdasarkan kaedah analisis kandungan terhadap prinsip hukum syarak yang dibincangkan secara holistik mengenai pengurusan bimbingan bagi mualaf menurut Islam. Penghasilan model ini diyakini mampu memberikan pemahaman yang menyeluruh kepada masyarakat khususnya terhadap agensi kerajaan dan badan bukan kerajaaan (NGO) supaya sentiasa berusaha untuk mewujudkan suasana pengurusan bimbingan yang kondusif dan efektif bagi menerapkan bimbingan agama dalam diri mualaf.

KACIPNANO: UTILIZING KACIP FATIMAH EXTRACT FOR ECO-FRIENDLY SYNTHESIS OF SELENIUM NANOPARTICLES

INVENTOR	Dr. Siti Hajar binti Adam
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Anas Azharuddin, Dr. Khairul Anwar Zarkasi, Dr. Mohd Faiz Nurrahman, Dr. Marami Mustapa
CORRESPONDING E-MAIL	siti.hajar@upnm.edu.my

Abstract

Selenium as an essential trace element for the health of the humans was used to synthesis selenium nanoparticle (Se NPs) using Marantodes pumilum (MP) plant extract. Effects of synthesis parameters namely; amount of MP and amount of Na_2SeO_3 solution, on the particle size and colour intensity of the solution containing Se NPs were studied using response surface methodology. FT-IR spectroscopy, UV-Vis spectrophotometry, DLS analyzer and TEM were used to determine the specifications of the MP and synthesized Se NPs. Obtained results indicated that the MP contained several bioactive compounds, which they had hydroxyl and amide I groups in their structures and these two functional groups had key roles in the reduction of the selenium ions to form Se NPs and stabilizing of them. Furthermore, from the FESEM+EDX analysis, amorphous SeNPs showed to be of high purity as with the average size to be in the range of 90-130 nm. These results demonstrate that the M. pumilum plant extract possesses the potential to reduce selenium ions to SeNPs under optimised conditions and can be further tested for other bio-potential applications.

LEARNING BASED ACTIVITY OF SURAH LUKMAN CURRICULUM USING AUGMENTED REALITY TECHNOLOGY IN DELIVERING DA'WAH

INVENTOR	Ts. Izati Nabila binti Marzuki
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Malaysia Kelantan
CO-INVENTOR	Prof. Madya Dr. Azaini bin Abdul Manaf, Prof. Madya Dr. Tan Tse Guan, Ts. Dr. Azmul Fadhli Kamaruzaman, LAr. Ayub Awang, Ts. Md Ariff Ariffin
CORRESPONDING E-MAIL	nabila.m@umk.edu.my

Abstract

The shift of change over time in the field of technology especially in education is constantly changing to current wants and needs. In the curriculum module, surah Luqman talks about family education, especially children's education. Among the main essence of the curriculum in this chapter is to emphasize the concept of family education, especially the education of children. Applying reality and virtual learning methods, augmented reality is one of the technologies that also influences innovation and conforms to current characteristics as a support for learning activities. Thus, to address the problem in improving children's understanding in order to foster the formation of positive behaviors towards children, appropriate teaching approaches will also be implemented in delivering this proposed model. By applying augmented reality in the delivery of the narration of Surah Lukman has two modes, namely 'delivery' and 'learning' apart from spreading the message to children.

DEFENCE, SECURITY AND SUSTAINABILITY (DSS) 2024

ABSTRACT

CATEGORY B : APPLIED RESEARCH

VALUE CREATION APPLICATION IN BIG DATA OF OIL AND GAS UPSTREAM PROJECT PLANNING DECISION MAKING

INVENTOR	Dr. Nor Azliana Akmal binti Jamaludin
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Cdr Shahrizan bin Abd Rahman
CORRESPONDING E-MAIL	azliana@upnm.edu.my

Abstract

Strategic Decision Making on valuable resources should be considered with the aim of avoiding risk. Many areas of the practical application of risk as regards the decision-making center. Big data can reduce costs, increase revenue and operating performance, achieve business process efficiencies, gain new insights, data integration and analyze data in various ways and develop new business models to increase market presence and revenue. The aim of this study is to develop an analysis application that can easily interpreted by humans and recommend actionable business decisions in budgeting and scheduling.

MICRO-BENDING ASSESSMENT USING POF FOR PRESSURE SENSING FOR INDUSTRIAL AND INFRASTRUCTURE SAFETY ENHANCEMENT

INVENTOR Ms. Fatima Yusran

RESEARCH FIELD Climate Change, Environment and Sustainability

INSTITUTION Universiti Pertahanan Nasional Malaysia

CO-INVENTOR L.S.Supian, Masyitah Muhmin, Assoc. Prof. Dr. Ummul Fahri binti Abdul Rauf, Dr. Khadijah binti Ismail, Dr. Nurul Sheeda binti Suhaimi

CORRESPONDING E-MAIL cawa711@gmail.com

Abstract

This project is an assessment of the development of an optical fiber sensor with the enhancement and analysis of micro-bending losses. It is proposed to optimize the capability of the bent optical fiber by examining the losses of different surface structures (circular, rectangular, and triangular) and different thicknesses using varied loads (0N, 9.81N, 19.62N, and 29.43N) with different wavelengths of Polymer Optical Fiber, POF(λ=650 nm and λ=850 nm) and Glass Optical Fiber, GOF(λ=1310 nm and λ=1550 nm). The benefits of this approach are that it is more straightforward, inexpensive, and very sensitive. The parameters considered for the design of the desired sensor setup are chosen based on the ability of the sensor's loss reading. The results may demonstrate a significant correlation between the behavior of the varied testing parameters and the performance for the application of each sensor generated based on the micro-bending losses.

SOIL DISPLACEMENT INITIAL INVESTIGATION USING POF-BASED SENSOR FOR GEOTECHNICAL MONITORING

INVENTOR	Ms. Nur Masyitah Muhmin
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	L.S.Supian, Nur Fatima Yusran, Murniati Syaripuddin, Dr. Chew Sue Ping, Ts. Dr. Jestin Jelani, Dr. Zuliziana Suif
CORRESPONDING E-MAIL	cawa711@gmail.com

Abstract

Current monitoring methods of soil displacement need high-priced and complicated sensor systems, making them impracticable for widespread use. However, recent advances in technology have brought plastic optical fibers (POFs) as a cost-effective and efficient alternative to landslide detection. POF can pass to be used to measure soil displacement, tension, and strain in real time, and therefore detect slope failures and assess structural stability. As soil stress or displacement occurs, POF sensors show changes in transmitted light intensity or frequency. The monitoring system can work well in difficult settings and bad weather due to this reliability. POFs can be easily placed underground for non-intrusive monitoring without disturbing the soil. Plastic optical fibers were improved by several design methods. This was done by assessing losses from different soil kinds, sensor cores, tapering areas, and pressure sensing soil conditions. The results may show a quantifiable association between parameters and sensor sensitivity and application performance.

PPG SURFACE-MODIFIED 2-D Ti3C2 MXene BASED PHOTOTHERMAL CANCER THERAPY

INVENTOR	Prof. Dr. Nanthini Sridewi A/P Appan
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Bushra Rashid, Dr. Ayaz Anwar, Assist. Prof. Syed Shahabuddin, Dr. Gokula Mohan, Prof. Dr. Rahman Saidur, Dr. Navid Aslfattahi
CORRESPONDING E-MAIL	nanthini@upnm.edu.my

Abstract

A comparative cytotoxicity investigation of Ti3C2 MXenes with polypropylene glycol (PPG), and polyethylene glycol (PEG) surface-modified 2-D Ti3C2 MXene flakes was conducted towards normal and cancerous human cell lines. The wet chemical etching method was used to synthesize MXene followed by a simple chemical mixing method for surface modification of Ti3C2 MXene with PPG and PEG molecules. The cell lines used to study the cytotoxicity of MXene and surface-modified MXenes in this study were normal (HaCaT and MCF-10A) and cancerous (MCF-7 and A375) cells. These cell lines were also used as controls (without exposure to study material and irradiation) to measure their baseline cell viability under the same lab environment. The surface-modified MXenes exhibited a sharp reduction in cell viability towards both normal (HaCaT and MCF-10A) and cancerous (MCF-7 and A375) cells but cytotoxicity was more pronounced towards cancerous cell lines. This may be due to the difference in cell metabolism and the occurrence of high pre-existing levels of reactive oxygen species (ROS) within cancerous cells. The highest toxicity towards both normal and cancerous cell lines was observed with PEGylated MXenes followed by PPGylated and bare MXenes. The normal cell's viability was barely above 70% threshold with 250 mg/L PEGylated MXene concentration whereas PPGylated and bare MXene were less toxic towards normal cells, even at 500 mg/L concentration. In general, the HaCaT cell line exhibited the lowest toxicity while toxicity was highest in the case of the A375 cell line. The photothermal studies revealed high photo response for PEGylated MXene followed by PPGylated and bare MXenes. However, the PPGylated MXene's lower cytotoxicity towards normal cells while comparable toxicity towards malignant cells as compared to PEGylated MXenes makes the former a relatively safe and effective anticancer agent.

XT-ULTRA NANO ENGINE OIL (MoS2-hBN BASED NANOLUBRICANT FOR DIESEL-BASED ENGINES)

INVENTOR	Prof. Dr. Nanthini Sridewi A/P Appan
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Lt Ts. Thachnatharen A/L Nagarajan, Prof. Dr. Mohammad Khalid, Assist. Prof. Dr. Syed Shahabuddin, Kept Prof. Dr. Zulkifly bin Mat Radzi TLDM (Bersara)
CORRESPONDING E-MAIL	nanthini@upnm.edu.my

Abstract

Introducing our cutting-edge product, the XT ULTRA NANO ENGINE OIL, MoS2-hBN Hybrid Nanolubricant. This innovative nanolubricant formulation incorporates hybrid nanoparticles of molybdenum disulfide (MoS2) and hexagonal boron nitride (hBN), specifically designed to revolutionize engine oil performance. Through our advanced microwave platform, MoS2-hBN hybrid nanoparticles are synthesized with precision and uniformity. These nanoparticles are then seamlessly integrated into a 20W40 diesel-based engine oil, resulting in a high-performance nanolubricant that surpasses traditional lubricants in numerous aspects. The physical and chemical properties of our nanolubricant have been extensively evaluated to ensure exceptional performance. The viscosity index, stability, volatility, tribological properties, oxidation resistance, and thermal conductivity have all been meticulously examined. The results of our comprehensive testing reveal remarkable benefits provided by our MoS2-hBN Hybrid Nanolubricant. With just a 0.05 wt.% concentration of hybrid nanoparticles, it achieves a remarkable 68.48% reduction in coefficient of friction and a significant 35.54% decrease in wear scar diameter. These outcomes translate into enhanced engine performance, reduced component wear, and prolonged engine lifespan. Moreover, our nanolubricant exhibits outstanding oxidation resistance, boasting a remarkable 38.76% improvement, ensuring engine oil longevity and stability even under demanding conditions. Additionally, it demonstrates a noteworthy 28.30% enhancement in thermal conductivity at 100 °C, effectively dissipating heat and contributing to optimal engine operation. By harnessing the unique properties of MoS2 and hBN hybrid nanoparticles, our nanolubricant offers unparalleled performance and protection for your engines. The synergistic combination of these nanoparticles optimizes lubrication at the nanoscale, reducing friction, preventing wear, enhancing thermal conductivity, and increasing oil stability. Our product represents the future of nanotechnology in lubrication.

ASCERTAINING THE IMPORTANCE OF RAPID, COLORIMETRIC SENSORS IN DETECTION OF HYPOXIA TOLERANCE AT HIGH ALTITUDE

INVENTOR	Dr. Shazreen Shaharuddin
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Nik Mohd Afizan Nik Abdul Rahman, Assoc. Prof. Dr. Mas Jaffri Masarudin, Dr. Maizatullifah Miskan, Dr. Hasliza Abu Hassan
CORRESPONDING E-MAIL	shazreen@upnm.edu.my

Abstract

Introduction: Prolonged exposure episodes to high altitudes have been demonstrated to cause acute hypoxia and lead to subsequent potential significant health consequences. In people suffering from high altitude disorders, homeostatic responses to high altitudes induce the formation of hypoxia-inducible factor (HIF) proteins which triggers a series of other physiological changes and plays a central role in hypoxia response. The activity of HIF is regulated by the oxygen-dependent degradation of the HIF-1α protein (HIF-1A gene). This physiological interaction provides the opportunity of studying effects pertaining to low oxygen tensions caused by prolonged exposure in high altitudes leading to hypoxia by using rapid colorimetric sensors. Material and Methods: The development of strip-based detection enables the use of an enzyme-linked assay in a lateral flow device, providing increased sensitivity while benefiting from rapid analysis time and low sample requirements.To achieve this, parameters including reagent concentration, reagent volumes, and device dimensions were optimized to produce a calibration curve generated using rabbit IgG. Subsequently, a housing for the detection kit with a reagent storage was crafted for an autonomously operating device. Results: There was a measurable qualitative change in colorimetric signal consequent to the presence of the HIF-1α biomarker protein. In the absence of the protein, no colorimetric signal was produced. The detection strip, housed in the operation device performed well to detect low volumes of the hypoxia biomarker, demonstrating potential to be further developed for use as a robust diagnostic approach with high sensitivity and specificity in hypoxia detection. Conclusions: This would enable point-of-care (POC) testing and individual self-administration, resulting in faster and more accurate results and enhanced health surveillance, particularly in high altitude exposure.

ECOSORB: MALATHION ABSORPTION MATERIAL

INVENTOR	Assoc. Prof. Dr. Noor Azilah Mohd Kasim
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mas Amira Idayu Abdul Razak, Dr. Mohd Norfaiz Norrrahim, Dr. Noor Aisyah Ahmad Shah, Dr. Siti Hasnawati Jamal, Dr. Ummi Habibah Abdullah, Dr. Norherdawati Kasim, Dr. Intan Juliana Shamsudin, Assoc. Prof. Ts. Dr. Norli Abdullah, Prof. Dr. Ong Keat Khim, Prof. Emeritus Dato' Dr.Wan Md Zin Wan Yunus, Prof. Dr. Victor Feizal Knight
CORRESPONDING E-MAIL	azilah@upnm.edu.my

Abstract

ECOSORB an innovative malathion absorption material based on modified nanocellulose functionalized with GTMAC (2,3-epoxypropyltrimethylammonium chloride). ECOSORB is an efficient and eco-friendly solution for the removal of malathion, a commonly used organophosphorus pesticide. The material exhibited high adsorption capacity and rapid absorption kinetics, making it a promising candidate for malathion removal applications. The use of nanocellulose, a renewable and biodegradable material, aligns with eco-friendly principles. The absorption process minimizes malathion residues in water sources, contributing to the preservation of ecosystems and safeguarding human health.

CHARGE TRANSPORT AND ELECTRON RECOMBINATION SUPPRESSION IN DYE-SENSITIZED SOLAR CELLS USING GRAPHENE QUANTUM DOTS (GQDS)

INVENTOR	Dr. Noor Fadzilah binti Mohamed Sharif
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ms. Nazatul Shiema binti Moh Nazar, Prof. Dr Suraya binti Abdul Rashid, Muhamad Amir Akhtar bin Saiful Azmi, Muhammad Afif Irfan bin Abidin
CORRESPONDING E-MAIL	noorfadzilah@upnm.edu.my

Abstract

In this study, TiO2 photoelectrodes were sensitized in different concentration of Graphene Quantum Dots (GQDs) solution to enhance photovoltaic performance and charge transport of DSSC. The performance of pristine TiO2 and TiO2-GQDs photoelectrodes were compared to investigate the effect of GQDs incorporation in DSSC. It was found GQDs increased light absorption of TiO2 photoelectrode at visible spectrum in the range of $\lambda = 375$ nm to $\lambda = 600$ nm, resulting highest current–density, Jsc and photon-to-current conversion efficiency, Ƞc. Solar cell sensitized in 7.5 mg/ml concentration of GQDs known as (PG 7.5) cell shown the highest reading by 15.49 mA cm−2 and 6.97%, which indicated an improvement by 28.07% and 70.83% for Jsc and Ƞ compare to pristine TiO2 DSSC at 12.10 mA cm−2 and 4.08%. Photoluminescence property own by GQDs may enhance photon emission to visible region when uv-ray excited on solar cell. Thus, generate more electron-hole pairs in the photoelectrode and enhance the photovoltaic parameters of DSSC. PG 7.5 cell also exhibited lowest series resistance (Rs) of 36.60 Ω, highest charge transfer resistance (Rct2) of 41.98 Ω and electron lifetime of 6.33 ms among other DSSC. These possibly due to suppression of recombination between TiO2/dye/electrolyte interfaces. Hence, resulting highest charge collection efficiency (CCE) of 53.42%. The EIS analysis confirmed the PV performance of the best cell of PG 7.5 since the same cell also generated the best photon-current conversion efficiency (PCE). This study revealed GQDs can enhanced photovoltaic parameter and charge collection efficiency of DSSC.

ASTHMA INFORMATION, ASSESSMENT FOR WELL-BEING AND SYMPTOMATOLOGY (AIRWAYS)

INVENTOR	Dr. Maizatullifah Miskan
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Shazreen Shaharuddin, Assoc. Prof. Dr. Mohd Fahmi Mohamad Amran, Dr. Shamsuriani Md Jamal, Assoc. Prof. Dr. Fakroul Ridzuan, Dr. Syarifah Bahiyah Rahayu Syed Mansoor, Dr. Nur 'Adnin Ahmad Zaidi, Muhammad Danial Dainil
CORRESPONDING E-MAIL	maizatullifah@upnm.edu.my

Abstract

Asthma is a respiratory disease that affected millions of adults globally. Asthma seen commonly in health care in Malaysia and associated with increased morbidity and mortality. It is often triggered by external stimuli in patients. It leads to mucus secretion, bronchoconstriction and airway narrowing. There are evidence-based guidelines and effective treatments for this disease, however patients with asthma still have uncontrolled symptoms. The successful control of chronic diseases depends on how well patients manage their disease with the aid of healthcare providers. Electronic health records are becoming common globally. It's feasible to provide health care professionals with computer decision support system during their clinic consultations. Websites contains resources to assist healthcare professionals and patients in asthma management. This decision support system website for asthma offers personalized treatment recommendations, symptom tracking and educational materials. Applying algorithms and data analysis, this website may provide customized guidance for individual's specific asthma symptoms. It helps physicians in their evidence-based treatment decisions, ensuring patients receive the standard of care. For patients, this websites serve as valuable resource for self-empowerment, enabling them to understand their symptoms, access educational materials to better understand their disease. AIRWAYS is developed and applied to determined its usability among adult asthma patients. It's anticipated by utilizing a decision support system website, physician may reduce workload in their consultation, enhance patient self-empowerment, and improve overall asthma management. Patients, gain better control over their health, leading to reduced hospitalizations, improved quality of life, and increased adherence to treatment. In conclusion, application of a decision support system for asthma has potential to reform adult asthma management.

MULTIVARIATE PROBIT MODEL: BAYESIAN INFERENCE APPROACH FOR CATEGORICAL DATA

INVENTOR	Ts. Dr. Fazilatulaili Ali
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Ruzanna, Dr. Sharifah Aishah, Ts. Dr. Nur Diyana Kamaruddin
CORRESPONDING E-MAIL	fazilatulaili@upnm.edu.my

Abstract

Dependence on car use generates adverse effects on the sustainability of our urban environment due to air and noise pollution and global warming. Along with technological and infrastructure improvements, an overall solution to this problem would require dramatic change to the way we chose to travel. Behavioural change of car users to have them move to other sustainable travel options making less impact to our environment is crucial. Behavioural change of car users is not straightforward given the huge range of factors governing their travel decisions. Local authorities with constrained budgets require evidence to help them introduce policies that will have significant impact on car use. Therefore, we need to understand which specific groups of car users are more inclined to change to sustainable modes so that ultimately targets can be met. The global aim of this research is to characterise target groups of car users (as a driver or passenger) who are more likely to switch from private transport to sustainable modes. The MPM was developed in this study specifically for ordinal responses and enabled responses to several questions, which can be correlated to be considered in a single model.

LEARNING PATHOLOGY THROUGH HANDS ON LAB EXPERIENCE USING AUGMENTED REALITY (AR)

INVENTOR	Assoc. Prof. Ts. Dr. Norshahriah Abdul Wahab
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ts. Suresh A/L Thanakodi, Dr. Amalina Farhi Ahmad Fadzlah, Dr. Mohd Sidek Fadhil Bin Mohd Yunus, Gs. Nurhazimah Nordin
CORRESPONDING E-MAIL	shahriah@upnm.edu.my

Abstract

Through the use of cutting-edge augmented reality (AR) technology, the initiative seeks to transform pathology education by offering a hands-on, immersive, and interactive learning environment. It is frequently difficult to provide practical exposure to complex pathological specimens in traditional pathology teaching. By incorporating augmented reality (AR) into the classroom, this project closes this knowledge gap by enabling students to interact with lifelike specimens, tour virtual pathology labs, and participate in dynamic disease simulations. The project's core is developing a thorough curriculum in line with pathologic learning objectives and educational standards. Virtual specimens are created with great care to replicate pathological conditions found in the real world, giving students a realistic and visually stimulating laboratory experience. Real-time feedback is made possible by the AR interface, which improves comprehension and memory of pathologic ideas. This AR-enhanced learning effort, which provides a dynamic and inclusive platform for learners to engage with the complexities of illnesses, is a significant step towards addressing the increasing needs of pathology education. The abstract captures the spirit of a project that will use cutting-edge augmented reality technology and hands-on experiences to completely transform pathology teaching in the future. The project is carried out using a systematic approach that includes phases for system analysis, design, implementation, and testing. This project is dedicated to students, teachers, and technologists who are interested in expanding the field of medicine.

SMART FARMING SOLUTIONS FOR SUSTAINABLE FOOD SECURITY

INVENTOR   Associate Professor Ts. Dr. Noor Afiza Mat Razali

RESEARCH FIELD   Food Safety and Security

INSTITUTION   Universiti Pertahanan Nasional Malaysia

CO-INVENTOR   Adriana Arul Yacob, Deventhren Kamala Nathan, Emmerich Wong Hing Yip, Law Kah Hou, Liew Thean Yew, Muhammad Qawiem Bin Mohd Nizam, Eris Joshan A/L Chew Ho Beng, Muhammad Faiz Bin Fauzay, Khairul Khalil Ishak

CORRESPONDING E-MAIL   noorafiza@upnm.edu.my

Abstract

Achieving food security necessitates the implementation of sustainable agricultural practices characterized by the integration of technologies. Food security is determined by the alignment of production capacity with population demand. As the global community endeavours to reconcile the requirements of a burgeoning population with sustainable agricultural methodologies, challenges arise in sustaining large-scale food production to ensure food security. The implementation of smart farming practices in the livestock farming ecosystem can effectively optimize production capacity to meet the demands of the population. This endeavour aims to improve both food supply productivity and overall agricultural sustainability. This project is about a sustainable smart livestock farming ecosystem that makes use of automation, data analytics, and cutting-edge sensor technology.

NURSE ROSTERING PROBLEMS: A CASE STUDY AT HOSPITAL ANGKATAN TENTERA LUMUT

INVENTOR   Dr. Sharifah Aishah binti Syed Ali

RESEARCH FIELD   Medical and Healthcare

INSTITUTION   Universiti Pertahanan Nasional Malaysia

CO-INVENTOR   Siti Farrah binti Mohd Arshad, Dr. Ruzanna binti Mat Jusoh, Dr. Fazilatulaili binti Ali, Ahmad Shafiq bin Abdul Rahman, Ts. Dr. Nur Diyana Kamarudin

CORRESPONDING E-MAIL   aishah@upnm.edu.my

Abstract

Nurses, as the primary line of defence in the healthcare sector, have a vital responsibility in safeguarding the health and welfare of patients. Nurses necessitate a scheduling system that can optimise operational efficiency in healthcare institutions to effectively carry out their duties. This study acknowledges the urgent requirement for streamlined scheduling systems in healthcare establishments, specifically aiming to enhance operational efficiency at Hospital Angkatan Tentera, Lumut (HATL). The study aims to address complex scheduling problems faced by healthcare institutions by utilising advanced mathematical methods, specifically 0-1 Goal Programming, and the LINGO software for formulation and solution. The main goals of the study are to fulfil six hard constraints and five soft constraints, while also reducing the time needed to generate a nurse schedule with fair shift distribution. The research's accomplishment of these objectives contributes to the broader advancement of the healthcare profession and the overall standard of patient care. This study highlights the importance of using advanced mathematical methods to tackle the intricate problems encountered by healthcare institutions. As a result, it contributes to the advancement of the healthcare profession and the improvement of patient care quality.

DEVELOPMENT OF SODIUM-ION BATTERIES FROM NVP CATHODE AND BIOMASS-DERIVED HARD CARBON ANODE

INVENTOR   Assoc. Prof. ChM. Dr. Siti Aminah Mohd Noor

RESEARCH FIELD   Energy and Water Security

INSTITUTION   Universiti Pertahanan Nasional Malaysia

CO-INVENTOR   -

CORRESPONDING E-MAIL   s.aminah@upnm.edu.my

Abstract

Hard carbon (HC) is synthesized from the core part of Kenaf plant (Hibiscus cannabinus L.). The HC is then mixed with a binder to form slurry that will be used to coat the copper/aluminium foil to fabricate the HC anode. After drying, calendering, and cutting, the fabricated HC anode will be assembled with sodium metal in the development of half-cell sodium-ion batteries.

STUDY PROTOCOL ON PRIMARY HEALTH CARE PHYSICIAN PREPAREDNESS ON DISASTER MANAGEMENT: A MALAYSIAN PERSPECTIVE

INVENTOR	Datin Dr. Hasliza binti Abu Hassan
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Col Dr. Siti Salmiah Awang, Dr. S Maria Awaluddin, Assoc. Prof. Dr. Saharuddin Ahmad, Dr. Azah Samad, Dr. Sarah Iziani Ramli
CORRESPONDING E-MAIL	hasliza@upnm.edu.my

Abstract

Central to the disaster response system is Primary Health Care (PHC), an indispensable service rooted in practical, evidence-based, and socially acceptable methods. Serving as the initial point of contact for individuals and families, PHC plays a crucial role in coordinating and referring patients to specialized care. Importantly, the PHC team's responsibilities extend across all phases of disaster management, addressing the diverse dimensions of victims' wellbeing, including physical, psychological, and social aspects. This study seeks to explore the preparedness of primary care physicians with the goal of improving their response capabilities, customizing education, and training initiatives, and reinforcing the entire primary healthcare system by addressing identified gaps in disaster preparedness. The aim of this study is to assess the knowledge (K), attitude(A) and readiness to practice (rP) regarding disaster preparedness among primary care physicians (PCPs) in the Ministries of Health, Defence, and Education using a self-administered validated questionnaire via google form. Independent t-test and chi square test are used to test the bivariate association between demographic data with K, A and rP. Multiple linear regression is used to test association of rP based on predictor variables (K, A and sociodemographic). A preliminary result of the study will be presented in conferences and scientific meetings. This initiative aims to fortify the primary healthcare system, ensuring resilient healthcare delivery during pandemics and their aftermaths. To adequately equip healthcare providers, especially primary care physicians, for disaster management, it is crucial to investigate their understanding and attitudes regarding disaster preparedness.

LOW POWER ENERGY HARVESTING FOR LOW POWER DEVICES

INVENTOR	Mr. Ahmad Loqman bin Ahmad Mazuki
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	-
CORRESPONDING E-MAIL	loqman@upnm.edu.my

Abstract

Most IoT device has simple function of periodically made some measurement and transmit data. These device will spend most of the time with no operation, or in sleep mode to reduce power consumption. These device need low power source that may not available through normal channel. Renewable energy source such as solar, wind, temperature and vibration can be utilized to charge the battery or capacitor. This research demonstrates the capabilities to utilize these sources to power small IoT devices.

ILLUMINATING THE FORGOTTEN FACES: UNMET HEALTHCARE AND PSYCHOLOGICAL NEEDS IN A CONCRETE JUNGLE

INVENTOR	Dr. Asma Assa'edah binti Mahmud
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Fatimah binti Mohamad Rom, Dr. Rosnadia binti Suain Bon, Dr. Sarah Iziani Ramli, Dr. Azura Sharena Yahaya, Dr. Aida Jaffar, Assoc. Prof. Dr. Mohd Fahmi Lukman
CORRESPONDING E-MAIL	asma@upnm.edu.my

Abstract

INTRODUCTION: The urban poor population in Kuala Lumpur comprises nearly 30,000 individuals, with urban poor women facing distinctive challenges due to the diverse roles they undertake within their families and society. This study aims to shed light on the often-overlooked unmet physical and psychological healthcare needs of urban poor women striving for survival in the city. METHODS: A survey was conducted during a healthcare workshop for underprivileged women in Chow Kit, Kuala Lumpur, utilizing demographic data, a validated questionnaire on unmet healthcare needs, and the PHQ-9. Among the 44 respondents, 36 were included for analysis. Non-parametric tests were employed to assess the association of demographic data with depressive symptoms. RESULTS: The mean age of respondents was 48.3 ± 20.4, with the majority being Malay (44.4%), married (47.2%), having a highest education level of secondary school (55.6%), unemployed (75.0%), and coming from households with a total income of less than RM2000/month (97.2%). Approximately 41.7% reported chronic medical illnesses and 11.1% reported mental illness. More than 50% exhibited symptoms of depression based on the PHQ-9. Significant associations of depression were found with ethnicity, education level, and reluctance to seek medical treatment. The primary factors influencing their decision to seek medical treatment during sickness were financial difficulties, lack of healthcare knowledge, and logistical issues. CONCLUSION: There are significant depressive symptoms and unmet healthcare needs among urban poor women in Kuala Lumpur. Addressing these issues necessitates a structured and sustainable health education intervention that tailored to their unmet needs.

YOUTH EMPOWERMENT: A SELF-HELP MODULE FOR PSYCHOLOGICAL WELLBEING

INVENTOR	Dr. Rosnadia binti Suain Bon
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Asma Assa'edah Mahmud, Dr. Muhd Farhan Nordin
CORRESPONDING E-MAIL	rosnadia@upnm.edu.my

Abstract

This module is designed as a practical self-help, user friendly approach for stress management for the university students. Besides providing general information on stress, it offers multidimensional strategies for dealing with it. This module aims to improve coping skills, reduce burnout, and promote resilience among users. The module highlights the negative impacts of chronic stress on both physical and mental health, while emphasizing the importance of effective stress management for maintaining optimal health and well-being. In-order to address these issues, the module provide an overview of stress including physiological response to stress. The module discusses various stress management techniques which include cognitive and behavioural coping strategies. It also focuses on the value of self-care and long-term coping techniques like building resilience, establishing persistent connections, building the foundation for life-long health. The students who are empowered with stress management skill can play a proactive role in handling their own stress in university life as well as in their future personal and professional lives.

A SUSTAINABLE APPROACH TO IMPROVE THE HYDAULIC PROPERTIES OF SUBGRADE USING MARBLE DUST AND COCONUT SHELL

INVENTOR	Assoc. Prof. Dr. Aniza binti Ibrahim
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Harith Hafiz, Fakhrurazi Awang Kechik, Dr. Noor Aina Misnon, Dr. Faridah Hanim Khairuddin, Dr. ZulkifliI Abu Hassan, Dr. Nor Izzah Mokhtar
CORRESPONDING E-MAIL	aniza@upnm.edu.my

Abstract

The distribution of suction, which has implications for seepage and shear strength, plays a crucial role in determining the stability of unsaturated soil. During a flood occurrence, the subgrade becomes inundated with water, leading to adverse effects on the AEV and RWC of the subgrade. Consequently, the performance of the subgrade is diminished. This study focuses on the use of marble dust waste (MDW) and coconut shell waste (CSW) as an addition to the subgrade to improve its strength. The objective of this study is to investigate the variations in AEV in relation to the optimal MDW and CSW in unsaturated soil in Malaysia. Four (4) types of samples were prepared for this study. Type 1: control sample; type 2: soil with addition of MDW; type 3: soil with addition of CSW; and type 4: soil with addition of both MDW and CSW. The results indicate a significant increase in the AEV for the mixed soil sample when compared to the control sample. While the soil-MDW mixture containing 5% of this material has an AEV value of 23 kPa, the control sample's value is 10 kPa. For the sample of soil-CSW, the mixture of 0.5% leads to 25 kPA, and the mixture of both MDW (5%) and CSW (0.25%) is 23 kPa. The findings of the study suggest that the utilisation of MDW and CSW yields a beneficial influence on the AEV, hence potentially improving the performance of the subgrade. The topic under discussion pertains to environmental sustainability, specifically focusing on enhancing the ability to withstand the adverse effects of climate change and disasters, as well as the Green Technology Master Plan Malaysia 2017–2030, with a specific emphasis on Chapter 6, which addresses the issue of waste management.

BEYOND THE WAVES: UNVEILING THE JOB STRESS AMONG NAVY PERSONNEL IN EAST COAST, PENINSULAR MALAYSIA

INVENTOR	Dr. Nur Adnin Ahmad Zaidi
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Noor Dalila Zulkhifli, Dr. Shahidah Leong, Assoc. Prof. Dr. Halyna Lugova
CORRESPONDING E-MAIL	adnin@upnm.edu.my

Abstract

Job stress plays an integral role in ensuring that Navy personnel can perform in their role as the frontlines of our nation's maritime border. Previous studies in the last decade showed a job stress level between 55.5% and 88% in the Royal Malaysian Navy (RMN). The objective of the study is to find the prevalence of job stress in Navy personnel. A total of 256 personnel from the HQ Naval Region 1 were chosen via a universal sampling method to take part in this analytical cross-sectional study. Data were collected using a self-administered online questionnaire adapted from the validated Job Stress Level Inventory (JSLI) and the Occupational Stress InventoryRevised (OSI-R) questionnaire. The prevalence of moderate to high job stress levels among the population is 42.6% (n=109). The prevalence of job stress among navy personnel is 42.6% which shows that the prevalence is lesser than previous studies among RMN. The result of this study will hopefully help the management to build up better programs and policies to ensure job stress can be mitigated.

SIMULASI PENYIASATAN JENAYAH (SiPenJenayah)

INVENTOR	Ms. Suhaila Ismail
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Muhammad Hazwan Herman, Assoc. Prof. Dr. Nurhafizah Moziyana Mohd Yusop, Dr. Siti Rohaidah, Siti Hajar Zainal Rashid
CORRESPONDING E-MAIL	suhaila@upnm.edu.my

Abstract

(SiPenJenayah) is a teaching and learning simulation for criminal investigation. SiPenJenayah is specifically developed for students taking courses in criminal investigation such as Digital Forensics. This simulation comprises several components: investigation, solution, and conclusion. Currently, students taking these courses primarily learn them theoretically with only partial practical exposure in the classroom. Due to the lack of real-world exposure, students are not fully prepared for the challenges they will face in the industry. The students' inability to gain experience in crime scene scenarios has lessen essential skills such as evidence collection, preservation, analysis, and the ability to accurately analyze crime scenes. Through the simulation of criminal investigation, students can experience for themselves the situations they might encounter at a crime scene. A needs survey was conducted with 31 students, and the majority agreed that the presence of this simulation could enhance the effectiveness of learning Digital Forensics courses. This simulation was developed using HTML, CSS, JavaScript, and MySQL programming as the database. Several missions and solution ideas are provided for students to obtain scores that determine their level of understanding. Students are required to analyze crime scenes, gather evidence, and obtain information about several suspects present at the crime scene. The Rapid Application Development (RAD) methodology, which emphasizes user requirements, was employed to develop this system based on four main phases: requirement planning, design, development, and implementation. It is expected that this simulation will produce students with the skills to investigate and analyze crime scenes, gather evidence, and assist in the investigative process.

ADMINISTRATIVE VOTING SECURITY SYSTEM USING ADVANCE ENCRYPTION STANDARD (AES) ALGORITHM

INVENTOR	Ms. Suhaila Ismail
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Nurzam Syahirah binti Mohd Zamri, Assoc. Prof. Dr. Nurhafizah Moziyana, Dr. Siti Rohaidah Ahmad, Assoc. Prof. Dr. Mohd. Fahmi bin Mohd. Amran
CORRESPONDING E-MAIL	suhaila@upnm.edu.my

Abstract

Concerns have been raised regarding the security, transparency, and integrity of the Faculty of Defence Science and Technology (FSTP) procedure over the manual voting technique utilised to choose senior management posts through Google Form. Due to inherent vulnerabilities, this manual voting mechanism is susceptible to fraud and manipulation, undermining its integrity and raising the possibility of vote manipulation and duplicate data compromising voting totals. Secure authentication and voter credentials are essential to ensuring a trustworthy voting process. The efficiency and dependability of traditional voter verification techniques are insufficient. In order to overcome this difficulty, an electronic voting mechanism for top management posts in FSTP is suggested. As a result, the primary goal of the website-based development of the Faculty of Defence Science and Technology's (SKPPT FSTP) Highest Administrative Voting Security System is to suggest a system with security features. This is achieved by creating a system that is secure through the use of cryptographic techniques, specifically the Advance Encryption Standard (AES). Additionally, the system is designed to have the features of a database containing voter and vote data, ensuring that the data can be accessed swiftly, securely, and easily. Furthermore, AES encryption is used to guarantee the security of the SKPPT FSTP system. FSTP lecturers have the ability to cast their votes for candidates inside their departments, as long as data integrity is upheld. through encryption and protecting result files.

ELECTRON BEAM IRRADIATED PVC CABLE FOR INSULATION APPLICATION

INVENTOR	Dr. Norazrina Mat Jali
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Nor Azwin Shukri, Nor Shafarina Ismail, Helmi Hafizul Hakim Asrol, Nur Alia Najihah Mohamad Rizani
CORRESPONDING E-MAIL	norazrina@upnm.edu.my

Abstract

In cable insulation and wiring, the brittle nature of raw PVC can cause breaking, particularly in situations where flexibility is essential. Brittle insulation may lead to electrical integrity being compromised, a higher chance of short circuits, and a decrease in the electrical system's safety. Furthermore, parts composed of brittle PVC, including terminal covers and connections, may be more prone to breaking. Durability problems could arise because of the brittleness of raw PVC in plugs and charging cords. This is why a need to improve the mechanical properties of PVC and one of the promising methods is inducing radiation into the PVC. Radiation-induced changes can influence the electrical properties of PVC. For instance, cross-linking may enhance insulation properties. Radiation technology related to polymer modification was successfully implemented in industrial applications over 50 years ago. The crosslinking of polymer can be performed efficiently in an electron beam facility during a continuous irradiation process. Electron beam (EB) radiation processing of electric wire and cable insulations is one of the successful applications in radiation technology industries, especially for building and automotive applications. Hence, this study aims to examine the effect of different electron beam irradiation doses on the degree of PVC crosslinking. To achieve the crosslink, the PVC nanocomposites were prepared using the melt blending method and then exposed to electron beam irradiation dose within 0 to 120 kGy. Subsequent analyses were conducted on the mechanical and electrical properties of PVC. The significant findings from this project hold great promise for developing safer and more efficient electrical insulation systems for buildings and vehicles.

FLOODWATCH: A NETWORK OF HYPERLOCAL, STREET-LEVEL FLOOD MAPPING AND MONITORING

INVENTOR	Ts. Dr. Lau Sei Ping
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Malaysia Sarawak
CO-INVENTOR	Prof. Dr. Tan Chong Eng, Assoc. Prof. Dr. Charles Bong Hin Joo, Assoc. Prof. Dr. Leonard Lim Lik Pueh, Christopher Sii How Chiong, Ho Wan Yu
CORRESPONDING E-MAIL	splau@unimas.my

Abstract

Flooding is one of the most dangerous natural disasters. It significantly affects infrastructure, mobility, and public health and safety. In many countries, floods can result from torrential rain, high tides, monsoons, or typhoons. Drains are often used in urbanized areas for the discharge of rainwater. However, climate change effects like sea level rise, extreme rain events, and localized floods are predicted to happen more frequently, especially flash floods. By strategically deploying hyperlocal water level sensing throughout urban drainage systems, municipal authorities and stakeholders can gain immediate and accurate insights into flood conditions to facilitate informed decision-making. While many have used social media to instantly broadcast the occurrence of floods, FloodWatch reports the event autonomously by constantly checking the water level in the drains. FloodWatch is a network of water-level sensing systems that creates highly dense or hyperlocal sensors that are self-sustaining and continuously monitor the water level of open surface drains in a given area. With the drains' hyperlocal water level data, FloodWatch can instantly provide a precise and localised flood occurrence.

LANDSLIDE SUSCEPTIBILITY AND ELEMENTS AT RISK IN KUALA LUMPUR

INVENTOR	Assoc. Prof. Ts. Dr. Ng Choy Peng
RESEARCH FIELD	Humanitarian Assistance Disaster Relief
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ahmad Najman 'Azam Zul Bahari, Ts. Dr. Nordila Ahmad, Assoc. hdProf. Dr. Law Teik Hua, Mohd Muhaimin Ridwan Wong
CORRESPONDING E-MAIL	cpng@upnm.edu.my

Abstract

Landslides are a significant natural hazard in Kuala Lumpur. It happens more than three times a year, leading to fatalities and property destruction. In 2021, Kuala Lumpur experienced 122 landslides, marking one of the greatest numbers recorded in the city. This research aimed to investigate landslide occurrences in Kuala Lumpur between 2007 and 2021, pinpoint areas prone to landslides in the city, and create a hazard, vulnerability, and risk map for quick emergency response and route planning. A map was generated to show landslip susceptibility based on factors such as slope, aspect, elevation, stream power index, and distance from the stream. The susceptibility was classified into five categories: very high, high, moderate, low, and very low, with corresponding percentages: 1.04% (very high), 1.79% (high), 16.78% (moderate), 39.66% (low), and 40.72% (very low). Although they identified highly vulnerable regions, they were deemed inconsequential. Approximately 20% of the study area is covered by moderate, high, and very high susceptibility areas, mostly because the ground is mostly flat, with 80% of it below 92 metres in height.

WHAT'S LEFT?

INVENTOR	Mr. Azwan Abidin
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Malaysia Sarawak (UNIMAS)
CO-INVENTOR	Noorhaslina Senin, Athmar Helmi Ali, Shin Jie Xi, Liong Yu Tian and Cheng Kah Looh
CORRESPONDING E-MAIL	snoorhaslina@unimas.my

Abstract

What's Left? is an innovative mobile app that connects the community and the food and beverage industry to tackle food waste. This app allows individuals to donate or exchange their surplus food, reducing waste and promoting sustainability.

CouAZO- SUSTAINABLE METAL FREE SUPER CAPACITOR FOR LIQUID CRYSTAL DISPLAY AND OPTICAL STORAGE DEVICE

INVENTOR	Mr. Eswaran A/L Madiahlagan
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Malaysia Sarawak (UNIMAS)
CO-INVENTOR	Prof. Dr. Zainab Ngaini, Prof. Dr. Gurumurthy Hegde, Dr. Nur Arif Mortadza
CORRESPONDING E-MAIL	meswaran@unimas.my

Abstract

CouAZO represents a naturally derived compound hinging on azo dyes, which has demonstrated remarkable capabilities in enhancing liquid crystal display (LCD) performance and exhibits promising potential for advancing optical storage technologies. The structural blueprint of this compound integrates Coumarin, a compound rooted in natural sources, with Azobenzene featuring an extended aliphatic-C14 chain. The fabrication process of this compound was meticulously developed using an environmentally friendly synthesis methodology. The compound showcases outstanding attributes as a Liquid Crystal, specifically manifesting the Smectic A phase renowned for its applicability in Liquid Crystal Displays (LCDs). Furthermore, the inherent properties of the dye necessitate a mere 46 seconds of UV exposure, resulting in the creation of extraordinary optical storage devices that sustain efficacy for up to 16 hours within the solutions.

METHOD VERIFICATION STUDY OF PLASMA GLUCOSE ASSAY: THE EVALUATION OF CLINICAL FITNESS FOR PURPOSE

INVENTOR	Dr. Siti Nadirah Ab Rahim
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Siti Nadirah Ab Rahim, Assoc. Prof. Dr. Nani Nordin, Brig. Jen (Dr) Ahmad Zakuan Kamarudin, Dr. Siti Sarah Zainal Abidin, Dr. Ananth Kumar Marutha Muthu, Mohamad Syazwan Zahari
CORRESPONDING E-MAIL	nadirah@upnm.edu.my

Abstract

Method verification study of plasma glucose assay: the evaluation of clinical fitness for purpose.

Plasma glucose measurement is a crucial marker used in the diagnosis of diabetes mellitus. To ensure a valid plasma glucose result, laboratory analysis of this marker must be optimize. Method comparison and precision studies are two method verifications that can be performed to optimize analytical performance of a measurement method. 54 patient plasma glucose samples and internal quality control (IQC) material at 2 levels were utilized for method comparison study and precision study respectively. The CLSI EP 15 and CLSI EP 09 were used as guidelines. For method comparison study, glucose estimation for all 54 samples were analyzed first using the reference method (old COBAS 6000) then the 2 newly introduced analyzers (COBAS 6000 A and B) within 2 hours apart as per guideline. Results were tabulated in excel and plotted for comparison using linear regression. Accuracy or bias were calculated and compared with EFLM desirable bias specification. New method is considered analytically acceptable if the bias obtained is less than the allowable error or specification. The precision study employs IQC materials from 2 different IQC concentration (5.64 mmol/L and 13.2mmol/L). Both samples were divided into 5 replicates to be analyzed daily for 5 consecutive days. Results were tabulated in excel and both within run and total imprecision were compared with manufacturer's claimed coefficient of variation (CV%). Method is considered analytically acceptable if CV% is less then the manufacturer's claimed CV. In conclusion, method comparison study shows bias that fall within allowable EFLM desirable bias specification. For precision study, both levels show imprecision that is less than the manufacturer's claim.These two method verification studies reveal than plasma glucose measurement using the new COBAS 6000 A and B were both precise and accurate thus measurement of plasma glucose using these two analyzers are fit for clinical purpose.

EXPLORING THE AI ODYSSEY: A PILOT STUDY WITH MEDICAL GRADUATES THROUGH THE LENS OF 'DIGITAL HEALERS.' ASSESSING PREPAREDNESS AND EXPERIENCES IN AI DURING UNDERGRADUATE STUDIES AND WORKING LIFE

INVENTOR	Dr. Fatimah Zahra binti Mohamad Rom
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Sarah Iziani Ramli, Dr. Asma Assa'edah binti Mahmud, Dr. Azura Sharena Yahaya, Dr. Rosnadia binti Suain Bon, Datin Dr. Hasliza Abu Hassan
CORRESPONDING E-MAIL	fatimah.zahra@upnm.edu.my

Abstract

Introduction: In recent years, the integration of Artificial Intelligence (AI) in healthcare has witnessed a significant surge, yet its adoption in medical education remains relatively underexplored. Methodology: This pilot study aims to evaluate the preparedness and experiences of medical graduate with AI, both during their undergraduate studies and in professional practice. An online survey, incorporating demographic details and the Medical artificial intelligence readiness scale (MAIRS) questionnaire, was administered to medical graduate at NDUM. Results: A total of 43 respondents, predominantly male, Malay, and graduating in 2023, participated in the study. The mean age of respondents was 26.15 ± 1.60. Findings revealed that 55.8% of participants had exposure to AI during both their undergraduate studies and working life. The primary applications of AI reported were calculating score for risk assessment, doing assignment, and aiding in writing message and emails. Concerning the MAIRS Score, respondents generally demonstrated agreement in understanding the ethical considerations, vision, and application of AI in medical settings. However, opinions were more neutral regarding the cognitive grasp of AI concepts. Conclusion: As real-world clinical settings increasingly incorporate AI, our study emphasizes the necessity for early exposure to AI during medical undergraduate studies. Future research should delve deeper into medical students' experiences to optimize AI utilization in medical education.

SECURE CHAOS-BASED AUDIO TRANSCEIVER

INVENTOR	Dr. Nur Aisyah Abdul Fataf
RESEARCH FIELD	National Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Muhammad Khairul Aiman bin Mat Zaki
CORRESPONDING E-MAIL	n.aisyah@upnm.edu.my

Abstract

Secure Audio Communication using Fractional-Order Chaos Model is an innovative communication model designed for secure audio signal transmission, employing chaos cryptography for enhanced security. The model features two channels (right and left) to further bolster security measures. Before transmission, these channels undergo encryption, followed by signal masking to ensure robust data protection during transmission and delivery to the receiver.

CoMIHL : EMPOWERING HUMANITY THROUGH KNOWLEDGE OF LAW

INVENTOR	Lt Kdr Dr. Mazura binti Md Saman RMN (R)
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Col Jamal Rodzi bin Dahari (R), Mr. Mohd Amirul Zzaki bin Razmi, Lt Col Shaharudin bin Abd Rahman (R), Mej Khairul Nizam bin Taib RMAF, Mr. Mohd Faizal bin Hashim
CORRESPONDING E-MAIL	amirul@upnm.edu.my

Abstract

While states cannot eliminate armed conflict, knowledge of its principles empowers individuals and organizations to act as informed advocates for peace, justice, and the protection of vulnerable populations. This project introduces initiatives designed by CoMIHL, the Centre for Military and International Humanitarian Law (Comprehensive Movement for Increasing Humanity's Legal Literacy), to empower individuals through comprehensive knowledge of humanitarian law. The strategic initiatives include collaboration with stakeholders to promote humanitarian law, the development of course modules on various legal topics, and the utilization of online platforms for disseminating humanitarian law. Humanitarian law fosters a culture of respect for human rights, even during conflicts. The knowledge can act as a seed for peace negotiations and reconciliation efforts by emphasizing the importance of upholding human dignity in all circumstances. CoMIHL's initiatives fostered civic engagement, informed decision-making, and respect for the rule of law.

SMOOTHING KINEMATICS DATA USING FUNCTIONAL DATA ANALYSIS APPROACH

INVENTOR	Dr. Noor Syazwana binti Abd Aziz
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Gan Kok Beng, Kathiresan Gopal, Normurniyati Abd Shattar
CORRESPONDING E-MAIL	noorsyazwana@upnm.edu.my

Abstract

Smoothing is one of the fundamental procedures in functional data analysis (FDA). There are three main factors in the data smoothing process through the basic method of B-spline expansion namely order, roughness penalty and smoothing parameter lambda. Therefore the main objective of this research are to identify the optimal value of derivatives, roughness penalty and smoothing parameter lambda by applying the kinematics data during the parachute landing activity. There have several series of tests conducted to obtain appropriate parameters to be applied to the overall kinematics and kinetics data. Moreover, a web portal was created to aid with the smoothing process. This web site will be built with open-source computing resources, including the Shiny web design framework and the R programming language. This online portal can be classified as a web-based peripheral. Users of this portal just require an internet connection and a web browser to view and use it. Users do not need to install any software on their devices. The portal can also be viewed and utilised on mobile devices such smartphones and tablets.

CONTINUOUS EDUCATION AND COACHING TO PERFECT THE TECHNIQUE AND IMPROVE BLOOD CULTURE VOLUME IN A MILITARY HOSPITAL

INVENTOR	Dr. Ummu Salamah binti Faisal
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Kol (Dr.) Noor Ashikin binti Mohd Rusly, Dr. Nur Adnin binti Ahmad Zaidi, Kol (Dr.) Ahmad Zakuan bin Kamarudin, Hazirah binti Husni
CORRESPONDING E-MAIL	salamah@upnm.edu.my

Abstract

Mortality and morbidity cases reported in hospital are frequently due to sepsis and septic shock. Multiple measures have been implemented to reduce the worst outcome from sepsis such as appropriate commencement of antimicrobial therapy. This particular measure is proven to mitigate the complication of sepsis. In order to initiate a proper antibiotic therapy, proving a diagnosis of bloodstream infection is crucial. Blood volume (BV) cultured in the blood bottle playing a key role and indirectly reflect the proper blood culture technique. Instead of sending an inadequate blood volume for blood culture, drawing the ideal volume of blood during sampling will increase the opportunity for pathogen identifications and eventually lead to a better usage of antibiotics, in terms of targeted antimicrobial therapy and appropriate duration of antibiotics. Aim of this study is to evaluate the mean blood culture volume after implementing educational tools among the healthcare workers in a military hospital in Kuala Lumpur. This is a pre and post test study conducted during January 2023 until December 2023 involving Intensive Care Unit (ICU), surgical ward and medical ward. A baseline data obtained showed that the mean blood volume were less than the recommended volume by the manufacturer (8mls -10 mls). During the study duration, continuous medical education (CME) by a certified microbiologist, periodic teaching and coaching sessions by general physician were conducted among the healthcare workers mainly house officers. By using t-test analysis, the mean blood volume after implementation of educational tools shows significant improvement in all the three wards. As a conclusion, educational tools including continuous medical education at the hospital level, periodic teaching and coaching session can help to improve the outcome of the blood culture techniques and eventually optimize the mean blood volume for blood culture sampling.

ETHICAL CHALLENGES IN ARTIFICIAL INTELLIGENCE INTEGRATION IN MEDICAL EDUCATION AND ITS RECOMMENDATIONS WITHIN THE BIOETHICAL FRAMEWORK

INVENTOR	Datin Dr. Hasliza Abu Hassan
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Astrid Sinarti Hassan, Dr. Aimi Nadia Mohd Yusof, Dr. Maizatullifah Miskan
CORRESPONDING E-MAIL	hasliza@upnm.edu.my

Abstract

Artificial intelligence (AI) shows potential in revolutionizing clinical diagnostics, predictive medicine, and decision-making, leading to improvements in patient care. Ethical considerations regarding its implementation require scrutiny. Integrating AI into medical education is crucial for future healthcare professionals, as it equips them with the knowledge and skills to adapt to the evolving healthcare landscape. AI applications can enhance medical education by offering case studies, virtual patient simulations, machine learning for image analysis, and personalized learning plans. With the increased use of AI, ethical challenges must be identified and addressed. The objective of this review article is to assess the ethical challenges associated with integrating AI into medical education and propose recommendations for medical institutions within a biomedical ethical framework. These suggestions emphasize four fundamental principles of biomedical ethics: autonomy, justice, beneficence, and non-maleficence. While AI integration in medicine offers potential advantages, it also raises ethical concerns such as privacy breaches, biases, and accountability. Consequently, comprehensive ethical guidelines are imperative to address these challenges in medical education. This research output is essential for promoting ethical decision-making, guiding institutions, developing guidelines, and educating stakeholders about the ethical considerations linked to AI integration in medical education.

PREDICTION OF FUTURE DIABETES RISK AMONG POST GESTATIONAL DIABETES MELLITUS WOMEN USING MACHINE LEARNING ALGORITHM

INVENTOR	Dr. Zubaidah Hasain
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Nurul Ain Najwa Norsam, Dr Muslihah Wook
CORRESPONDING E-MAIL	zubaidah@upnm.edu.my

Abstract

Women with a history of gestational diabetes mellitus (post-GDM) have up to a 10-fold higher risk of developing diabetes in the future compared to healthy women. They are exposed to diabetic complications such as heart disease, nerve damage and kidney failure at an early age. This will cause a significant healthcare burden to the family and society. However, the compliance rate for glucose monitoring after delivery is poor as some women have the misconception that the glucose level will be always normal after delivery. Moreover, manual prediction after delivery increases the medical staff burden and may not be effective in detecting high-risk post-GDM women systematically. Thus, this study aims to predict the risk of future diabetes among post-GDM women earlier by implementing the machine learning algorithm prediction system (PSD-PostGDM). In this system, medical staff as the user will be able to predict the future risk of diabetes among their GDM women automatically based on GDM records (i.e., sociodemographic and obstetric data). The PSD-PostGDM employed the ID3 algorithm based on the decision tree method. A total of 100 post-GDM women's sociodemographic and obstetric data were used to develop the model. Based on the developed model, a software package utilising PHP and the XAMPP stack was designed to predict future diabetes risk. The system will provide preliminary diagnosis results after performing calculations and generating results based on input. Post-GDM women that have a high risk will be prioritised and given counselling to increase their awareness about diabetes. Hence, PSD-PostGDM is a frontier in improving the Malaysian healthcare system as it is beneficial in stratifying high-risk post-GDM women automatically, reducing the progression to permanent diabetes and also reducing the medical staff burden.

E-CHOREOGRAPHY : SBVR2ALLOY

INVENTOR	Dr. Nurulhuda A. Manaf
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Najihah Zainal Abidin, Nurul Husna Mohammad Azhar, Dr. Nur Amalina Jamaluddin
CORRESPONDING E-MAIL	nurulhuda@upnm.edu.my

Abstract

This study introduces an automated tool called e-choreography: SBVR2Alloy, which generates a Semantics of Business Vocabulary and Rules (SBVR) model for service choreographies and transforms the SBVR model into the Alloy model. This transformation is used for analysis purposes in Alloy Analyzer afterwards. The development of SBVR2Alloy uses HTML, CSS, Java, and MySQL. SBVR2Alloy simplifies stakeholder tasks by enabling them to independently develop choreography models without requiring extensive knowledge of the underlying construction process.

THERMAL RESISTANT COMPOSITE BRICK

INVENTOR	Lt Col (R) Ir. Ts. Dr. Vikneswaran A/L Munikanan
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Hifzhan Syafi bin Saipul Zahri, Assoc. Prof. Ts. Dr. Muhamad Azani Yahya dan Prof. Ir. Dr. Mohammed Alias Yusof
CORRESPONDING E-MAIL	vikneswaran@upnm.edu.my

Abstract

As the number of cars produced rises, more wasted tyres are created each year. waste tyres are the primary source of solid garbage. Waste tyres may be recycled and utilised in the construction industry to help the environment and promote sustainable growth. This study's objective was to assess the thermal properties of composite sand brick with shredded waste tyres.. Additionally, the compressive strength, heat resistance, and fire resistance of composite sand-cement brick containing shredded of waste tyre were studied. Results show that composite sand brick made using shredded waste tyres performs better than standard brick. This composite sand brick offers improved compressive strength, reduced percentage strength losses after exposure to high temperatures, and more heat resistance than ordinary brick. Because composite bricks reduce environmental pollution while simultaneously taking socioeconomic considerations into account, this shows that the building industry has a lot of potential for adopting them.

PREDICTIVE PROJECT COMPLETION DATE: ADOPTING SCHEDULE QUALITY INDEX AND REAL TIME ADVANCE ANALYTICS (ASQIRTAA)

INVENTOR	Dr. Nor Azliana Akmal binti Jamaludin
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mohd Shahrizan Abdul Rahman, Assoc. Prof. Dr Zuraini Zainol, Prof Emeritus Tengku Mohd Tengku Sembok
CORRESPONDING E-MAIL	azliana@upnm.edu.my

Abstract

Effective project management hinges on accurate forecasting of project completion dates. The abstract propose the innovative approach to elevate predictive accuracy by amalgamating the Schedule Quality Index (SQI) with real-time advances analytics insight. The conventional method of project scheduling often encounter challenges in adapting to dynamic project environments, leading to inaccurate estimations and potential delays. This research aims to address these limitations by introducing the comprehensive methodology that leverages SQI principles and real-time analytics for more robust predictive framework. The SQI serves as the foundation, offering the quantitative measure to assess the reliability of project schedules. By integrating SQI into project management practices, we aim to enhance the precision of completion date prediction. Additionally, real-time advanced analytics will be employed to continuously monitor project progress, identifying potential risk, deviations and opportunities.

INCLUSIVE-SDER INDEX: A TEACHING AND LANGUAGE LEARNING PEDAGOGICAL PREPAREDNESS FOR VISUALLY & HEARING-IMPAIRED (SENSORY DISABILITIES) LEARNERS

INVENTOR	Mrs. Mardziah binti Shamsudin
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mrs. Surinder Kaur Satwant Singh
CORRESPONDING E-MAIL	mardziah@upnm.edu.my

Abstract

This study explores the readiness of teaching institutions in Malaysia, specifically tertiary institutions towards inclusive education using an index called "Inclusive-SDER Index". Inclusive-SDER Index stands as the first index which examines both ESL instructor and institutional preparedness towards catering for inclusivity especially for language related courses. In line with the SDG Goals, this index supports and address the element of inclusivity (SDG4 - Inclusive Education). While most other surveys or questionnaire focus on preparedness at school levels (primary/secondary), this index prepares institutions to focus on the extension of their school learning (especially for learners with sensory disabilities). Moreover, this index can be adopted and adapted as a readiness tool for inclusivity by other tertiary institutions regardless of being language specific. Plus, this index can also be used as a reviewing tool for tertiary institutions that have implemented taught-courses and subjects which also cater to learners with sensory disabilities. Therefore, this can give them an indication on the progress and provide information on areas that require improvement. It can be concluded from this study that the "Inclusive-SDER Index" is a valid and reliable instrument and can be readily used in assessing the pedagogical readiness for inclusive education at tertiary education, especially in catering towards leaners with sensory disabilities and further encourage inclusivity among learners in Malaysia.

INSIDER THREATS: EXPLORING HUMAN, TECHNICAL AND ORGANISATIONAL FACTORS THROUGH CONTENT ANALYSIS

INVENTOR	Mej Nur Fahimah binti Mohd Nassir
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Ummul Fahri binti Abdul Rauf, Assoc. Prof. Dr. Zuraini binti Zainol
CORRESPONDING E-MAIL	fahimahnassir0386@gmail.com

Abstract

In the realm of cybersecurity, insider threats persist as significant challenges for organisations globally. Despite the increasing acknowledgment of their impact, there remains a lack of comprehensive studies that explore the multi-perspective factors contributing to insider threats occurrence from a holistic standpoint. This study aims to address this gap by conducting a thorough analysis of the human, technical, and organisational elements influencing insider threats. Through a content analysis approach, this study delves into the intricate interplay of individual characteristics, technical vulnerabilities, and organisational practices that can give rise to insider threats. This methodology involves systematically collecting, coding, and analysing a diverse range of textual data sources to identify recurring themes and patterns related to insider threats. To systematically review the literature, the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) method was employed. The literature search was conducted on Scopus, Web of Science, and IEEE for articles published between 2014 and 2023. A total of fifty-four (54) articles were identified as relevant for further analysis. By conducting an extensive review of relevant literature, this study sheds light on the complex nature of insider threats and offers insights into how these threats manifest within the organisation. Not only does this study contribute to a deeper understanding of insider threats, but it also provides valuable implications for cybersecurity practitioners, policymakers, and researchers. By adopting a multi-perspective view, it offers insights into the root causes, motivations, and consequences of insider threats. On the whole, this study emphasises the importance of approaching insider threats from multiple perspectives since no single factor operates independently. Instead, it is the combination and interaction of human, technical, and organisational components that create vulnerabilities and opportunities for insider threats to occur.

THE POTENTIAL USE OF EAR BIOMETRICS IN DISASTER VICTIM IDENTIFICATION

INVENTOR	Dr. Nadiawati binti Dato' Abdul Razak
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Nurul Kharmilla Abdullah, Dr. Nur Arina Ahmad
CORRESPONDING E-MAIL	nadiawati@upnm.edu.my

Abstract

The ears have increasingly been recognised as one of the supportive tools in forensics, based on the identification of landmark variations of ear biometrics in living persons. However, no studies have been done on the reliability of such comparisons on the deceased. The study aimed to investigate the correlation between ear biometrics and the age, sex, and stature of the deceased. The study was conducted on 181 deceased persons, aged between 18 and 70 years old, on cases received by the Forensic Unit of Universiti Kebangsaan Malaysia Medical Centre. Documentation of age, sex, race, and height was recorded, and photographs of bilateral ears were taken. Measurements of twelve ear biometrics based on the Iannarelli method and ear length and ear width were taken from the photographs. Results showed a significant difference between males and females in six ear biometrics. There was also a significant correlation between ear biometrics, that is, ear length and ear width, with an individual's age and height. Regarding the distinctiveness of the ear, the research affirms that each human ear is one of a kind. This uniqueness is attributed to the considerable variability observed in the external structure of the ear. In conclusion, there exists a significant difference between males and females in ear biometrics with good correlations between ear biometrics and the height and age of an individual. Hence, the ear can be used for physiognomic features of a human body for identification purposes in the forensic field, especially in human identification during mass disasters. This knowledge can be further applied in forensic examinations, particularly in identifying individuals through ear images.

MHD FLOW AND HEAT TRANSFER ANALYSIS OF HYBRID NANOFLUID DUE TO THERMAL RADIATION, JOULE HEATING AND THERMAL SLIP IMPACTS

INVENTOR	Mrs. Nur Sakinah binti Idris
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Mohd Anuar Jamaludin, Prof. Dr. Roslinda Nazar, Mohamad Syafiq bin Zainodin, Nurul A'isyah binti Jaafar
CORRESPONDING E-MAIL	nursakinah@upnm.edu.my

Abstract

Hybrid nanofluid is gaining recognition as an exceptional heat transfer fluid due to its promising thermal properties. However, certain challenges persist in its practical applications, necessitating ongoing investigation to control fluid behavior. This study aims to model and analyze radiative-MHD hybrid nanofluid flow over a permeable surface, accounting for thermal slip and Joule heating effects. The mathematical formulation of the governing partial differential equations was developed and transformed into a system of nonlinear ordinary differential equations using appropriate similarity transformation variables. Then, MATLAB's BVP4C solver was utilized to numerically solve the problem. Notably, the solutions are found to be non-unique, prompting a stability analysis, which reveals stability only for the first solution. The impacts of various controlling parameters on the primary physical quantities of interest and the profiles are analyzed and depicted via graphs. It is found that intensified radiation, magnetic, and suction parameters effectively boost the heat transmission rates. Meanwhile, degrading an Eckert number and thermal slip parameter improved the temperature profiles. Surprisingly, skin friction and velocity profiles are not influenced by radiation and thermal slip parameters. Remarkably, the heat transfer performance of hybrid nanofluid is superior compared to nanofluid and water.

SABUN MANDIAN RAED

INVENTOR	Dr. PM Ridzuan
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Dr. Ridz Research Centre
CO-INVENTOR	Muhammad Norfitri Md. Bakim, Nur Hidayu Che Baharudin
CORRESPONDING E-MAIL	drpmridzuan@gmail.com

Abstract

Sabun Mandian RAED is a research-based product which was formulated to soothe the skin. This product was formulated based on natural herbs namely Neem Leaves, Cengkih extract and Pimpinella anisum extract as main ingredients. These herbs have been proven to act as natural antibacterial and antifungal which is suitable for daily use especially on baby and children. This shower gel can soothe and improves the skin moisturizer by maintaining the skin pH and also safe to be applied on skin (face area), making it alternative natural shower gel which is safely can be used for children and adult age.

DEFENCE, SECURITY AND SUSTAINABILITY (DSS) 2024

ABSTRACT

CATEGORY C : INNOVATIVE RESEARCH

SMART LANDING BOARD - CHWISO

INVENTOR	Dr. Siti Azilah
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Aizuddin Amri bin Zainuddin, Nursyazliana binti Suhaimi, Aime Shyzleena binti Che Suhaimi, Nurul Nabilah binti Azizul, Nur Hafizatul Alya binti Yahya
CORRESPONDING E-MAIL	sitiazilah@upnm.edu.my

Abstract

Development and Validation of Smart Landing Board Chwiso as a Foul Detector of a Long Jump and Triple Jump Jumping Line

Long jump and Triple Jump is a track and field event in which athletes sprint down a runway and then take a single, explosive jump into a sandpit. The goal is to achieve the greatest distance possible. Long jump and triple jump is one of the important and popular events of modern track and field sports. These events require precise measurement of the athlete's landing position. Accurate determination of foul jumps is crucial for maintaining fair competition and ensuring the integrity of results. In these events, referees play crucial roles in ensuring fair competition, adherence to rules, and the overall safety of the athletes. Traditionally, runway referees are positioned along the runway to observe the take-off and landing of the athletes. They ensure that athletes do not overstep the take-off board during the jump. Runway referees also watch for any fouls, such as athletes stepping over the board or making an incorrect takeoff. However, in the formal competition process, the referee may be interfered by many factors and it is easy to misread the movements of the athletes and cause misjudgement. Therefore, it is very necessary to have tools that may assist referee to detect fouls. The implementation of the Smart Landing Board as a foul detector in long jump and triple jump events has the potential to revolutionize the way these competitions are officiated. By combining sensor technologies, this innovation aims to contribute to the fairness, transparency, and overall improvement of track and field events.

YOUTH FOOTBALL SIMULATION RUNNING PROTOCOL

INVENTOR	Dr. Siti Azilah Atan
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Aizuddin Amri Zainuddin
CORRESPONDING E-MAIL	sitiazilah@upnm.edu.my

Abstract

Testing football players during actual match play is challenging due to variant between matches; such as strength of the opposition, fitness level and environmental conditions. Therefore, Football Simulation Running Protocols (FSRP) have become primary means to investigate football players in football related performances. These protocols attempt to re-create and standardise movement patterns and physiological demands in football with the key benefit to control and manipulate certain variables to measure their impact on sporting performance. The FSRP that was developed for adult's football players has been successfully used to evaluate performance, physiological responses, and the efficacy of nutritional interventions. Surprisingly, despite the growing interest in youth football, there has been no valid representation of a football simulation protocol for young football players. There have been a few attempts at developing youth football simulation protocols, including non-motorised treadmill by Thatcher & Batterham (2004) and Phillips et al. (2010) who modified the Loughborough Intermittent Shuttle Test (LIST) to a shorter time (60 min) compared to the original LIST (90 min). Nevertheless, all the previously mentioned methods suffer from some limitations. The existing youth protocols have failed to reproduce match activity activities pattern, duration of exercise and physiological responses simultaneously. Given the limitations associated with assessing young players, we have devised novel shuttle-running simulations for youth players based on match analysis data from three age groups (U13, U14 and U15). These protocols were designed to simulate the total distance covered, physiological demands and match activity patterns observed during match-play.

ECO-FRIENDLY BRICKS WITH WASTE PAPER

INVENTOR	Hafiz Maulana Hudha
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Sekolah Indonesia Kuala Lumpur
CO-INVENTOR	Syaqiena Oceanix Hindi Andrea Sudrajat, Farrel Ravi
CORRESPONDING E-MAIL	Hapzyd57@gmail.com

Abstract

Every month, Malaysia creates a huge amount of waste paper, about 57,000 tonnes. Sadly, only a small part of it, just 25%, gets recycled into new paper and cardboard. The majority of this paper waste doesn't get handled properly. Instead, it either ends up in landfills or gets into drains and rivers. This causes issues like sudden floods and still water where mosquitoes lay their eggs. These problems can lead to more troubles, like diseases spreading, landslides happening, and traffic jam. To address this environmental challenges, there are two essential strategies. The first is increasing paper waste recycling rates through creating awareness, improving waste collection systems, and encouraging responsible disposal practices. Secondly, we need to actively seeking and implementing diverse techniques to repurpose paper waste into valuable applications. This project is part of the continuous effort within the second strategy which involves the incorporation of paper waste as a strengthening material in cement bricks. In this project, paper waste is processed into pulp and is used as the strengthening agent in cement bricks. By shredding paper waste into fibrous components and integrating them into the brick-making process, we conserve resources, minimize landfill usage, and lower the carbon footprint associated with traditional brick production. This innovative approach not only reduces the burden of paper waste but also enhances the structural integrity of bricks, making them more durable and eco-friendly. The main goal of this project is to find the optimum composition of cement, sand, water and waste paper for the maximum strength of the cement bricks. To study the effects of additional paper waste to the bricks, two tests will be performed namely bending and shear tests. This is to ensure that the additional paper waste to the traditional brick materials can improve the bending and shear performance of the bricks.

AQUAHOOP BUDDIES: THE BENEFITS OF AQUATIC STRATEGIES AND TECHNIQUES FOR CHILDREN WITH AUTISM

INVENTOR	Dr. Noor Hamzani Farizan
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Shamsulariffin Samsudin, Dr. Siti Athirah Zafirah binti Abdul Rashid, Atikah Fakhira binti Shaiful Azli, Mohamad Shamir bin Mohamad Amran
CORRESPONDING E-MAIL	noorhamzani@upnm.edu.my

Abstract

Swimming lessons have been suggested as a beneficial health promotion intervention and a means to acquire life-saving abilities for individuals with autism spectrum disorder (ASD). This study perceived benefits related to swimming lessons for children diagnosed with ASD, with specific emphasis on tools that can enhance the effectiveness of teaching lessons in this particular population. The paper highlights the innovation project tool called "AquaHoop Buddies", which is specifically tailored for swimming instruction, intends to improve the efficiency of teaching swimming stroke lessons and aims to address challenges or areas for improvement in ASD children. The name "AquaHoop" implies an association with the use of hula hoops and highlights a feeling of companionship or assistance, as indicated by the term "Buddies". The term suggests that this tool is not only practical but also aimed at encouraging a constructive and cooperative learning experience. Children diagnosed with ASD express high levels of intuition, making it crucial to enhance the teacher-student connection for future lessons. Utilizing these specific tools was hoped to facilitate ASD children's engagement with their swim instructor. In addition, "AquaHoop Buddies" also attempts to implement a lead-and-follow approach that hopes to reduce the inflexibility of the ASD swimmer and foster the development of their focus.

MY STEM INNOVATION

INVENTOR	Ilman Ziqri bin Mohamad Asmidzam & Qisya Khayla binti Mohamad Asmidzam
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	SK Putrajaya Presint 11(3)
CO-INVENTOR	-
CORRESPONDING E-MAIL	asmidzam@unikl.edu.my

Abstract

This invention helps students to understand STEM. More details will be available later.

UTILIZING A CRISIS-READY TECHNOLOGY SURVEY TO ASSESS PREPAREDNESS FOR TECHNOLOGY IN TIMES OF CRISIS

INVENTOR	Nur Aisyah Aqilah binti Mohd Fauzi
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Norshima binti Zainal Shah, Norashikin binti Sahol Hamid
CORRESPONDING E-MAIL	aisyahaqilahmohdfauzi@gmail.com

Abstract

The COVID-19 pandemic in Malaysia has accelerated the integration of technology in higher education institutions (HEIs), establishing it as a new educational norm. This shift aligns with the ninth transformation outlined in the Malaysia Education Blueprint for Higher Education, emphasizing globalised learning. To ensure the equivalence of online learning quality with traditional methods, an investigation into educators' readiness to teach effectively online, particularly in terms of technological pedagogical content knowledge (TPACK), is imperative. While the TPACK survey exists for instructors to assess their teaching and technology proficiency, understanding lecturer competence from the perspective of learners is more pertinent. This study introduces a tool designed for students to gauge educators' technology readiness during crises like the COVID-19 pandemic. Employing a quantitative approach and a correlational research design, data were gathered from 445 NDUM undergraduates through an online questionnaire, analysed using SPSS Version 25.0. Results indicated the validity and reliability of the instrument, having undergone evaluation by expert reviewers and pilot testing with 30 students. Furthermore, each section's coefficient alpha exceeded 0.800, indicating excellent internal consistency. Despite a weak positive correlation between lecturer competence and student achievement, the study suggests that the newly developed questionnaire is a valuable tool for students to assess educators' preparedness during emergencies. Additionally, educators can use the tool to evaluate their own competencies in online teaching. The findings underscore that a high level of lecturer readiness in terms of technology, pedagogy, and content knowledge contributes to quality online learning and enhances student achievement.

FAULTY PROPELLER PREDICTION SYSTEM FOR QUADROTOR UAV BASED ON INFORMATIVE ACOUSTICAL FEATURES

INVENTOR	Ms. Fareisya Zulaikha Binti Mohd Sani
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Siti Noormiza Makhtar, Ts. Dr. Nur Diyana Kamarudin, Dr. Elya Mohd Nor, Baizura binti Bohari, Dr. Syaril Azrad Md Ali
CORRESPONDING E-MAIL	noormiza@upnm.edu.my

Abstract

The propeller is one of the critical components in unmanned aerial vehicle (UAV) systems. The risk of the propeller's failure could result in significant harm and hazardous events which require primary maintenance services. Thus, prompt detection of flight faults is crucial through real-time flying condition monitoring systems to ensure a stable and safe UAV operation. The sound emitted by quadrotor UAVs offers valuable insights into their flight performance, serving as a crucial element for the efficient monitoring of flying conditions and early detection of potential faults. This invention aims to develop a faulty propeller prediction system using acoustical signals recorded during flight operations. The faulty conditions are predicted using a machine learning classification model based on three informative acoustical features: pitch, zero-crossing and short-time energy. The prediction system shows promising potential for real-time fault diagnosis using acoustical sensors to enhance the operational safety of the quadrotor UAV.

DRIVER DISTRACTION APPS

INVENTOR	Assoc. Prof. Ts. Dr. Suzaimah Ramli
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ms. Natasyha Nabila Zainudin, Ts. Norulzahrah Mohd Zainudin, Ts. Dr. Nor Asiakin Hasbullah, Dr. Muslihah Wook, Assoc. Prof. Ts. Dr. Noor Afiza Mat Razali, Prof. Ts. Gs. Dr. Mohd A'fizi Mohd Syukran, Mrs. Tuan Khalisah Tan Zizi
CORRESPONDING E-MAIL	suzaimah@upnm.edu.my

Abstract

Road accidents are a terrible fact of life. A traffic collision is usually mentioned in at least one of the daily news reports in Malaysia. The number of victims and damage done can be disastrous depending on the severity of the disaster. Road accidents claim many lives and cause significant property damage. This paper describes an eye-tracking system for the drowsiness detection of a driver. It is based on the application of Haar Cascade algorithm. The system alerts the driver if the drowsiness index exceeds a threshold level. The application was developed that focuses on the eye area, where the system makes a real-time analysis for the user which is the driver.

MSYNC : MULTI SYNC EMERGENCY SUPPORT SYSTEM

INVENTOR	Syed Nasir Alsagoff bin Syed Zakaria
RESEARCH FIELD	Humanitarian Assistance Disaster Relief
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Anis Adilah Syahmina binti Yahaya, Hafiza binti Matusin, Khor Xue Li, Mohammad Hafiz bin Masyus
CORRESPONDING E-MAIL	syednasir@upnm.edu.my

Abstract

MULTI SYNC EMERGENCY SUPPORT SYSTEM is a is a synchronized multi flash beacon system that can increase the lumens and extend the visibility range of Morse code signals.

SISTEM PEMANTAUAN KEGUNAAN LEBAR JALUR (BANDWIDTH) SECARA BERPUSAT DI MAKMAL KOMPUTER

INVENTOR	Syed Nasir Alsagoff bin Syed Zakaria
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Anis Adilah Syahmina binti Yahaya, Hafiza binti Matusin, Khor Xue Li, Mohammad Hafiz bin Masyus
CORRESPONDING E-MAIL	syednasir@upnm.edu.my

Abstract

Sistem Pemantauan Kegunaan Lebar Jalur (Bandwidth) secara berpusat di Makmal Komputer merupakan sistem pelayan-pelanggan (client-Server). Dalam sistem ini, komputer pelanggan (client) perlu disambungkan melalui alamat IP pelayan (server). Setelah itu, pelayan (server) boleh memantau aktiviti yang dilakukan oleh pelanggan (client). Pelayan (server) boleh memantau dari segi aplikasi yang digunakan dan juga kadar lebar jalur (bandwidth) yang digunakan oleh pelanggan(client). Dengan adanya sistem ini, kadar lebar jalur (bandwidth) dapat dipantau agar tiada penggunaan lebar jalur yang berlebihan oleh pelanggan (client) yang mampu memperlahankan rangkaian di dalam Makmal Komputer.

SISTEM PENGUNCIAN OPERASI WINDOWS SECARA BERPUSAT

INVENTOR	Syed Nasir Alsagoff bin Syed Zakaria
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Anis Adilah Syahmina binti Yahaya, Hafiza binti Matusin, Khor Xue Li, Mohammad Hafiz bin Masyus
CORRESPONDING E-MAIL	syednasir@upnm.edu.my

Abstract

Sistem ini berfungsi untuk mengunci windows semasa peperiksaan berkomputer dijalankan.Sistem ini juga akan memaparkan jumlah windows yang telah berjaya dikunci oleh pensyarah.

DOCUMENT SELF DESTRUCT SYSTEM USING DOD 5220.22-M

INVENTOR	Syed Nasir Alsagoff bin Syed Zakaria
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Anis Adilah Syahmina binti Yahaya, Hafiza binti Matusin, Khor Xue Li, Mohammad Hafiz bin Masyus
CORRESPONDING E-MAIL	syednasir@upnm.edu.my

Abstract

DOCUMENT SELF DESTRUCT SYSTEM is a system that can perform targeted search and wipe document files in a device by overwriting file space to secure a computer devices in a short time. It is used to ensure that the confidential or sensitive files in a computer do not leaked out. This system is applicable to many type of documents such as Microsoft Words, Excel, PowerPoint and PDF.

SISTEM PENCARIAN GAMBAR YANG MENCURIGAI

INVENTOR	Syed Nasir Alsagoff bin Syed Zakaria
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Anis Adilah Syahmina binti Yahaya, Hafiza binti Matusin, Khor Xue Li, Mohammad Hafiz bin Masyus
CORRESPONDING E-MAIL	syednasir@upnm.edu.my

Abstract

Sistem pencarian gambar yang mencurigai adalah sistem pencarian gambar yang berkonsepkan pencarian gambar yang menggunakan kata kunci, selain itu, sistem ini juga dapat mencari pelbagai jenis fail gambar dalam satu masa.akhir sekali, sistem ini juga dicipta untuk mencari gambar dengan satu jangka masa tertentu.

EXPLORATION OF ABDOMINAL CAVITY ANATOMY IN MIXED REALITY ENVIRONMENT

INVENTOR	Assoc. Prof. Ts. Dr. Norshahriah Abdul Wahab
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ts Suresh A/L Thanakodi, Dr. Amalina Farhi Ahmad Fadzlah, Dr. Mohd Sidek Fadhil Bin Mohd Yunus
CORRESPONDING E-MAIL	shahriah@upnm.edu.my

Abstract

Advancements in mixed reality technologies have sparked transformative possibilities across various fields, particularly in medical education. This research focuses on the application of HoloLens, a leading Mixed Reality device, as an educational tool for exploring the complexities of abdominal cavity anatomy. The study aims to investigate the efficacy of this technology in providing an immersive, hands-on learning experience for medical students. Traditional methods of learning anatomy often present challenges in comprehending the intricate structures within the abdominal cavity. The static nature of textbooks and two-dimensional illustrations can hinder the depth of understanding required in medical education.

Addressing these limitations, this research explores whether mixed reality through HoloLens can offer a dynamic solution to enhance anatomical comprehension. The research employs qualitative analysis involves user observations, and assessments from medical students Year-One in UPNM .Research finding that users immersed in the mixed reality environment exhibited heightened engagement and retention of anatomical knowledge. The interactive nature of HoloLens allowed for in-depth exploration to visualize anatomical structures dynamically. Based on the findings, this research recommends further integration of mixed reality technologies like HoloLens into medical education. Continued development of interactive and comprehensive anatomical models specific to abdominal structures is recommended. Additionally, ongoing evaluation and refinement of mixed reality applications should be pursued to optimize learning outcomes.

SISTEM PENJEJAKAN PEGAWAI KADET

INVENTOR	Ts. Dr. Muhammad Fairuz bin Abd Rauf
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	PKdt Afiq Zaidi bin Amiruddin, Assoc. Prof. Dr. Mohd Fahmi bin Mohamad Amran, Dr. Yuhanim Hani binti Yahaya, Dr. Rita Wong Mee Mee
CORRESPONDING E-MAIL	fairuz.rauf@upnm.edu.my

Abstract

An Android application that uses to track the live location and monitor the presence of of Cadet Officer in the university and military camp area. It helps Officer Commanding stay connected with their Cadet's location in real-time. Perfect use on a daily basis for military academies and training institutions, the Cadet Officer Tracking System enhances supervision during exercises and daily activities, improving overall organization and response capabilities. Stand out with innovative features like real-time tracking, geofencing, and emergency alerts. This system is designed to make Cadet Officer management effective and hassle-free. Can be commercialize in military academies and training institutions to specific target group of Officer Commanding and Cadet Officer.

MULTIMODAL APPROACH FOR STUDENT ATTENDANCE MONITORING IN A HYBRID LEARNING

INVENTOR	Ts. Dr. Syarifah Bahiyah Rahayu
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Putra Ros, Dr Venkatesan
CORRESPONDING E-MAIL	syarifahbahiyah@upnm.edu.my

Abstract

Emerging technologies have revolutionized various sectors, including education, where traditional systems are being transformed to enhance efficiency and effectiveness. This study presents a student attendance application that leverages emerging technologies such as blockchain, face recognition, and location-based services to capture secure attendance data for hybrid learning environments. Traditional attendance monitoring system has manual roll calls and proxy attendance, which are more prone to errors. However, conventional methods are challenging to identify and address attendance issues promptly. This leads to disputes and extra administrative work for instructors and administrative staff to resolve discrepancies. This causes educators delays in starting the class and reduces instructional time. Furthermore, digital attendance systems may face data security threats, including unauthorized access and data breaches. In this research, we propose a framework that orchestrates a multi-modal approach to student attendance monitoring by integrating the synergistic potential of blockchain, facial recognition systems, and GPS-based tracking. The use of blockchain technology ensures the integrity and immutability of attendance records. Student attendance records are stored on a tamper-proof decentralized ledger, ensuring transparency with time-stamped and linked data. Automating attendance through facial recognition compares student faces with a database, allowing for real-time identification and reducing administrative errors. Additionally, this application incorporates GPS or Wi-Fi to confirm student's physical presence in the classroom, reducing attendance fraud. Real-time experiments in a hybrid learning classroom setting were conducted to evaluate the effectiveness of this framework. The results demonstrate that the proposed framework enhances the efficiency in hybrid learning environments, ensuring a robust and reliable attendance system adaptable to the needs of education 4.0.

ENERGY SHIP FOR FAR OFFSHORE WIND ENERGY EXPLOITATION

INVENTOR	Ts. Dr. Roshamida binti Abd Jamil
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ts. Dr. Abu Ubaidah Amir bin Abu Zarim, Adenen Shuhada binti Abdul Aziz, Dr. Mohd Iqbal bin Shamsudheen, Lt Kdr Ir. Ts. Mohd Najib bin Abdul Ghani Yolhamid TLDM (Bersara), Ir. Adruin Shazaen bin Mohd Mustaffa
CORRESPONDING E-MAIL	roshamida@upnm.edu.my

Abstract

Far offshore wind energy has immense potential vis-a-vis near offshore wind energy as it has potential and promise for a higher capacity factor (Roshamida AJ. et al, 2019). However, the cost for connection to the grid will increase exponentially if the fixed or floating wind turbine installed further off shore. This issue can be potentially solved by a mobile energy ship that is weather routed which it will literally chase the wind and store the captured energy in the form of Hydrogen which can be offloaded ashore (Babarit et al., 2018). As wind energy is directional and is related to the direction of wave propagation, further studies need to be made on the type of hull that is most suitable for the energy ship concept. The research conducted taken into account the heaving, rolling and pitching motion characteristics of the three test hulls and a tandem analysis made with regards to ship resistance,hydrostatics and seakeeping in order to tabulate the best combination in optimizing the ideal hull design for the energy ship. The three hulls were modelled using MAXSURF modeler. Meanwhile, the analysis of resistance, hydrostatics and seakeeping are respectively using MAXSURF resistance, MAXSURF stability and MAXSURF motions. As for the results, both the Monohull and the Catamaran proved themselves to be prime candidates for most suitable hulls for the energy ship concept.

HANDHELD HUMAN DETECTOR DEVICE FOR SEARCH AND RESCUE (SAR) APPLICATION

INVENTOR	Ts. Dr. Noor Hafizah Amer
RESEARCH FIELD	Humanitarian Assistance Disaster Relief
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Siti Aisyah binti Abdul Aziz, Noor Amira Ilyanie binti Ruslan
CORRESPONDING E-MAIL	noorhafizah@upnm.edu.my

Abstract

Natural disasters have a negative impact on people's health, property, and the environment. There are various types of human detectors currently available such as drones and snake robots. However, the existing human detector has many limitations such as very high processing cost and a continuous need for illumination due to be operated in dark conditions. In this project, a human detector with low processing costs will be designed. The main objective of this project is to develop a handheld device that uses a motion sensor to detect life sources based on human activities. In this study, the behaviour of motion sensors will be compared to choose the best sensor for the handheld human detector. The methodology used in this project includes the selection of conceptual design and making decisions based on product design requirements; design processes and mechanical analysis using Solidworks software; instrumentation of the device which comprises the device's motion sensor's programming and calibration; and product testing to ensure it functions as intended. To the author's knowledge, there is no existing handheld human detector for search and rescue applications. As the result, the device exceeded the 10-minute threshold for handheld usage and reliably detected living humans. It also demonstrated effective performance within the specified temperature range during testing.

VEHICLE ALERT RADAR SYSTEM (VARS)

INVENTOR	Assoc. Prof. Ts. Dr. Ng Choy Peng
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Capt. Assoc. Prof. Syed Nasir Alsagoff bin Syed Zakaria, Iswarran A/L Ragunath, Surender Singh A/L Tara Singh
CORRESPONDING E-MAIL	cpng@upnm.edu.my

Abstract

Telemetry vehicle monitoring systems facilitate remote, real-time data collection from motor vehicles, enabling analysis, tracking, and management. They are widely used in industries, for instance, transportation, logistics, and public transport. Nevertheless, the available telemetry solutions on the market are constrained by the fact that sensors are only fitted in the front and rear of vehicles, and implementing a 360-degree LIDAR system incurs substantial costs. In addition, the system is unable to overcome blind spots or even warn drivers to prevent collisions.

The Vehicle Alert Radar System (VARS), on the other hand, is affordable and versatile. It can integrate seamlessly into any vehicle with only an Android smartphone and Wi-Fi access point. By installing VARS on an Android smartphone and positioning the smartphone on the dashboard of a vehicle, it is capable of identifying potential collisions, including 360-degree, lateral, and merging collisions, by detecting the presence of a Wi-Fi signal from nearby vehicles. The driver will receive an alert that provides information about the direction and proximity of other vehicles.

VARS establishes a connection between Android and Windows devices and server systems by utilizing Commercial Off-the-Shelf (COTS), mobile, network-centric, and location technologies. It utilizes the inherent Android device to deliver real-time telemetry data for GPS radar functionalities. The device will display the three closest vehicles within a radius of 200 meters. In addition, the VARS client provides directional arrows, enables the use of maps without an internet connection, and emphasizes the nearest vehicle on Google Maps.

PSEUDOSENSE 2.0: A SMARTPHONE-INTEGRATED BIOSENSOR FOR RAPID DETECTION OF PSEUDOMONAS AERUGINOSA INFECTIONS

INVENTOR	Dr. Jahwarhar Izuan bin Abdul Rashid
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mr. Dhanendiren Narayanasamy, Dr. Safura Taufik, Dr. Ahmad Farid Mohd Azmi, Assoc. Prof. Dr Siti Aminah Mohd Nor, Dr. Nik Noorul Shakira Mohamed Shakrin
CORRESPONDING E-MAIL	jahwarhar@upnm.edu.my

Abstract

Pseudomonas aeruginosa, a type of antibiotic-resistant bacteria, is the leading cause of various infections including chronic wound infections, burns, bacteremia, cystic fibrosis, and urinary tract infections. While microbial culture methods and lab-based Polymerase Chain Reaction tests have been widely used as the gold standard for diagnosing P. aeruginosa infections, scaling up PCR tests for mass-testing presents challenges due to requirements for specialized laboratories and trained personnel. In response to these challenges, we present PseudoSense 2.0—an innovative advancement in rapid diagnosis of P. aeruginosa infections. This upgraded biosensor represents a breakthrough in smartphone-portable electrochemical sensing technology that offers a field-portable method for detecting P.aeruginosa with high sensitivity and specificity within under 15 minutes without the need for complex sample preparation.

WEARABLE ANTENNA FOR MILITARY ATTIRE

INVENTOR	Assoc. Prof. Dr. Mohd Taufik bin Jusoh @ Tajudin
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Mohd Hermas Abd Jalil, Anis Shahida Niza Mokhtar, Muhammad Al-Asyraaf Ahmad, Khairol Amali Ahmad
CORRESPONDING E-MAIL	taufiktajudin@gmail.com

Abstract

This project proposes a design of a dual-band button antenna with miniaturised structure. The button antenna is designed and simulated at Industrial Scientific Medical (ISM) band resonant frequency of 2.45 GHz and 5.8 GHz to be used with military garments epaulettes. The material and parameters of structure have been chosen and calculated so that the antenna is radiating with omnidirectional radiation pattern. The simulated gains of the antenna are 3.97 dBi and 7.52 dBi for the two resonating frequencies, respectively. The front to back ratio (f/b) for both frequencies are higher than 10 dB. The maximum beams are directed at 51° and 108° respectively for E-plane, and 29° and 59° respectively for H-plane. The simulations have been performed by using Computer Simulation Technology (CST) software.

A PARAMETRIC STUDY OF SMALL-SCALE OFFSHORE VERTICAL AXIS WIND TURBINES: UNLOCKING POTENTIAL IN LOW WIND PROFILE REGIONS

INVENTOR	Lt Kdr Dr. Norzaima binti Nordin TLDM (B)
RESEARCH FIELD	Energy and Water Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Nur Ezalifah Ahmad Mokhtar, Ts. Dr. Maidiana Othman, Baizura Bohari, Fazril Azim Shaharuddin
CORRESPONDING E-MAIL	norzaima@upnm.edu.my

Abstract

In recent decades, wind turbines have emerged as substantial renewable energy technology, particularly for offshore applications. However, the utilisation of conventional wind turbine in regions characterised by a low wind speed profiles, such as Malaysia, remains limited. Therefore, this study addresses the gap by developing an unconventional small-scale Vertical Axis Wind Turbine (VAWT) provision for offshore application in Malaysia's low wind speed regions. The study commenced with a wind feasibility analysis which aimed to determine the viable range of offshore wind speeds prior conducting wind tunnel tests. The VAWT model was designed using Solidworks software, fabricated using a 3D printer and tested in the National Defence University of Malaysia (UPNM) wind tunnel lab facilities. Through a systematic analysis and optimisation of blade diameters, stages and angles using Taguchi method, this study aimed to enhance the wind turbine performance in terms of power coefficient (Cp) and tip speed ratio. The result highlighted the pivotal role of blade diameter and the number of stages as a key design factors for VAWT, with the optimal configuration of blade diameter of 16 cm, a single stage and Angle of Attack (AoA) set at 7°. This configuration exhibited a remarkable Cp value of 0.622, signifying the power output efficiency of small-scale VAWT. Meanwhile, variations in AoA were found to be the least significant design factor, as all models demonstrated peak Cp values corresponding to wind speeds. Thus, these findings show the key design considerations for small-scale VAWT in low wind profile regions as well as contributing valuable knowledge for the sustainable development of wind energy in Malaysia.

INTERLOCKING PAVER BLOCK WITH SILICA FUME FOR SUSTAINABLE ROAD

INVENTOR	Ts. Dr. Faridah Hanim binti Khairuddin
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ts. Dr. Noor Aina binti Misnon, Dr. Ahmad Nazrul Hakimi bin Ibrahim, Nor Annisa binti Mustaffa, Ainur Radiha binti Mahyan
CORRESPONDING E-MAIL	hanim@upnm.edu.my

Abstract

Interlocking Concrete Paver Block (ICPB) is a cost-effective option for outdoor applications and requires low maintenance compared to asphalt or concrete pavement. However, the cement manufacturing process contributes to CO_2 emissions and global warming. This study aims to replace cement with Silica Fume (SF) as a pozzolan material in ICPB. By incorporating SF, the goal is to create environmentally friendly and durable ICPB in line with the Sustainable Development Goal No. 9. Finding reveals that 5% of SF has the highest compressive strength at 28 days and is hydrophobic with water indicating that ICPB with SF has higher durability, enhanced the strength and reduced the cement content. This paver block is also suitable to be use for heavily traffic road.

FITNESS APPLICATION FOR MEASURING THE LEVEL OF LOWER BODY STRENGTH

INVENTOR	Dr. Shahrulfadly bin Rustam
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Jorrye Jakiwa, Dr. Siti Azilah Atan
CORRESPONDING E-MAIL	shahrulfadly@upnm.edu.my

Abstract

The study aims to develop the application of physical fitness norms on standing broad jump training among Army Reserve Officer Training Unit Cadet (ROTU). This physical fitness apps is easily and quickly tool for evaluating physical fitness level. It's also important to motivate the military officers to maintain good physical health for the readiness of physical combat. This study was conducted on 212 respondents consisting of male cadet officers ROTU of National Defense University of Malaysia (NDUM). Population and sample surveys were selected purposively in which all the samples were the population of ROTU male cadet officers of the NDUM. Methodology: This study use a standing broad jump test battery as a research instrument. This application is develop for physical fitness norms for Android system in cell phone. The development of application is intended to build a physical fitness app, which focuses on physical fitness norms standing broad jump training. The availability of these smart applications, individuals are able to measure and know their fitness levels easily and quickly after physical activity. Result: The findings showed the correlation coefficient between the trials is significant ($r = 0.81$, $n = 50$, $p < 0.001$). The results of the study found that the value of the Pearson correlation coefficient for both tests was $r = 0.81$. The reliability testing showed a strong positive correlation of the fitness test for the standing broad jump. Research impact: Implication of this study, this application of physical fitness norms can provide easily and quickly the level of fitness for defense and security forces in measuring the physical fitness level of defense and security personnel and security personnel in Malaysia. Novelty: The novelty of this research is to establish and develop physical fitness norms apps for ROTU cadets. Commercialization: The develop of physical fitness norms apps have a commercial value to market because it can put on the Play Store in cell phone.

MANGROVE VEGETATION ANALYSIS USING CLUSTERED MULTISPECTRAL LANDSAT IMAGES

INVENTOR	Assoc. Prof. Ts. Dr. Norshahriah Abdul Wahab
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Mohd Sidek Fadhil Bin Mohd Yunus
CORRESPONDING E-MAIL	shahriah@upnm.edu.my

Abstract

Imej satelit, terutamanya imej Landsat, telah digunakan secara meluas selama lebih dua dekad untuk memantau dan mengkarakteristikkan ekosistem bakau disebabkan kepentingan ekologi mereka. Namun, pengiktirafan visual terhadap ekosistem bakau menggunakan kombinasi warna komposit RGB bagi imej Landsat 8 terbukti terhad. Bagi mengatasi cabaran ini dan meningkatkan proses pemantauan, penyelidikan ini mencadangkan penyatuan sistem Capaian Imej Berasaskan Kandungan (CBIR) dengan teknik klasifikasi imej GIS. Kajian ini memberi tumpuan kepada pembangunan model pemantauan bakau yang tepat dan pengesahan di Kawasan Ramsar Johor, Semenanjung Malaysia, dengan menggunakan imej Landsat. Kajian ini mengadaptasi pendekatan bermetodologi campuran, menggabungkan kajian tinjauan teori dan kaedah ujikaji makmal, dibahagikan kepada tiga fasa untuk mencapai objektifnya. Dalam fasa pertama, klasifikasi imej GIS dianalisis untuk menilai perubahan indeks vegetasi dalam kawasan bakau. Kajian sistematik mengenai imej satelit, teknik klasifikasi imej, dan kombinasi jalur yang digunakan dalam pemantauan perubahan bakau menjadi panduan dalam fasa ini. Fasa kedua melibatkan pembangunan model menggunakan CBIR untuk memantau perubahan bakau di Pontian Johor. Ujikaji makmal termasuk pengumpulan data imej Landsat 8 dari tahun 2013 hingga 2021, pra-pemprosesan menggunakan pelbagai kaedah, dan analisis imej pra-pemprosesan dalam CBIR dengan kombinasi jalur RGB yang berbeza untuk memantau perubahan bakau. Fasa ketiga memberi tumpuan kepada pengesahan model untuk memantau perubahan bakau di Semenanjung Malaysia. Analisis prestasi digunakan untuk mengenal pasti kombinasi jalur RGB optimum dan membandingkan algoritma pengkelasan untuk hasil terbaik.

EMOTICARE: AN EMOTIONAL INTELLIGENCE APP TOWARDS A NEW-GEN DIGITAL COUNSELLING EXPERIENCE

INVENTOR	Ts. Dr. Nur Diyana Kamarudin
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Aida Jaffar, Muhammad Alif Ikhwan Zainuddin, Fatin Nur Syafieka Roslan
CORRESPONDING E-MAIL	nurdiyana@upnm.edu.my

Abstract

EmotiCare, an innovative Emotional Intelligence App, is meticulously designed to assist students in recognizing and addressing mental health challenges. This pioneering mobile and web application encourages student engagement with mental health assessments, prompting timely professional intervention for those with severe or extremely severe depression to prevent further decline. Through a comprehensive two-phase digital assessment process encompassing pre-test and post-test evaluations, students establish baseline levels of stress, anxiety, and depression, while gauging improvements in emotional well-being. Administrators gain secure access to student data via this app, ensuring efficient data management and privacy through MySQL and XAMPP databases. During the field test, the UPNM Counseling Center receives a prototype of EmotiCare, empowering counselors to interact effectively with students facing mental health concerns. EmotiCare signifies a groundbreaking advancement toward a new-generation digital counseling experience at schools and universities, addressing immediate mental health needs while fostering an environment of emotional intelligence and overall well-being. This integration of technology and mental health support aligns seamlessly with the evolving landscape of digital solutions, aiming to cultivate a resilient and emotionally intelligent student community at schools and universities.

IMPROVING THE EFFICIENCY AND ACCURACY OF DIGITAL FORENSICS INVESTIGATIONS WITH MULTI-CRITERIA DECISION MAKING: A FOCUS ON FILE CARVING TOOL SELECTION

INVENTOR	Ms. Nor Ika Shahirah binti Ramli
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Malaysia Sarawak
CO-INVENTOR	Dr. Syifak Izhar Hisham
CORRESPONDING E-MAIL	rnishahirah@unimas.my

Abstract

In response to the pervasive challenge of inefficient tool selection in digital forensic investigations, an innovative solution emerges – the Framework for Selection of Digital Forensic Tools (File Carving Tool). Seamlessly integrating Multi-Criteria Decision Making (MCDM),Analytical Hierarchy Process (AHP), this framework addresses the critical issues of time-intensive processes, jeopardized data quality, and prolonged investigations. Focused on enhancing overall investigation efficiency and accuracy, the framework's primary objective is to introduce a systematic approach to tool selection in the digital forensic landscape. Unveiling a unique blend of performance analysis and AHP, this innovation goes beyond file carving tools, showcasing adaptability to various digital forensic tools, thus setting a new industry standard for meticulous decision-making. With its comprehensive application of MCDM, the framework overcomes current challenges in digital forensic investigations by ensuring the systematic selection of the most relevant tools based on predefined criteria. Trials and case studies affirm the success of the Tool Selection Framework, demonstrating its efficacy in law enforcement, legal firms, IT security, and corporate investigations. The framework's versatility and standardized approach contribute significantly to improving investigation precision, speed, and reliability, marking a transformative milestone in the digital forensic field. It is not only a technical advancement but also aligns with sustainability goals, reducing investigation timeframes and costs, thereby fostering resource efficiency in digital forensic practices. Committed to ongoing development, the framework's future roadmap includes updates, additional features, and expansion into new areas, ensuring its continued relevance and leadership in digital forensic innovation. With its far-reaching impact on investigations, organizations, and the sustainability of the field, this product stands as a beacon of transformation, poised to elevate digital forensic practices to new heights.

MODEL HIGH-FIVE KEPWA

INVENTOR	Dr. Amnah Saayah Binti Ismail
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Nurhana binti Mohamad Rafiuddin, Dr. Siti Nurhafizah Saleeza binti Ramlee, Dr. Nor Nazimi binti Mohd Mustaffa, Ku Mohamad Asyraf bin Ku Mustafa, Nur Irdina binti Abdullah
CORRESPONDING E-MAIL	nurhana@upnm.edu.my

Abstract

Penglibatan wanita dalam kepimpinan ketenteraan telah terbukti sejak awal lagi. Ramai tokoh-tokoh wanita dalam sejarah ketenteraan telah dibuktikan dalam pelbagai penulisan. Penglibatan mereka dalam pentadbiran dan kepimpinan membolehkan segala perancangan dan perencanaan seperti kaedah dan strategi peperangan dengan baik selain peranan mereka di sebalik tabir. Sejarah membuktikan peranan wanita sebagai penguat semangat, perawat dan pembantu dalam tugas-tugas khas yang amat cemerlang dan berkesan. Pada hari ini, evolusi peranan wanita dalam jawatan kepimpinan di organisasi ketenteraan telah mengalami perubahan ketara dalam kerangka kompleks. Peranan kepimpinan wanita dalam bidang professional di organisasi ketenteraan dilihat sering menghadapi cabaran dan halangan kerana secara tradisionalnya ia didominasi oleh lelaki. Justeru itu, tumpuan berterusan bagi kepentingan memaksimumkan kebolehan kepimpinan anggota wanita memerlukan satu model khas berkaitan kepimpinan wanita dalam bidang ketenteraan. Satu inovasi model yang dikenali sebagai Model High-Five KEPWA telah digubah dan kajian rintis telah dijalankan bagi memperkasakan model ini. Inovasi ini diharap dapat digunakan untuk membangunkan strategi yang berkesan dalam merekrut dan mengekalkan wanita di bidang ketenteraan.

SMART DISTRIBUTION SYSTEM OF STUDENT'S LECTURE GROUP FOR PUSAT ASASI PERTAHANAN UPNM

INVENTOR	Assoc. Prof. Dr. Ummul Fahri Binti Abdul Rauf
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Muhammad Dani Darwisy Bin Azrol, Assoc. Prof. Dr Zuraini Binti Zainol
CORRESPONDING E-MAIL	ummul@upnm.edu.my

Abstract

Sistem Agihan Pintar Kumpulan Kuliah Pelajar di Pusat Asasi Pertahanan UPNM merupakan satu sistem yang berasaskan web yang dapat membahagikan pelajar kepada kumpulan kuliah kecil mengikut prestasi pelajar dan bilangan kaum secara seimbang. Sistem ini membantu pihak pentadbir untuk melakukan proses pengagihan pelajar dengan lebih cepat, cekap dan jitu di samping membenarkan pentadbir memproses dan menganalisis data dengan jumlah yang banyak dan membentangkan hasil dalam bentuk visual yang menarik. Sistem ini juga mengawal data yang boleh dicapai oleh pengguna mengikut peranan masing-masing dan menjanjikan integriti data yang tinggi. Sistem ini menggunakan MySQL sebagai pangkalan data untuk menyimpan dan merekod data dalam sistem. Dengan adanya sistem ini, diharapkan segala masalah yang dihadapi dapat ditangani dengan lebih mudah.

THE ELEVATE PROGRAM: MENTAL HEALTH AND WELL-BEING EMPOWERMENT FOR WOMEN IN NEED

INVENTOR	Dr. Sarah Iziani Ramli
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Asma Assa'edah binti Mahmud, Dr. Rosnadia binti Suain Bon, Dr. Fatimah Zahra Mohamad Rom, Dr. Azura Sharena binti Yahya, Dr. Aida binti Jaafar, Assoc. Prof. Dr. Mohd Fahmi bin Lukman
CORRESPONDING E-MAIL	sarahiziani@upnm.edu.my

Abstract

The ELEVATE Program is a comprehensive community module designed to create awareness on mental health, women health and hygiene, as well as empowerment to underprivileged women. The program aiming to provide education on hands-on coping methods, resilience building, introduction to resources hub for access to mental health resources and helplines.

The module begins with an in-depth needs assessment to tailor interventions to the participants' specific circumstances, considering cultural and socio-economic factors influencing mental health. The first workshop is divided into multiple group activity with individual guidance stations with unique focuses and intervention. The ambient of each station are constructed as such to create a positive ground for the participants to share experiences and ventilate their related issues. The goal of the first workshop is also to foster peer support network as the participants are encouraged to spread their knowledge gained from the workshop to the others.

In the second workshop, the aim is to evaluate the outcome of the first phase of the program. In a group activity, the participants are to provide feedback on the impact of the first workshop to themselves, their families, and their peers' well-being. This is very valuable to ensure continuous improvement of this program. In the future, the team will introduce new module focusing on substance-misuse related mental issue.

The ELEVATE Program strives to empower underprivileged women by addressing their emotional, psychological, coping mechanism, drive to help self and other, and creating a supportive community for lasting change. The beauty of this community enrichment module that it's not only covers various aspects of physical and mental health education via hands-on activities, but it also offers free basic medical check-up and health consultation by the specialist in the respective fields.

MyTraining Siber: A VIRTUAL LEARNING PLATFORM FOR CYBER SECURITY EDUCATION

INVENTOR	Assoc. Prof. Mohd Hazali bin Mohamed Halip
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Arniyati binti Ahmad, Afiqah binti Mohammad Azahari
CORRESPONDING E-MAIL	hazali@upnm.edu.my

Abstract

The MyTraining Siber is a platform designed for cyber security education. It is a server-based system that offers users a virtual learning and teaching environment for trainers and learners. The MyTraining Siber platform offers an interactive user interface for cybersecurity training that includes user management and comprehensive training libraries. Administrators and trainers can add new content across categories, create and edit training modules and develop the entire courses. Additionally, features such as searching for specific trainings and saving the preferred order of modules enhance the learning experience. The system is developed with Python scripts for its server-side components to enable the management of virtual machines which include installing, running and shutting down virtual machines. This system facilitates hands-on learning experiences in cyber security, providing an interactive environment for users to explore various security concepts and practices. This innovative approach creates an engaging learning environment which enable users to participate in hands-on exercises while enhancing their practical skills that are essential for cyber security.

HARMONY CIPHER

INVENTOR	Ts. Dr. Syarifah Bahiyah Rahayu
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Muhammad Farok Mohd Sultan, Muhammad Ashraff Farhan Kamaruzzaman, Muhammad Kamarul Ihsan Wirazimi, Pratosh A/L Kannadasan, Thinesh Gaundar A/L Raja Ratnam
CORRESPONDING E-MAIL	syarifahbahiyah@upnm.edu.my

Abstract

Harmony Cipher, where musical nodes and decryption techniques to decrypt the code of the songs. In a dystopian future when the sounds of songs have been played by input the code that related to the each songs. Equipped with cards that hold encrypted codes, each representing a fragment of a top-secret song, Crack the codes, expose the notes. The code that need to encrypt very related or similar to each songs such as the punchline of the songs, the lyrics of the songs, and or words that familiar in the songs of the movie. Harmony Cipher skillfully combines the thrill of cryptography with the delight of deciphering a musical masterpiece. Each note that is decoded puts the player one step closer to the symphony. The Harmony Cipher innovatively merges the worlds of cryptography and music, offering players a unique and immersive gaming experience The game features a dynamic puzzle generation system that ensures each gameplay session is unique and challenging. By utilizing algorithms to generate encrypted fragments of songs in real-time.

NOBLE CRYPTOGRAPHY QUEST : THE PRINCE'S RESCUE

INVENTOR	Ts. Dr. Syarifah Bahiyah Rahayu
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Siti Farrah binti Mohd Arshad, Nurul Iffah Nabilah binti Ishak, Muhammad Hasif bin Khairul Anuar, Nurhaneesya binti Mohd Noh, Muhammad Shahrul Hafiz bin Shahrulizan
CORRESPONDING E-MAIL	syarifahbahiyah@upnm.edu.my

Abstract

Embark on a thrilling adventure in "Noble Cryptography Quest : The Prince's Rescue," an engaging 2D game set in a magical fantasy world. Players take on the role of a courageous hero tasked with rescuing Princess Annesaa from the clutches of the sinister Gorgon. Created using the user-friendly RPG Maker MV, the game is accessible to both experienced and novice players. What sets this game apart is its unique approach to education, introducing players to the fascinating realms of cryptography concept in a playful and interactive manner. Throughout the game, players must encrypt and decrypt codes to advance, with each successfully completed mission earning valuable coins. These coins can then be used to acquire powerful weapons, sturdy armor, and potent potions, enhancing the overall gaming experience. Prepare for an immersive journey filled with challenges, discovery, and the excitement of mastering cryptography skills.

ThMJ

INVENTOR	Mrs. Fatin Amirah binti Ahmad Shukri
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Nurulhuda binti A. Manaf, Nabilah Fikriah binti Rahin, Dr. Nur Amalina binti Jamaludin, Dr. Mohd Faisal bin Saari
CORRESPONDING E-MAIL	fatin@upnm.edu.my

Abstract

Learning mathematics, especially topics like trigonometric functions, can be quite dense with formulas and identities. Therefore, it is a bit challenging for students to acquire, and they may lose interest in these topics. However, when students enter university level, they have no choice but to apply these concepts in various engineering and science fields. Introducing the "ThMJ" board game, which stands for TRIGON-HEXA MAGIC JOURNEY, can be a useful and effective way to make the subject more accessible. The game incorporates the concepts of trigonometric functions in a magic hexagon, representing a jungle-hunt like treasure to be explored. Players are tasked with applying basic trigonometry at the starting point (entrance) to proceed to various challenges in a jungle. These challenges require the application of trigonometric identities and ratios to determine the missing values in the inscriptions. Correctly solving this identity puzzle will unlock the entrance to various destinations in the dense jungle, revealing hidden treasures within, with the ultimate goal of reaching the final destination, the ancient cave, to collect valuable artifacts. This challenge combines the excitement of a jungle treasure hunt with trigonometric identities, encouraging players to apply their knowledge and critical thinking skills to access the treasure. The game is designed for students, teachers, lecturers, and anyone interested in learning or practicing trigonometry in an entertaining way. It is suitable for both beginners and those with prior trigonometry knowledge. By combining entertainment with learning, the ThMJ board game provides an innovative and effective way to teach and reinforce trigonometric knowledge in an engaging and memorable manner.

THE INNOVATION OF DIGITAL PARALLEL RULER (DPR) FOR MAP PLOTTING

INVENTOR	Lt Kdr Ts. Dr. TLDM (Bersara) Mohd Azzeri bin Md Naiem
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Amirrul Faiz bin Asma Latif, Lt Ts. Mohamad Azrin bin Abd Azis TLDM (B)
CORRESPONDING E-MAIL	azzeri@upnm.edu.my

Abstract

A Parallel Ruler is a drafting instrumental used in technical and drafting in navigation consists of two straightedges or rulers that are hinged or joined together at one end. This project is about the innovation of the parallel ruler that improvise to make them easy to use, carries and multifunction. The purpose of Digital Parallel Ruler (DPR) design to create a portable measurement tool that able to calculate the distance and angle from one point to another by using a sensor to get reading of the object distance and angle for map plotting.

BEESWRAPPER ALTERNATIVE FOR A GREENER SOLUTION

INVENTOR	Vlasaerra Madin, Max Goh, Edlewise Lovender Lawrine
RESEARCH FIELD	Food Safety and Security
INSTITUTION	Smart College
CO-INVENTOR	Zuailline binti Arian
CORRESPONDING E-MAIL	zuailline@smartcollege.edu.my

Abstract

Introduction: As the number of human population increases the consumption of food and food waste also increases. The total current population in Malaysia of 34 million (Malaysia Population (2024) - Worldometer, n.d.). Increased rate of food consumption and food waste means the world also faces the challenges in ensuring that all people are equally getting the same nutritious, safe and adequate number of food. (Garcia et al., 2020). Another challenge is food spoilage and innovative ways of food preservation are in need. Tomato is a fruit that is consumed globally due to the nutrition that comes with it ((Khalid et al., 2024). However, due to the moisture that the fruit has, tomatoes have a shorter shelf life compared to other fruits. Plastic wrap is being discouraged as more environmentally friendly alternatives can be chosen. Although plastic wrap can add to the shelf life of a product by avoiding the products from oxidation, options that are recyclable should be chosen in order to support the effort to reduce non-degradable products. Beeswax as a wrapper is a safer alternative as the beeswax has proven to be as effective with anti-microbial properties (T. Pinto et al., 2017). Aloe vera is also another material that has been proven to increase the duration of shelf life of a fruit. Objective: To produce an alternative food plastic wrapper Method: Therefore, a mixture of aloe vera and beeswax will be used to form a wax which will be spread on a piece of cloth so that it can be recycled.Whole tomato fruits were wrapped with the beeswax wrapper and monitored for physical changes everyday for a week. Controls were included. Conclusion: Beeswax wrapper was able to increase the shelf life of tomatoes whilst being a greener alternative.

SMART PARENT VISITING SYSTEM (SPVS)

INVENTOR	Sathyaaruban A/L Devaraj
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Hassan Mohamed, Ts. Suresh a/l Thanakodi, Muhammad Iqbal Daniel bin Arywan, Muhammad Irfan bin Mohd Raffi
CORRESPONDING E-MAIL	hassan@upnm.edu.my

Abstract

The development of Smart Parent Visiting System (SPVS) is mainly to facilitate the management to approve and record the details of visiting activity of parent or relatives. The concept of this system can be used at any institutions who has students living at their hostel in campus. In our case, we use UPNM to prove the concept. This mobile application is developed for issuing the pass identification of parent of UPNM's students to ease security personnel at the UPNM entrance gate. Before the visitors come to the campus, they can do preregistration as an application to enter the campus. Once they have registered, the application will be screened and approved by a dedicated personnel. The applicant will receive an email notification with a generated QR-code is attached. This code will be scanned by the Guard/Security Personnel at the entrance gate to record the visit. Therefore, with this innovative smart system, it reduces the time for the Security Personnel to record the data instead of current manual practices and the obtained data is more reliable and enhances the data traceability as data is being recorded digitally by the system.

LEVERAGING NFC TECHNOLOGY FOR STUDENT IN AND OUT FROM CAMPUS

INVENTOR	Muhammad Irfan bin Mohd Raffi
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Hassan bin Mohamed, Ts. Suresh A/L Thanakodi, Muhammad Iqbal Daniel bin Arywan, Sathyaaruban A/L Devaraj
CORRESPONDING E-MAIL	hassan@upnm.edu.my

Abstract

The current campus entry and exit system employed at UPNM is deemed inefficient. Students encounter difficulty in manually storing information to record their movements in and out from the campus. This innovation aims to solve the problem by recording student movements of campus' entry and exit by leveraging with the Near Field Communication (NFC) technology. The concept of this system is to show a prototype system that can effortlessly record the student's entry and exit from the campus using the NFC features. The prototype can be run on Android OS that ease the user to use through the respective mobile phones. Therefore, with this innovative system, it reduces the time for the students to record the data instead of current manual practices and the obtained data is more reliable and enhances the data traceability as data is being recorded digitally by the system.

MCLCK GAME (MALAYSIA: CRYPTO LANGUAGE CULTURE KIT GAME)

INVENTOR	Dr. Nur Aisyah Abdul Fataf
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Suresh Thanakodi, Azuraini Mohd Arif, Fatin Amirah Ahmad Shukri, Mohd Syazwan Mohamad Anuar, Chanita a/p Cham Nan, Kavitha a/p Selvakumar
CORRESPONDING E-MAIL	n.aisyah@upnm.edu.my

Abstract

The MCLCK (Malaysia: Crypto Language Culture Kit Game) integrates elements of language, culture, and STEM knowledge into a single game centred around cryptography. In the first stage of the game, players are presented with questions about historical sites, tourist attractions, traditional foods, and traditional games based on Malaysian's environment. These questions contain encrypted words that players need to decrypt to understand the complete sentences. Proceeding then to the second stage, players choose cards with pictures based on the respective answers from the first stage. Next, players are given riddles related to colours, specifically colours of the Malaysian flag: Red, White, Blue, and Yellow. After answering the colour-related riddle, players then must select cards based on the respective answer. Following this, players answer science-related questions covering blood groups, plants, animals, and energy sources. In the final stage, players need to answer math-related questions encompassing algebra, sequences, probability, and angles. The main objective of the game is to develop players' knowledge of cryptography while simultaneously instilling Malaysian values in the students aged 13 years old and above. The authors believe the developed MCLCK kit game using gamification techniques are packed with hands-on fun in which the students will learn STEM related topics with cultural and Malay language in an exciting new way.

NON-DESTRUCTIVE TESTING OF ROCKETS USING DIGITAL RADIOGRAPHY METHODS

INVENTOR	Mohd Moesli bin Muhammad
RESEARCH FIELD	Frontier, Defence Technology and Defence Infrastructure
INSTITUTION	Institut Penyelidikan Sains & Teknologi Pertahanan (STRIDE)
CO-INVENTOR	Azmi bin Minal, Muhammad Ariffin bin Ares, Ts. Muhammad IIzzamir Firdaus bin Idris, Fikri bin Abdul Rasih, Mohd Zaidi bin Ismail, Ahmad Subardi bin Mohd Wazir, Husni Nizad bin Mahamud
CORRESPONDING E-MAIL	moesli.muhammad@stride.gov.my

Abstract

In military engineering, ensuring the integrity and functionality of rocket components is crucial. Traditional inspection methods, necessitating disassembly and manual intervention, not only demand extensive labor but also pose risks of damaging systems and igniting explosive materials. Advanced Digital Radiography (ADR) technology emerges as a groundbreaking solution in the non-destructive evaluation of military rockets. ADR facilitates real-time, high-resolution imaging directly at the inspection site without physical contact or disassembly, significantly mitigating the risk of explosions inherent in conventional methods.

This paper expounds on ADR's principles, showcasing its advantages in speed, efficiency, and image quality over traditional inspections. The critical nature of rapid anomaly detection in military rockets to maintain operational readiness and ensure safety is emphasized, highlighting the indispensability of ADR's non-invasive approach for regular, risk-averse inspections.

Empirical analysis and comparative studies validate ADR's capability to identify defects within rocket components effectively, reinforcing its role in preventive maintenance and safety enhancement. Its adaptability for on-site inspections allows for immediate, informed decision-making, reducing downtime and improving hardware reliability.

In sum, integrating ADR into military maintenance protocols signifies a pivotal advancement in non-destructive testing. By delivering instant, detailed images without direct interaction or the threat of explosions, ADR stands as an essential instrument for technological innovation, strategic readiness, and enhanced safety.

POWERPULSE: SMART ELECTRICAL DISTRIBUTION BOARD

INVENTOR	Ja'afar Bin Adnan
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Muhammad Izzat Farhan bin Ibrahim, Prof. Dr. Mohd Taufiq bin Ishak, Assoc. Prof. Dr. Fakroul Ridzuan bin Hashim
CORRESPONDING E-MAIL	jaafar@upnm.edu.my

Abstract

Smart distribution boards, in contrast to traditional ones, showcase a paradigm shift in electrical infrastructure. It is equipped with advanced features such as smart monitoring, remote control, reporting functions, and enhanced safety mechanisms. They offer improved efficiency and convenience. Traditional distribution boards, in contrast, lack the digital intelligence and versatility to adapt to the dynamic demands of today's electrical grids. The smart distribution board, often integrated with IoT technology, provides real-time data, allowing for proactive maintenance and energy management, making it an essential component in the evolution of electrical systems. PowerPulse: This name suggests a constant monitoring of power.

SMALL-SCALE HYBRID WIND-SOLAR RENEWABLE ENERGY SYSTEMS

INVENTOR	Baizura Bohari
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Raja Ejjy Raja Akhmar, Assoc. Prof. Dr. Leong Kin Yuen, Lt. Kdr. Dr. Norzaima Nordin, Dr. Siti Noormiza Makhtar, Assoc. Prof. Ir. Ts. Dr Mohd Rashdan Saad
CORRESPONDING E-MAIL	baizura@upnm.edu.my

Abstract

The research aims to determine the most effective combination of wind and solar conditions for generating hybrid wind-solar energy at UPNM. Additionally, it analyzes the performance of a small-scale off-grid wind-solar hybrid renewable energy system (HRES) prototype to meet localized energy needs. This hybrid system comprises a Savonius Vertical Axis Wind Turbine (VAWT), a solar panel, and a pulse-width modulation (PWM) charge controller, which channels generated power into a 12V DC battery for storage. Feasibility studies for wind and solar power generation are conducted at various locations on campus, with the football field identified as the optimal site satisfying both renewable sources. The HRES prototype is tested at this location, with power analysis conducted to meet localized energy requirements. Findings demonstrate that the HRES can generate up to 50 W of rated power under optimal conditions, and a minimum of 5.08 W, facilitating simultaneous charging of multiple mobile devices while mitigating the limitations of standalone renewable energy systems through improved energy generation in a hybrid setup.

DOUSE FIRE 2.0

INVENTOR	Ir Suriyadi Sojipto
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Ir. Ts. Dr. Mohd Rashdan Saad, Assoc. Prof. Ir. Dr. Mohd Rosdzimin Abdul Rahman, Muhammad Taufiq Jumahadi, Ir. Ts. Dr. Siti Khadijah Che Osmi, Ts. Dr. Noor Aina Misnon, Muhammad Zuhairi Mohd Aliashak, Nor Muhammad Azman Sujani, Junaidi Asiran
CORRESPONDING E-MAIL	suriyadi@upnm.edu.my

Abstract

Peat fire is a type of wildfire that occurs in peatlands, which are wetlands characterised by the accumulation of partially decayed vegetation. Peat fires can burn underground for long periods of time and be difficult to extinguish. They can release large amounts of smoke and carbon dioxide, significantly impacting the environment and human health. One technique that can be used to extinguish peat fires is the use of liquid carbon dioxide (CO_2). CO_2 is a highly effective fire suppressant because it is non-toxic, does not leave any residue, and can be used to suffocate the fire by reducing the oxygen supply. The liquid CO_2 is injected into the burning peat through special nozzles. It quickly turns into a gas upon contact with the heat of the fire, which smothers the fire by cutting off its oxygen supply. It was found that the rapid expansion of CO_2-based technology effectively extinguished underground peat fires, and CO_2 is also a good option for peat fires as it is not harmful to the soil, the water table, or the surrounding environment.

IMPLEMENTATION OF REAL TIME SMART HOME AUTOMATION AND MONITORING USING IOT BASED SENSING AND FPGA

INVENTOR	Dr. Anis Shahida Mokhtar
RESEARCH FIELD	Industrial Revolution 4.0/Cyber Security/Data Analytic/Artificial Intelligent
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Nur Balqis binti Mahasan, Dr. Chew Sue Ping, Assoc. Prof. Dr. Taufik Jusoh
CORRESPONDING E-MAIL	anis.@upnm.edu.my

Abstract

With the rapid growth of technology and the growing popularity of smart homes, it is critical to implement solid security measures. This paper presents an approach to enhance home protection by designing and implementing a Smart Home Security Access System using FPGA. The proposed systems incorporate a range of security elements to ensure household safety such as user authentication, access control and using variety of sensors. Smart home security access systems provide enhanced security solutions to address issues such as theft, intrusion, gas leakage and potential fire incidents. Consequently, this project aims to design and construct a smart system the incorporates a digital security entry for automatic door locking. The systems feature a magnetic door lock system at the entrance, PIR motion sensor to detect irregular movement, temperature sensor to measure high temperature within the house as well as gas sensor to detect the presence and concentration of hazardous gases and vapors. These sensors are connected through Arduino Uno and transmit through analog signals to DE-115 FPGA Board. The process data is then displayed on LED at FPGA and Seven Segment Display as an indication status of the password entered and the condition of the sensors.

INDUSTRIAL VIBRATION ALERT SYSTEM USER MANUAL

INVENTOR	Dr. Elya binti Mohd Nor
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	-
CORRESPONDING E-MAIL	elya@upnm.edu.my

Abstract

This User Manual i-VAS provides a detailed guide with necessary links that can assist the engineers, technicians, and researchers in building the tool in a shorter time. The i-VAS tool comprises using Arduino and ADXL345 sensor and an Xbee wireless communication module. The tool also gives step-by-step on data management and developing the alert system upon data acquisition.

SHEAR PERFORMANCE OF YELLOW MERANTI SOLID TIMBER BEAM STRENGTHENED USING FIBRE REINFORCED POLYMER

INVENTOR	Dr. Nor Izzah binti Mokhtar
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Ts. Dr. Shukur Abu Hassan
CORRESPONDING E-MAIL	norizzah@upnm.edu.my

Abstract

The use of softwood timber in construction is a growing area of interest due to its potential environmental benefits. However, Yellow Meranti timber has relatively lower shear strength than other softwood species due to its shorter fibre length and larger pores. As a result, it suffers lower fibre strength, more brittle and lower load carrying capacity. The recent study was carried out by strengthening Yellow Meranti with glass laminate Fibre Reinforced Polymer (GFRP) using Sikadur-330 as bonding agents and for laminating to improve the shear performance of Yellow Meranti beam. Thirty-six beams were tested under four-point loading up to failure. The results showed that all the strengthened beams performed better than the control beam in terms of ultimate load, shear strength, stiffness and ductility. The performance enhancement by FRP to timber beam for load carrying capacity and shear capacity ranged from 11.0% to 41.0%, while for stiffness; the range was 26.61% to 62.05%. The ductility index for strengthened beams ranged between 2.0 to 3.7 and 3.7 to 8.4 based on deflection and energy method respectively. The optimum number of FRP is 5 strips. The optimum wrapping schemes were fully wrapped (FW) with the addition of FRP overlapping at the bottom of the beam. Strengthening at the shear zone of the beam could change the mode of failure from shear failure to a combination of compression and tensile fracture with no shear failure at the shear zone. In conclusion, the shear performance of solid beam of Yellow Meranti timber was successfully improved by external strengthening using FRP, where the optimum design parameter for shear strengthening was proposed.

UNVEILING TACIT KNOWLEDGE AND CULTURAL INSIGHTS: EMPOWERING MALAYSIAN MILITARY OBSERVERS' SITUATIONAL AWARENESS

INVENTOR	Dr. Wan Su Emi Yusnita binti Wan Yusof
RESEARCH FIELD	National Security
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Lt Col Assoc. Prof. Dr. S. Ananthan, Dr. Nur Haffiza Rahaman
CORRESPONDING E-MAIL	wansuemi@upnm.edu.my

Abstract

In the field of peacekeeping, there exists a vast reservoir of tacit knowledge regarding situational awareness that remains largely untapped. This issue gains even greater significance as military observers conclude their service, carrying with them invaluable insights that are at risk of being lost during transitions. The necessity for a structured approach to extract and formalize this tacit knowledge, along with cultural insights, into a user requirements handbook becomes increasingly evident. This study utilizes a methodology that combines the Nonaka and Endsley models, providing a robust framework for our research. This hybrid approach facilitates the systematic collection and transformation of relevant tacit knowledge and cultural insights into a meticulously documented user requirements handbook. This paper presents the development of an essential user requirements handbook tailored for Malaysian military observers, intending to enhance their knowledge through shared situational awareness, tacit knowledge, and cultural insights.

E-HAPPINESS : SISTEM PENGUKURAN INDEKS KEGEMBIRAAN STAF UPNM

INVENTOR	Dr. Norzaura binti Abd Rahman
RESEARCH FIELD	Education, Community Development and Social Science
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Dr. Ummul Fahri bin Abdul Rauf, Assoc. Prof. Dr. Zuraini binti Zainol, Prof. Dr. Hasan Al Banna bin Mohamed, Nurhanim Hanani binti Mohammad
CORRESPONDING E-MAIL	norzaura@upnm.edu.my

Abstract

Dalam menghadapi cabaran arus madani yang canggih, kebimbangan terhadap kesihatan mental di kalangan pekerja semakin meningkat, khususnya di Malaysia. Statistik menunjukkan peningkatan kes bunuh diri dan masalah kesihatan mental di kalangan pekerja, khususnya golongan pekerja berumur 27 hingga 44 tahun. Universiti Pertahanan Nasional Malaysia (UPNM) tidak terkecuali dari kemungkinan ancaman isu ini, terutamanya dengan kebanyakan staf dan pensyarah dari generasi Y. Oleh itu, sistem pemantauan indeks kegembiraan staf di UPNM dibangunkan sebagai solusi untuk mengukur dan memantau kegembiraan serta kesejahteraan mental mereka. Sistem ini bertujuan untuk membentuk persekitaran kerja yang positif dengan memanfaatkan konsep Gross National Happiness (GNH). Melalui soalan-soalan yang merangkumi pelbagai aspek seperti persekitaran kerja, hubungan organisasi, kepuasan fasiliti, pembangunan kerjaya, dan kesihatan mental, sistem ini memberikan gambaran holistik terhadap kegembiraan staf. Pendekatan ini dapat membantu pihak atasan mengenal pasti masalah dan mengambil tindakan sewajarnya. Dengan menggunakan bahasa pengaturcaraan PHP dan pangkalan data MySQL, sistem ini membolehkan staf mengisi penilaian dan melihat hasil indeks kegembiraan mereka. Keputusan ini dapat membantu pihak atasan dalam membuat keputusan yang bermakna untuk meningkatkan kesejahteraan staf. Kesimpulannya, sistem ini merupakan langkah proaktif untuk menjaga kesejahteraan mental pekerja di UPNM, dengan harapan dapat memberikan sumbangan positif terhadap pembinaan persekitaran kerja yang seimbang dan berdaya maju.

IMPROVEMENT IN STRENGTH PROPERTIES OF SUBGRADE SOIL USING BAMBOO FIBER

INVENTOR	Dr. Mohd Nazrin bin Mohd Daud
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Ihsan Pang bin Mohd Zaki Pang, Wan Muhamad Nabil bin Wan Mohd Zamri
CORRESPONDING E-MAIL	nazrin@upnm.edu.my

Abstract

Granitic residual soil (GRS) is a common type of soil which makes up about 75% of Malaysia's total land area. It plays a significant role in construction of engineering project including highway, embankment, slope and foundation. However, the properties of soil could be affected by various deteriorating factors and gradation due to exposure to tropical climate that subsequently degrade its strength characteristics. Currently, there are many of research regarding the use of eco-friendly material for sustainable application in engineering project includes the use of renewable material such as natural fibers. Natural fiber particularly bamboo due to it tensile strength, stability and durability commonly being explored like others natural fibers such as banana fiber, seed flax and kenaf as alternative binder in soil stabilization. In this study, the strength properties of treated subgrade soil have been carried out by adding designated proportions of bamboo fiber of Gigantochloa scortechinii (buluh semantan) species into the mixture with dehydrated lime as binding agent. This study was primarily aimed to determine the unconfined strength (UCS) of lime-treated granitic residual soil using bamboo fiber with design proportion used in this study was 0%, 1% and 3% while, length of bamboo fibers vary from 10mm to 30 mm. The results revealed that untreated GRS exhibited an initial strength increase of 35% after treatment and followed by a 17% increase after 7 curing day.

MUNSHI (MULTI-LINGUAL HIGH INTEGERS) MOBILE APP GENERATOR AND TRANSLATOR

INVENTOR	Assoc. Prof. Dr. Syahaneim binti Marzukhi
RESEARCH FIELD	Science, Technology, Engineering and Mathematics Education (STEM)
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Assoc. Prof. Syed Nasir Alsagoff, Dr Nor Fatimah Awang
CORRESPONDING E-MAIL	syahaneim@upnm.edu.my

Abstract

This product is a new model for the translation of high integers from numerical representations to words across multiple languages. The model combines the Conway chained arrow notation with the power of neural machine translation, offering a comprehensive solution to the challenges inherent in multi-unilingual numerical language conversion. The integration of Conway chained arrow notation provides an expressive means of representing high integers, enhancing both computational efficiency and user comprehension. This mathematical notation, known for its conciseness, is seamlessly incorporated into the translation process, allowing for the precise encoding and decoding of large numerical values. Through training on multilingual datasets, the model learns to navigate grammatical structures, numeral systems, and linguistic nuances, ensuring accurate and contextually relevant translations across a spectrum of languages. Key features of the model include its innovative approach to bridging the gap between mathematical notation and natural language, facilitating a more intuitive understanding of high integers. The synergistic collaboration between mathematical symbolism and artificial intelligence techniques results in a versatile tool applicable to various domains, such as finance, scientific research, and cross-cultural communication. Preliminary evaluations demonstrate the model's proficiency in handling numerical language conversion tasks, showcasing its potential for real-world applications.

IOT BASED FLOOD MONITORING AND NOTIFICATION SYSTEM

INVENTOR	Assoc. Prof. Dr. Syahaneim Binti Marzukhi
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Pertahanan Nasional Malaysia
CO-INVENTOR	Dr. Nor Fatimah Awang, Assoc. Prof. Syed Nasir Alsagoff
CORRESPONDING E-MAIL	syahaneim@upnm.edu.my

Abstract

In Malaysia, floods are the natural disasters that happen every year during the monsoon season from November until January. This flood caused serious damage to houses, roads, businesses, public facilities and even killed people. Though many steps have been taken by the government in order to prevent these incidents, but it seems went unsolved. Here, the IOT Based Flood Monitoring and Notification System is proposed in helping to monitor and manage this critical situation by providing crucial information (i.e. flood conditions, plan and preparation, and many others) to the public and the local authorities at the affected area. The system is able to measure the water level and alert the public and the local authorities by sending a notification regarding the flood conditions. Furthermore, the system enables the public and the local authorities to see the live graph data of the water level using the system.

PERCEPTIONS AND ACCEPTANCE OF JeliXBee GUMMIES MADE FROM STINGLESS BEE HONEY: IMPLICATIONS FOR HEALTHY SNACK INNOVATION

INVENTOR	Dr. Zubaidah Aimi binti Abdul Hamid
RESEARCH FIELD	Medical and Healthcare
INSTITUTION	Universiti Malaysia Kelantan
CO-INVENTOR	Dr. Nur Nabilah binti Shahidan, Assoc. Prof. Ts. Dr. Sitti Fatimah binti Mhd. Ramle, Dr. Rosmawani binti Mohammad, Ts. Dr. Mardawani binti Mohamad
CORRESPONDING E-MAIL	zubaidahaimi.ah@umk.edu.my

Abstract

This research investigates consumer perceptions and acceptance of JeliXBee gummies made from stingless bee honey, a novel snack aimed at combining the health benefits of stingless bee honey with the popular gummy candy format. Stingless bee honey is distinguished by its unique nutritional profile, including higher antioxidant levels and medicinal properties compared to honey from conventional honeybees. The study employed a mixed-methods approach, integrating surveys and focus groups to collect data on consumer attitudes, taste preferences, and willingness to purchase these innovative gummies. Participants were selected from diverse demographic backgrounds to gauge a broad spectrum of consumer responses. The analysis revealed a high level of interest in healthier snack alternatives, with many respondents indicating a preference for snacks that offer additional health benefits beyond basic nutrition. The JeliXBee gummies made from stingless bee honey were particularly well-received among consumers looking for natural, low-sugar options without sacrificing taste. Key factors influencing acceptance included the gummies' flavor, perceived health benefits, and the novelty of using stingless bee honey as a primary ingredient. The study highlights significant potential for the incorporation of stingless bee honey into mainstream snack products, suggesting that consumer education on its health benefits could further enhance market acceptance. The findings contribute to the understanding of consumer behavior regarding innovative health-oriented snacks and offer valuable insights for food product developers and marketers aiming to meet the growing demand for healthier snacking options.

PRODUCTION OF CITRUS HYSTRIX DISHWASHING SOAP WITH PLANT EXTRACT FROM WASTE COOKING OIL FOR SUSTAINABLE FUTURE

INVENTOR	Ts. Dr. Zatil Izzah binti Ahmad Tarmizi
RESEARCH FIELD	Climate Change, Environment and Sustainability
INSTITUTION	Universiti Teknologi Malaysia, Malaysia Japan International Institute of Technology
CO-INVENTOR	Assoc. Prof. Dr. Roshafima Rasit Ali, Nurul Izzat Zaharudin, Afifah Mardhiah Mohamed Radzi, Chia Jing Jie
CORRESPONDING E-MAIL	zatil.izzah@utm.my

Abstract

This research endeavours to pioneer the creation of an eco-friendly dishwashing soap by repurposing used cooking oil, utilizing the natural cleansing potential of citrus hystrix extract, and integrating cutting-edge silver nanoparticles for heightened antibacterial effectiveness. The overarching objectives are geared towards innovating a product that not only addresses environmental concerns but also elevates sanitation standards. To achieve these primary goals, the research is structured around three specific sub-objectives. Firstly, it aims to ascertain the optimal ratio of citrus bystrix extract in the synthesis of silver nanoparticles. Secondly, it seeks to comprehensively assess the impact of varied parameters on the dishwashing soap production process. Lastly, the study strives to conduct a thorough analysis of the physicochemical properties of the dishwashing soap and appraise its overall performance. By delving into these sub-objectives, the research aims to significantly contribute to the development of a sustainable and highly efficient dishwashing solution, endorsing both environmental responsibility and superior cleaning capabilities.

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