InECCE 2023

The 7th International Conference on Electrical, Control and Computer Engineering

PROGRAM BOOK

7th International Conference on Electrical, Control, and Computer Engineering

"Embracing Innovation for The Community Through Technological Transformation"

Organized by:

UNIVERSITI MALAYSIA PAHANG AL-SULTAN ABDULLAH

Faculty of Electrical and Electronics Engineering Technology

Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik

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Foreword

Assalamualaikum wrt and welcome everybody,

Distinguished keynote speakers and all participants.
It is a glorious moment to extend my warm wishes on behalf of the Faculty of Electrical and Electronics Engineering Technology (FTKEE), Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA). I want to convey my heartfelt gratitude to the UMPSA management, particularly our Vice Chancellor, for supporting us in holding this event, namely "The 7th International Conference on Electrical, Control, and Computer Engineering," better known as InECCE 2023, with the selected theme, "Embracing Innovation for the Community through Technological Transformation."

We are also pleased to welcome our keynote speakers: Professor Emeritus David Al-Dabbas from Nottingham Trent University, England, United Kingdom; Dr. Shahrul Yazid Yahaya from Intel Technology Sdn. Bhd., Kulim, Kedah; and Professor Ir. Ts. Dr. Kamarul Hawari bin Ghazali from Universiti Malaysia Pahang Al-Sultan Abdullah, Pekan, Pahang. I would also like to express my heartfelt gratefulness as we are able to hold this series of conferences in a physical mode after the necessity to hold it virtually in 2021 due to the COVID-19 pandemic. There were 134 papers submitted; however, only 107 relevant and high-quality papers have been accepted and will be presented in hybrid mode. This is also a great opportunity to share the new findings and innovations in electrical, electronic, and computer engineering, particularly for the benefit of the community, in alignment with the theme.

On behalf of FTKEE, I am pleased to congratulate all the research scholars and paper presenters from various backgrounds and countries who have made it to this conference. These papers will enlighten all of us on the importance of a research culture, especially in the area of electrical and electronics. It is hoped that all shared knowledge here will be utilized for the betterment of humanity and nature for our future generations.

Last but not least, I am keen to congratulate the InECCE 2023 chairman and the organizing committee for successfully holding this conference in the series. Despite all the challenges faced, this conference has been successfully delivered and has served as a platform for knowledge sharing.

Associate Professor Dr. Hamdan Bin Daniyal
Dean
FTKEE, UMPSA

Welcoming Remark

On behalf of the organizing committee, it is my great pleasure to welcome all participants to attend the 7th 2023 International Conference on Electrical, Control and Computer Engineering (InECCE2023). This conference is organized by Faculty of Electrical and Electronics Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah. It is a second time that the conference is held outside Pahang, Malaysia. The main aim of the conference is to provide an international platform for researchers, academicians, engineers as well as industrial professionals from all over the world to share the findings from latest research and developments in Sustainable Energy & Power Engineering, Instrumentation, Control & Computer Engineering and Applied Electronics & Computer Engineering research clusters.

As stated by the conference theme, "Embracing Innovation for the Community Through Technological Transformation", it is hope that this conference will provide a good platform for the researcher to come together to contribute ideas and knowledge to transform the innovation of technology for the benefit of the society or community. It is a unique opportunity for us to come together and to meet each other physically since the last conference is held virtually due to Covid19 pandemic. A total of 134 papers have been submitted to this conference where the Microsoft Conference Management Toolkits (CMT) was employed as a platform for paper submission, reviews and camera-ready submission. After the reviewing process, 107 papers are accepted to be presented in the conference. Among the 107 papers, 41 papers come from the researchers from other universities including the universities outside Malaysia. The accepted paper will be presented in the conference before submitting to the Springer Lecture Notes in Electrical Engineering (LNEE) book series indexed by Scopus.

I would like to take this opportunity to express my gratitude to conference committee members and reviewers for assisting me in the conducting the event and working hard to finish review in time to ensure the success of the event. I would like to thank our academic keynote speakers (Professor Emeritus David Al-Dabass and Professor Ir. Ts. Dr. Kamarul Hawari Ghazali) and industrial keynote speaker (Dr. Shahrul Yazid Yahaya) from Intel Corporation, Penang, Malaysia. Also, I would to acknowledge the great support from my Dean of Faculty, Associate Professor Dr. Hamdan Daniyal who give me huge opportunity to organize the Faculty main event in this year. I would like to extend my high appreciation to the secretariats of the conference and all faculty staffs (academic & non-academic). Finally, lets enjoy and obtain benefit from the conference.

Ir. Ts. Dr. Norizam Bin Sulaiman
General Chair
InECCE2023

KEYNOTE SPEAKER 1

Professor Emeritus David Al-Dabass

BSc(Eng), ACGI, PhD, CEng, CMath, FIMA, FIET, FBCS
School of Computing & Informatics
Nottingham Trent University

A Professor Emeritus of Intelligent Systems in the department of Computer Science, The Nottingham Trent University. He graduated from Imperial College, worked for Redifon Flight Simulation for 6 years. Completed a Ph.D program in Parallel Processing at Staffordshire University. He is Fellow of the IET, IMA and BCS and editor-in-chief of the International Journal of Simulation: Systems, Science and Technology; he currently serves as Chair of the UK Simulation Society.

TITLE:

Deep Learning Hybrid Recurrent Algorithms using Data Mining for Knowledge Discovery

SYNOPSIS:

Starting with a model of the signal trajectory to be mined, a recurrent deep learning hybrid algorithm is derived to discover the knowledge embedded within the data. Results show good performance of the algorithm in discovering the data model parameters online. Suggestions for future directions are given.

Dr. Shahrul Yazid Yahaya

Department Manager,
System Test Hardware Design & Development, Sort Test Technology Development/TMG
Intel Technology Sdn. Bhd.

An accomplished R&D professional in the semiconductor industry, he serves as the Department Manager for Product Platform Development at Intel Corporation. With a Doctor of Engineering in Engineering Business Management, he possesses 28 years of diverse experience spanning manufacturing, R&D, project management, and technology transfer. A valued member of university advisory panels, he bridges industry expectations, academic capabilities, and graduate potential. His expertise fuels innovation, research, and successful team leadership.

KEYNOTE SPEAKER 2

TITLE:

Challenges in the Deployment of Artificial Intelligence System

SYNOPSIS:

Artificial intelligence (AI) technology has been steadily moving towards becoming the mainstream driver of many systems that affect how people live and work. This covers many different areas such as healthcare, transportation, retail, finance, manufacturing and many others. The challenges of developing AI system in the laboratory mostly involves technical considerations such as architecture, workload balancing, performance, scalability tradeoffs, etc. The challenges of deploying such system all the way to end users however, involve significant and overwhelming effort
to address. This keynote will introduce challenges, namely bias, privacy, ethics and legal aspects, that must be considered and comprehended in the deployment of any AI system. The keynote will mainly use autonomous driving system as a case example. The keynote will suggest ways where social leaders, lawmakers, technologists and industry leaders can formulate solutions together in order not to inhibit the growth of AI technology.

KEYNOTE SPEAKER 3

Professor Ir. Ts. Dr.Kamarul Hawari Ghazali

Faculty of Electrical and Electronics Engineering Technology
Universiti Malaysia Pahang Al-Sultan Abdullah

A Professor in the Faculty of Electrical and Electronic Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah. His major research areas include Machine Vision System, Image Processing, Signal Processing, Intelligent system, Vision Control, Thermal Imaging Analysis. (in all related applications – Electrical, Medical, Environment), Deep Learning for Image and Signal Classification. Currently a Professional Engineer (Ir.), Board of Engineer Malaysia (BEM).

TITLE:

Early Warning System for Landslides in Malaysia: A GNSS-Based Monitoring Approach

SYNOPSIS:

Landslides, escalating globally, pose a pressing challenge in Malaysia due to climate change impacts. To minimize devastating consequences on life, property, and infrastructure, effective control measures are vital. Real-time monitoring systems offer a proactive approach to identify potential landslide zones, averting disasters in advance. Despite remote sensing, radar, and LiDAR being available technologies, cost and accuracy limit their broad use. Addressing these limitations, a novel solution employs GNSS satellite technology for landslide monitoring. Analyzing land movement signals, it promptly detects changes in position and slope, providing early warnings for potential landslides. Cost-effectiveness and precision make the GNSS-based monitoring system suitable for diverse locations. By deploying this technology in high-risk areas, Malaysia can promptly detect and mitigate potential landslides. Its affordability and accuracy make it a valuable asset for sustainable development in Malaysia and other similarly affected regions.

PROGRAM SCHEDULE

Time	Program
8.00 AM	Registration
8.30 AM	Opening Ceremony
9.00 AM	Keynote Sessions 1 and 2
10.00 AM	Break
10.30 AM	Keynote Session 3
11.00 AM	Parallel Sessions
12.00 PM	Lunch Break
2.00 PM	Parallel Sessions
4.00 PM	Break
4.30 PM	Closing Ceremony

PARALLEL SESSIONS

- PHYSICAL EVENT -

Time	Program		
08:00 - 08:30	Registration | Level 2, Royale Ballroom		
08:30 - 09:00	Opening Remarks		
09:00 - 09:30	Keynote Speech 1	Prof. Emeritus Dr David Al-Dabbas, Nottingham Trent University, United Kingdom	
09:30 - 10:00	Keynote Speech 2	Dr Shahrul Yazid Yahaya, Intel Corporation, Malaysia.	
10:00 - 10:30	**GROUP PHOTO & COFFEE BREAK**		
10:30 - 11:00	Keynote Speech 3	Prof. Ir. Ts. Dr. Kamarul Hawari Ghazali, Universiti Malaysia Pahang Al-Sultan Abdullah	
ROOM	**Parallel Sessions | Level 2**		
	ROYALE 1	ROYALE 2	ROYALE 3
11:00 - 13:00	Session 1 (AppECE)	Session 2 (ICE)	Session 3 (SUPER)
	ID59 , ID4, ID14, ID24, ID26, ID28, ID30, ID39, ID42, ID58, ID114	ID86, ID3, ID10, ID6, ID12, ID31, ID22, ID32, ID46, ID95	ID61, ID2, ID7, ID29, ID52, ID72, ID85, ID106, ID107, ID35
13:00 - 14:00	**LUNCH TIME | Royale Coffee House**		
14:00 - 16:00	ROYALE 1	ROYALE 2	ROYALE 3
	Session 4 (AppECE)	Session 5 (ICE)	Session 6 (SUPER)
	ID87, ID25, ID65, ID69, ID118, ID71, ID80, ID83, ID27, ID110, ID88	ID77, ID124, ID76, ID40, ID13, ID44, ID63, ID75, ID23, ID20, ID115	ID62 , ID8, ID9, ID11, ID99, ID68, ID97, ID56, ID128, ID47, ID19
16:00 - 16:30	**COFFEE BREAK**		
16:30 - 17:00	Conference Awards | Level 2, Royale Ballroom		

SESSION INFORMATION

Session 1, 4: APPECE - Applied Electronic and Computer Engineering
Session 2, 5: ICE - Instrumentation & Control Engineering
Session 3, 6: SUPER - Sustainable Energy & Power Electronics

PARALLEL SESSIONS

- ONLINE EVENT -

11:00 - 12:30 MS TEAMS	Session 7 (AppECE)	Session 8 (ICE)	Session 9 (SUPER)
	ID104, ID109, ID111, ID119, ID125, ID133, ID135	ID94 , ID116, ID127, ID129, ID131, ID132, ID122	ID18 , ID41, ID73, ID78, ID82, ID90, ID91
	https://tinyurl.com/ParSess7	https://tinyurl.com/ParSess8	https://tinyurl.com/ParSess9
			
14:00 - 15:30 MS TEAMS	Session 10 (AppECE)	Session 11 (ICE)	Session 12 (SUPER)
	ID36, ID37, ID38, ID45, ID117, ID103, ID123,	ID101 , ID98, ID89, ID60, ID102, ID136, ID121	ID92, ID105, ID126, ID130, ID137, ID108, ID93, ID55
	https://tinyurl.com/ParSess10	https://tinyurl.com/ParSess11	https://tinyurl.com/ParSess12
			

SESSION INFORMATION

Session 1, 4: APPECE - Applied Electronic and Computer Engineering
Session 2, 5: ICE - Instrumentation & Control Engineering
Session 3, 6: SUPER - Sustainable Energy & Power Electronics

ABSTRACTS (PHYSICAL EVENT)

PARALLEL SESSION 1

Paper ID: 59

TITLE: Porous Paper-based Device with Different Electrode Dimensions for Humidity Sensor Applications

AUTHOR(S): Loo Wei Yang, Gan Shin Pyng, Tan Jin Peng and Mastura Shafinaz Zainal Abidin*

Abstract:

Understanding the influence of different dimensions on conductivity is fundamental in many fields, including electronics, material science, and electrochemical sensing. This study investigates the impacts of varying dimensions of electrodes on the conductivity performance of the porous paper-based humidity sensor. Hydrochloric acid (HCl) solution was chosen for its potential to alter the surface properties of the paper to form porous paper. Interdigitated electrode structures with varying dimensions were fabricated using porous paper. It is found that a smaller electrode gap size provides better conductivity and less resistance. A wider finger width provides more conductive pathways for electrons to travel, increasing conductivity. In comparison to a smaller electrode finger width, the wider electrode finger width transmits more current.

Paper ID: 4

TITLE: Surface anomaly detection using feature-based transfer learning for IoT-enabled smart manufacturing

AUTHOR(S): Muhammad Ateeq, Matilda Isaac, Hadyan Hafizh, Bintao Hu, Ismail Mohd Khairuddin, Mohd Amirul Abdullah and Anwar P.P. Abdul Majeed

Abstract:

Owing to the advancement of computational technology, the employment of deep learning architecture for defect detection in the manufacturing in-dustry has gained considerable attention. Traditional means of defect detec-tion through manual visual inspection by operators are laborious as well as susceptible to mistakes. In the present study, a feature-based transfer learning approach is used to classify surface defects. The KolektorSDD database is used in the present study. Two pipelines were developed to investigate their efficacy in detecting the defects, namely the InceptionV3-SVM and VGG19-SVM pipelines, respectively. It was demonstrated from the study that the VGG19-SVM pipeline could provide desirable results compared to the InceptionV3-SVM pipeline, suggesting that the VGG19 is a better feature extractor for the evaluated surface defects. It could be concluded that the proposed pipeline is suitable for the classification of surface defects.

Paper ID: 14

TITLE: Fuzzy-PID Trajectory Tracking Control of a Quadcopter

AUTHOR(S): A'dilah Baharuddin and Mohd. Ariffanan Mohd. Basri

Abstract:

The increasing demand and usage of quadcopter drone across fields and missions has led to active involvement of quadcopter in research community. A proper controller is required for a quadcopter in order to operate with a smooth and stable flight. Feature such as tracking has become one of the requirements to quadcopter. Such feature gives another challenge in designing a controller to en-sure a stable and accurate quadcopter operation. Most system in industrial control application, including quadcopter prefer conventional PID controller as the main or base control system. However, conventional PID used fixed parameters for the system which could lead to undesired responses if the system encountered any changes, and this could also lead to a long-time adjustment. Thus, fuzzy logic technique is integrated to system to form Fuzzy PID controller which the tuning process can be simplified and shorten. The proposed algorithm of Fuzzy PID is simulated with some trajectories and put to comparison with conventional PID. The result of conventional PID shows more tuning need to be conducted to im-prove the responses, while the Fuzzy PID controller provide better responses without further tuning applied.

Paper ID: 24

TITLE: A Comprehensive Review on Luminance Distribution for Visible Light Communication (VLC) Systems

AUTHOR(S): Izzah Hazirah binti Zainal, Zaiton binti Abdul Mutalip, Faezah binti Jasman, Wan Hafiza binti Wan Hassan

Abstract:

Visible light communications (VLC) are widely used in industries in or-der to transmit data signal from transmitter to receiver. This paper pro-vides comprehensive overview of the research conducted on luminance distribution for VLC. Luminance distribution can contribute significantly for visual performance and visual comfort. The introduction to the basic ideas of VLC systems is followed by a review of the modulation strategies applied by re-searchers. The optimization of lighting schemes is also discussed, along with the challenges and limitations of various approaches. The benefits of using multiple light sources are also included in this paper. The re-view concludes by summarizing the research gaps identified and pro-posing future work in this area. Overall, the aim is to provide a comprehensive understanding of the current state-of-art in luminance distribution of VLC systems with a focus on highlighting areas for future improvement.

Paper ID: 26

TITLE: Convolutional Neural Networks Performance Study for Image Processing of Waste Segregation for Reverse Vending Machine

AUTHOR(S): Tan Hor Yan, Zamani bin Md. Sani, and Sazuan Nazrah binti Mohd Azam

Abstract:

The main element for reverse vending machine (RVM) is the waste classification technique. The performance of the RVM's waste segregation can be enhanced by incorporating a good classification technique. The objective of this project is to study the performance of CNN for image processing for the waste segregation part of RVM. For this RVM, only polyethylene terephthalate (PET) bottles, aluminium cans, and drink carton boxes are considered for recycling by using image classification based on transfer learning with Convolutional Neural Network (CNN) algorithms. The performance parameters that are evaluated are F1-score, computational time, and testing result for each neural network. In this paper, ResNet50 surpasses other neural networks due to the highest F1-score which is 0.9541 and the good testing performance although the computational time is longest among the other network which is 240min 01s. The accuracy rate of ResNet50 achieved in this project is 0.9724.

Paper ID: 28

TITLE: Mechanical and Electrical Issues in Prefabricated Housing; Their Real Causes and Corrective Steps

AUTHOR(S): Ahmad Bin Abd Jalil, Fadhilah Binti Md Fazil, Mohd Amir Shazwan Bin Hashim, Nurina Binti Nawi

Abstract:

Housing is most suitable to adopt prefabricated as it uses repetitious design, simultaneous construction, large scale and embed Mechanical & Electrical. Unlike develop countries which already far advanced, Malaysia still facing critical issues including on fragmentation especially on M&E scope. Frag-mentation is defined as working in isolation, work in separation and division that happens among different parties in the same project. Various research on prefabricated housing has been conducted focusing on supply chain, modularization, automation, design, payment and procurement but lack fo-cus on fragmentation. This paper investigates the real causes of fragmenta-tion issues in Malaysian prefabricated housing that affected M&E and struc-tural to be miss-matched, their consequences and recommend steps to over-come. The methodology used is mixed method with 118 questionnaires were analyzed using SPSS, then followed with deep interviews with experienced professionals from M&E companies, prefabricated manufacturers, prefabri-cated installers, academicians, consultants, developers and main contractors. The result shows the causes of fragmentation are M&E unfamiliar with pre-fabricated concept, late involvement of prefabricated companies and the practice of segregation culture while the steps to overcome are by establish-ing close integration between M&E and project team since beginning, each party must be appointed early and forming direct contract between prefabri-cated companies and developers. The contribution to the body of knowledge is by detailing the real causes that make fragmentation issue become critical, with descriptions on where the causes were actually started and also present-ing recommendations that are practical which verified by all stakeholders who directly involve in Malaysia prefabricated housing.

Paper ID: 30

TITLE: Monitoring and Controlling Wireless Power Transfer System Performance via IoT

AUTHOR(S): Liew Hui Fang, Muhammad Izuan Fahmi Romli, Rosemizi Abd Rahim, Nur Irwany Ahmad, Junaidah Binti Ali Mohd Jobran, M. Abdul Jabbar, Muhammad Khairul Bin Jaafar

Abstract:

This research focuses on the integration of Internet of Things (IoT) technol-ogy for monitoring and controlling the performance of wireless power trans-fer (WPT) systems. Overall, WPT allows for the transmission of electrical energy without the use of physical connections, which provides simplicity and flexibility. The proposed framework incorporates IoT capabilities into the WPT system allowing for real-time monitoring and control. IoT devices deployed throughout the system collect data on parameters such as power transmission efficiency, temperature, voltage, and current. The experimental result shows the transmitter and receiver for coil inductance by using 30 turns with 0.5 mm diameter helical and spiral copper coils. Whereby, 145.00 µH inductance was entered to the transmitter and 165.00 µH for the receiver of the helical coil. Alternatively, the spiral coil inductance for the transmitter and receiver was 106.98 µH and 110.00 µH respectively. Following that, the output voltage for the WPT with load is 2.35 V at 10 mm distance, which is higher than 0.08 V at 50 mm distance between coils. Next, it is noteworthy that the output voltage for the WPT without load exceeded the output voltage with load, which is 10.47 V at a10 mm distance and 0.34 V at a 50 mm dis-tance. This research advances WPT technology by demonstrating the con-venient of IoT-enabled monitoring and control. The proposed framework in-creases the overall performance efficiency of WPT systems, making them ideal for use in industries such as automotive, consumer electronics, and healthcare.

Paper ID: 39

TITLE: Enhancing Driver Fatigue Detection Accuracy in On-Road Driving Systems using an LSTM-DNN Hybrid Model with Modified Z-Score and Morlet Wavelet

AUTHOR(S): Rafiuddin Abdubrani ; Mahfuzah Mustafa ; Zarith Liyana Zahari

Abstract:

Driver fatigue is a significant safety concern in transportation systems, with the potential to cause accidents. Detecting and addressing driver fatigue in real time is crucial for improving road safety. This research paper introduces an innovative method for detecting driver fatigue using electroencephalogram (EEG) signals, enhanced by the Morlet mother wavelet and modified z-score feature. The Morlet wavelet is adapted to capture both temporal and frequency information from EEG signals associated with driver fatigue, while the modified z-score feature measures abnormal EEG activity. Three deep learning models, Long Short-Term Memory (LSTM), Deep Neural Network (DNN), and LSTM-DNN, are employed to classify the data. The LSTM model captures long-term dependencies, the DNN model learns complex relationships, and the hybrid LSTM-DNN model combines their strengths to improve classification accuracy. The proposed approach demonstrates its effectiveness through comprehensive experiments, achieving high accuracy, specificity, sensitivity, F1-score, and recall in driver fatigue detection. The LSTM-DNN hybrid model showed exceptional performance, achieving an accuracy of 99.99% in classifying EEG signals. This showcases its remarkable precision in accurately categorizing the signals. Additionally, the LSTM-DNN model exhibited a specificity of 99.98% and a sensitivity of 100.00%, indicating its capability to classify driver fatigue states accurately. Furthermore, the F1-score and recall for the LSTM-DNN model were 99.99% and 100.00%, respectively.

Paper ID: 42

TITLE: Smart Charging System for Mobile Charges and Laptops Using RFID and Raspberry Pi

AUTHOR(S): Liew Hui Fang, Muhammad Izuan Fahmi Romli, Rosemizi Abd Rahim, Nur Irwany Ahmad, Junaidah Binti Ali Mohd Jobran, M. Abdul Jabbar, Lee Jun Rong

Abstract:

This research aims to provide a wireless and convenient charging solution, eliminating the need for multiple cables and adapters. By integrating RFID technology with Raspberry Pi, the system can identify and communicate with RFID tags or chips embedded in devices, initiating the charging process wirelessly. However, most of the mobile phones and laptop come with a very poor battery life. Such as, li-ion batteries used for mobile phones and laptops are consumable products. Due to the chemical properties of Lithium ions, the battery capacity will decrease by use over time, the user's environment and behavior. By leveraging RFID technology and the versatility of Raspberry Pi, the system aims to offer an efficient and convenient charging solution. RFID tags embedded in chargers and laptops enable automatic device detection and authentication on the charging station. The Raspberry Pi serves as the control unit, managing the charging process and ensuring optimal power management. This system will limit the charging time to each user with 5 minutes and the LCD display showing the actual time left. This system will cut off the current automatically which is in fully charged. The simulation and experiment proved that mobile phone and laptop charging output volt-age DC is within 5 VDC to 20 VDC, respectively. Moreover, output current estimated in the range 0.5 A to 5 A. Experimental evaluations demonstrate the system's feasibility and effectiveness in enhancing user experience, reducing cable clutter, and streamlining the charging process. The proposed system has implications for diverse settings, catering to the increasing demand for user-friendly wireless charging solutions.

Paper ID: 58

TITLE: IoT Smart Distribution Box (SDB) for Homestay Energy Management System by Using Arduino and ESP32

AUTHOR(S): Muhammad Syurahbil Shamsudin ,Sim Sy Yi *, Mohd Abdul Talib Mat Yusoh Alvin John Lim Meng Siang , Azuwien Aida Binti Bohari

Abstract:

This paper presents the design and implementation of a Smart Distribution Box (SDB) system to address energy waste behaviour by tenant of homestays during vacation. The system allows owners of homestays to con-trol and monitor energy usage at their properties using a Blynk application and a GSM SIM900A control system. Consumers can also limit their energy usage based on the amount they have "topped-up" to the system. The SDB includes a user-friendly Distribution Box (DB) that facilitates monitoring and controlling energy usage during stays. Additionally, a mock payment system for tenant has been developed using messages sent to a GSM SIM 900A connected to an Arduino Uno and an ESP32 to link the Blynk apps for the owner to the system. The results show that the system can be used in standby mode, top-up mode, usage mode, low balance mode, and owner mode for the homestay. The system effectively manages energy usage between tenant and owners, makes payments for energy usage easy, and allows for upgrad-ing the DB system as technology evolves.

Paper ID: 114

TITLE: Modelling of Miniaturized Rectangular Microstrip Antenna Using Epoxy-Barium Titanate Nanocomposite Substrate for Wi-Fi Applications

AUTHOR(S): Nurulfadzilah Hasan, Nurul Hazlina Noordin, Mohamad Shaiful Abdul Karim, Nurhafizah Abu Talip Yusof, Noor Zirwatul Ahlam Binti Naharuddin , Mohd Ruzaimi Mat Rejab

Abstract:

Increasing demand for miniaturized antennas in wireless communication sys-tems has driven research on antenna miniaturization. This paper focuses on the miniaturization of a rectangular microstrip patch antenna, a commonly used antenna in wireless communication. To achieve miniaturization, a high permit-tivity substrate, specifically an Epoxy-Barium Titanate nanocomposite, is em-ployed as a replacement for the conventional substrate, FR4. Different compo-sitions of epoxy filler (90:10%, 80:20%, 70:30%, and 60:40%) substrates are investigated to determine the optimal design. The design and simulation are performed using CST Studio Suite software at the Wi-Fi frequency of 2.4 GHz. Simulation are conducted to evaluate the antennas' performance in terms of S11, VSWR, efficiency, gain, and directivity. Among all the antennas with epoxy-barium titanate substrates, the antenna with a 20% epoxy-barium titan-ate composition exhibits the best performance at the Wi-Fi frequency of 2.4 GHz. Finally, the optimized antenna design with the 20% and 30% epoxy-barium titanate substrate has potential to be fabricated.

PARALLEL SESSION 2

Paper ID: 86

TITLE: State Machine Logic Vibration Control Simulation of Rotary Impact Driver

AUTHOR(S): Chi Hoe Leong and Rosmiwati Mohd-Mokhtar

Abstract:

Rotary-impact mechanisms generated high-impulse torques directly to the screws with relatively low input power. However, this type of tool also generates noise and vibration that may affect the operator who uses it. This paper develops a supervisory logic control based on a state-flow control algorithm on the model to improve the shortfalls. Testing and evaluation are made through experiment and optimization through simulation. The results showed a 19% vibration reduction from the motor's reaction torque to the user's arms. The outcome may improve the user's comfort, reducing the cause of hand-arm vibration and increasing the workers' allowable work time.

Paper ID: 3

TITLE: Respiration Rate Monitoring using Optical-based Sensor integrated in Portable on Bed Device System

AUTHOR(S): Mohd Anwar bin Zawawi, Nur Fatin Adawiah binti Ismail

Abstract:

In the past 3 years, coronavirus disease (COVID-19) which is caused by the SARS-CoV-2 virus has caused a great challenge to human health condition. One of the major symptoms related to the COVID-19 is shortness of breath or breathing difficulty. People with severe COVID-19 may remain infectious beyond 10 days. As the positive number of COVID-19 infectious patients in each country could increase higher that the capacity of available hospital beds, less critical cases will have to continue self-isolation at their respective home. The proposed respiration rate monitoring device is based on optical fiber sensor integrated in a portable on bed device. The proposed device is able to provide continuous measurement of the respiration where the breath-ing rate that could be recorded is between 6 to 24 times per minutes. In summary, the implementation of portable on bed device with the optical fi-ber sensor can be applied as an alternative method to provide continuous respiration rate measurement for COVID-19 patient who are undergoing self-isolation period at their respective home.

Paper ID: 10

TITLE: Beampattern Optimization of Collaborative Beamforming in Wireless Sensor Network using Evolutionary Algorithms: a Comparison

AUTHOR(S): Najla Ilyana Ab Majid, Nik Noordini Nik Abd Malik, Nor Aini Zakaria, Muhammad Zahid Zainul Abidin

Abstract:

The beampattern of the collaborative beamforming (CB) in wireless sensor network (WSN) suffers from high maximum sidelobe level (SLL) due to the distribution of sensor nodes in random manner. The high SLL will cause high interference which is unreliable for wireless communication. Thus, this paper proposes a method of optimizing inter-element spacing of sensor nodes based on evolutionary algorithm (EA) optimizers which are Imperialist Com-petitive Algorithm (ICA), Backtracking Search Algorithm (BSA), Genetic Al-gorithm (GA) and Particle Swarm Optimization (PSO). The inter-element spacing between sensor nodes is optimized in linear antenna array (LAA) configuration. The beampattern is optimized in terms of peak SLL suppres-sion, control first null beam width (FNBW) and null placement in unintended directions. The algorithms are evaluated in different cases to fulfil the single and multiple fitness functions. The results show that all algorithms managed to control FNBW size in five cases, while reducing peak SLL up to 40% (ICA), 33% (PSO), 30% (GA) and 25% (BSA).

Paper ID: 6

TITLE: Improved Sparrow Search Algorithm for Test Redundancy Reduction

AUTHOR(S): Mizanur Rahman, Kamal Z. Zamli, Md. Abdul Kader

Abstract:

The Sparrow Search Algorithm (SSA), a kind of innovative swarm intelligence algorithm, has been used in a variety of domains due to its special qualities, such as its robust global search capabilities, its limited number of adjustable parameters, and its clear structure. However, the SSA still has some weaknesses that prevent its further development. These weaknesses include low population diversity, limited local searchability, and a tendency to easily slip into local optima. Software testing is critical to fulfilling the user requirement. the software is tested using test cases, and it is impossible to run all test cases in a regression test suite because the size of the test suite increases as the software changes over time, and this would take a lot of time and effort. There are numerous approaches to minimize test suites, but none of them can create a test suite with the ideal number of tests because the problem is NP-complete. In this context, in this paper, we proposed an improved sparrow search algorithm and we use the test redundancy reduction problem as a case study. Therefore, our algorithm has shown promising and superior results compared to standard SSA.

Paper ID: 12

TITLE: Radial Basis Function with PID for Quadcopter: Disturbed Trajectory Tracking

AUTHOR(S): Nur Hayati Binti Sahrir, Mohd Ariffanan Bin Mohd Basri

Abstract:

Uncertainties and perturbations are the 'enemies' of a flying robot without a proper and reliable controller. The easiest controller to implement is the PID controller which its gains only need to be tuned properly either using Ziegler-Nichol's Method or manual tuning. Both are time consuming and single-acting PID controllers cannot adapt in various situations with only single-tuning. Being in different situations requires re-tuning, which is unfavorable during physical flight mode. In this paper, single-acting PID controller will be transformed into a hybridized mode which includes the action of Radial Basis Function (RBF) Neural Network. The objective is to help a quadcopter to survive various uncertainties and perturbations with a self-tuned algorithm. An RBF network is one kind of Artificial NN but with simpler network design and more accurate local approximation. The performance of the proposed work is proved through simulations using MATLAB/Simulink. Different situations are presented to test the final system, which are the wind disturbance and trajectory tracking. Results are presented in this paper using visual simulation and ISE performance index. After comparison between the proposed work and ZN-tuned PID controller is made, RBFPID controller wins the deal.

Paper ID: 31

TITLE: Kalman Filter Based Vehicle State of Charge Performance Analysis for Different Battery Types

AUTHOR(S): Hamzah Ahmad, Mohd Mawardi Saari, Mohd Syakirin Ramli, Nor Aqilah Othman

Abstract:

The Battery Management System (BMS) is critical to the battery's efficient and safe performance. The monitoring of bat-tery parameters is one of the tasks performed by the BMS. The state of charge of a battery is a critical parameter that indi-cates the amount of charge it contains. Battery SOC estimate is at the root of the battery management system and SOC has a direct impact on BMS decision-making and control. The Kalman filter correction approach is used in this design, as well as the impact of charge and discharge rates, temperature, and charge or discharge cycles on SOC estimates. The Kalman fil-ter correction technique is presented based on this technology, with its application in the pure electric car battery man-agement system. The findings reveal that the Kalman filter correction algorithm efficiently corrects the Ah method error, increases estimate accuracy, and offers a more accurate SOC estimation technique for battery management systems. An ac-curate estimate of the battery's level of charge is critical not only for alerting the user, but also for developing a control plan for maintaining the battery's characteristics within safe limits in order to extend its life.

Paper ID: 22

TITLE: Data-Driven Adaptive Fuzzy-PID Control of TITO Coupled Tank System with Input Delay: Design, Implementation, and Performance Evaluation

AUTHOR(S): Mohd Riduwan Ghazali, Mohd Ashraf Ahmad, Wan Ismail Ibrahim, Mohamad Jamadil Akbar Jaafar, Suliana Ab. Ghani

Abstract:

Coupled tank systems have been commonly employed across various industries to maintain accurate liquid levels in storage tanks. However, the dynamic nature and input-output reactions within TITO-coupled tank systems pose challenges for controller design. Possible enhancement towards accurate controlling of TITO systems through the application of the existing PID controller has been recognized. A data-driven Adaptive Fuzzy-PID controller is designed in this article for improved control accuracy of TITO systems. Safe Experimental Dynamics (SED) is employed as the data-driven tool to determine optimal Fuzzy-PID parameters that minimize control tracking performance and errors. The proposed method achieved effective Adaptive Fuzzy-PID parameter adjustments in the absence of the layout's mathematical modeling. An integrated approach between Fuzzy logic and PID control demonstrated significant potential for enhanced control performance over conventional PID controllers. Through simulation results, the proposed objective function has been demonstrated to yield superior control accuracy. The integration of data-driven techniques and utilization of the Adaptive Fuzzy-PID controller offers promising prospects in advancing the control performance of TITO-coupled tank systems.

Paper ID: 32

TITLE: A ROS Based Mobile Robot Navigation with Imperfect Data Association

AUTHOR(S): Hamzah Ahmad, Mohd Mawardi Saari, Mohd Syakirin Ramli, Nur Aqilah Othman

Abstract:

This paper attempts to design and analyze a mobile robot navigation system with imperfect data association. In this paper, we address the issue related to navigation and control of a mobile robot which enable it to deal with unexpected moving obstacles by sensor-based control. A probabilistic approach is proposed to deal with collision avoidance under certain uncertainty conditions. The mobile robot localization methodologies in common use at present will be introduced. A localization algorithm based on Extended Kalman Filter (EKF) will be the technique to be investigate considering of environment feature extraction and map building. The technique can reduce the error in the calculation of the robot`s position and orientation. The analysis is mainly take into account the observations about the mobile robot surroundings from multiple sensors by EKF, which enables the robot to identify the surrounding objects clearly and moves accordingly. The simulation and experimental results show that the proposed navigation method is effective.

Paper ID: 46

TITLE: Paper-Based Device using Vacuum Filtration Technique with Different Electrode's Material

AUTHOR(S): Tan Jin Peng, Loo Wei Yang, Gan Shin Pyng and Mastura Shafinaz Zainal Abidin

Abstract:

In this study, paper-based energy storage devices using various electrodes' mate-rial through vacuum filtration technique is studied. Paper substrate is becoming more common in supercapacitors manufacturing due to its properties of low cost and environmental friendliness. This study examined the physical properties of fabricated devices using graphene and zinc oxide electrode, as active materials. Based on the result, it is shown that active materials that are coated on the paper substrate do not deteriorate in terms of physical properties after vacuum filtration process in producing electrodes. This proves that vacuum filtration implements sufficient amount of active material for power storage into the electrodes. This shows the feasibility for large scale production in future.

Paper ID: 95

TITLE: Lego Parts Recognition Based on Its Unique Characteristics

AUTHOR(S): Nur Afifah Mohamad Yusob and Mohd Razali Daud

Abstract:

The recognition of Lego parts plays a crucial role in automated assembly and sorting systems. In this paper, we propose a novel approach for Lego parts recognition based on their unique characteristics. Each Lego part is characterized by the presence of circles on its surface, with the size of the circles generally corresponding to the number of circles present. By analyzing the arrangement of circles, the shape of a Lego part can be determined. Our approach focuses on two key aspects: the count of circles and the connectivity of straight lines through the circle centers. By examining how straight lines intersect, we can accurately identify the shape of a Lego part. To achieve Lego parts recognition, we employ computer vision techniques and algorithmic analysis. We first detect and extract circles from images of Lego parts using the Hough transform. Next, we analyze the circle count and calculate the connectivity of straight lines based on the circle centers. By considering the intersection patterns of these lines, we can classify Lego parts into various shapes, including squares, rectangles, triangles, and more complex configurations. Experimental results on a large dataset of Lego parts demonstrate the effectiveness of our approach. We achieve a high accuracy rate in recognizing Lego part shapes, with minimal false positives and negatives. Our method offers a promising solution for automating Lego part recognition in assembly and sorting systems, enabling improved efficiency and productivity.

PARALLEL SESSION 3

Paper ID: 61

TITLE: A Preliminary Design of Hybrid Excitation Flux Switching Generator for Small Scale Applications

AUTHOR(S): Nur Afiqah Mostaman, Mahyuzie Jenal and Erwan Sulaiman

Abstract:

Recently, Flux Switching Generator has been widely used due to its ability of having simple constructions yet high output performances. Hybrid Excitation Flux Switching Generator (HEFSG) are one of the sufficient machines that can reduce the armature winding on the excitation part. However, the impact of the HEFSG design parameters on overall electric generator performance cannot be underestimated. This is due to the generator's output voltage, power, and thus flux distribution is all determined by its appropriate geometries. Consequently, the impact of various design factors, such as rotor span angle, rotor pole width, shaft radius, rotor outer radius, stator inner radius, stator pole width and stator back iron dimension has been observed. The results for the preliminary design of HEFSG has been obtained with an output voltage of 384.87V with 4.26Nm of cogging torque.

Paper ID: 2

TITLE: Maximizing Photovoltaic Cell Efficiency: Experimental Investigation on the Impact of Cleaning Methods on Power Output and Cost-effectiveness

AUTHOR(S): Ruzlaini Ghoni, Mohd Aizat Bin Mohd Sulaiman, Ammar Husaini Hussian, Fuaad@Fuaat Mohamed Nawawi, Ahmad Firdaus Zali, Ahmad Farid Ridhwan Zakaria

Abstract:

The performance of photovoltaic panels is greatly influenced by various environmental factors, affecting power output, conversion efficiency, and energy expenses. Dust, being a significant factor, plays a crucial role in this regard, with its properties varying based on location and including kind, size, shape, and meteorology. Soil erosion poses a considerable challenge to the widespread adoption of solar photovoltaic systems. To address these concerns, a study conducted at Epic Solar Sdn Bhd in Kemaman, Terengganu, Malaysia, investigated the impact of soiling and different dust-cleaning strategies on photovoltaic panels. The research explored the daily and monthly energy production variations based on cleaning agents and frequency. Three panels underwent monthly cleaning with or without a clean-ing agent, while another group was cleaned weekly without any agents. The findings revealed that soiling is non-uniform over time and influenced by daily weather changes, with the highest levels occurring from July to November and the least in May and June. The study concluded that cleaning the panels every two weeks is necessary to minimize losses caused by improper cleaning practices and emphasized that cleaning frequency out-weighs the choice of cleaning chemicals in achieving effective dust removal.

Paper ID: 7

TITLE: Harvesting Magnetic Energy from Induction Motors: Design and Development of an Energy Harvester

AUTHOR(S): Ammar Husaini bin Hussian, Ruzlaini Ghoni, Mohd Tarmizi Ibrahim, Youcef Mahboub, Afidatul Nadia Mok Hat

Abstract:

Induction motors are commonly employed for converting electrical power to mechanical power because they are uncomplicated, durable, sturdy, energy-efficient, and appropriate for use in challenging surroundings. An induction motor emits a magnetic field of low magnitude that can be harvested. In most cases, researchers focus on capturing magnetic energy from electrical transmission lines, power plants, and electrical track paths. Though limited studies have been conducted on magnetic energy harvesting from manufacturing machinery, such as an induction motor, the electromagnetic transducer developed employs the clamped current-transformer technique. However, no investigation has been carried out on the extraction of magnetic energy from an induction motor utilizing a clampless current-transformer method, which has similar capabilities for capturing magnetic field energy from an induction motor. The proposed project aims to create an electromagnetic transducer to harvest magnetic energy from an induction motor without a clamp by developing a magnetic field energy harvester. The main goal is to design and build a current transformer to capture magnetic energy from an induction motor. Radiation from magnetic fields is used as an energy-harvesting element to provide voltage performance from the induction motor rod core. The design contrasts stainless steel and carbon steel for the core material. It also consists of cylindrical and square rods for the core shape and 300 or 500 turns for the number of turns. Further, this design provides more flexibility since the transducer does not need to be clamped to the incoming supply to the induction motor; instead, it can be placed anywhere near the engine where the strongest magnetic field exists. The findings demonstrate that a material Carbon Steel long cylindrical core design is the higher output power with 52.95μW for 500 turns.

Paper ID: 29

TITLE: Analysis of Photovoltaic Module Degradation: An Experimental Investigation on the Correlation Between Partial Shading, Hot Spots, and EVA Discoloration

AUTHOR(S): Md. Imamul Islam, Mohd Shawal Bin Jadin, Ahmed Al Mansur, Mohd Salmizan Bin Mohd Zain, Mohammad Asif Ul Haq

Abstract:

The performance of solar PV modules is impacted by several environmental stressors, including high ambient temperatures, inadequate sunlight, shade, dust, soiling, cell damage, etc. To guarantee long-term clean and sustainable energy generation, it is crucial to understand performance degradation and PV module reliability. In this current research, an experimental investigation on the degradation analysis of three 80-watt monocrystalline PV modules that have been exposed for approximately ten years in a tropical environment in Malaysia as well as a correlation between partial shading, hot spots, and EVA discoloration has been conducted. The use of visual inspection, I-V curve measurement, thermal imaging, and degradation estimation have all been used to conduct an extensive study throughout this work. The outcome demonstrates the rate of degradation and hot spots phenomena of each module because of the partial shading impact. Hot spots development is to blame for the EVA discoloration seen on Panel 2 and Panel 1 cells. The degradation rates of Panel 1, Panel 2, and Panel 3 are 0.496%, 1.264%, and 0.189% per year, respectively. The study addressed the fact that dust and dried algae serve as mechanisms of PV degradation, and hot spots caused by partial shade may have an impact on cell discoloration.

Paper ID: 52

TITLE: Control of Low-Wind Energy-Generating Turbines using TRIZ Methodology: A Portfolio of Patented Technological Innovations

AUTHOR(S): Muhammad Saqib Iqbal and Zulhasni Abdul Rahiim

Abstract:

There have been several significant advances in the field of wind power. Wind turbines have been used for over 2,000 years and are still vital to the 21st century's global energy industry. The importance of advanced wind turbine control methods for inefficient energy collection is growing. The Pitch Control-ler adjusts the Wind Turbine (WT) blade using sensors. Adjusting a WT's pitch angle dampens structur-al modes and reduces blade root moment. These researchers could generate new ideas by combining the TRIZ approach of the systematic invention with data mined from patent databases. Pitch control tech-nology development may benefit from the structured creativity made possible by the TRIZ framework. TRIZ's novel approach to analysing patent portfolios, based on three key factors, may be fruitful. The three metrics evaluate the development of patented technology over the previous two decades and offer recommendations for the sector's future. Research and development in the scientific and technological fields covered by patents are essential sources of information for predicting and planning future techno-logical breakthroughs in various areas

Paper ID: 72

TITLE: Design of V-Shape Magnets Sandwich Flux-Switching Permanent Magnet Machines with Modular Rotor Topology

AUTHOR(S): Irfan Ali Soomro, Mahyuzie Bin Jenal, Erwan Sulaiman, Md Zarafi Ahmad, Nur Afiqah Binti Mostaman and Norsuhada Binti Zainal Abidin

Abstract:

Conventional flux-switching permanent magnet brushless machines (PMFSM) gained a lot of attraction due to their high torque densities, simple and robust rotor structure, and the permanent magnets and coils on the stator. The Vshape magnets sandwich PMFSM machine has been proposed to improve thetorque density of the machine in which two PM pieces in V-shape are sandwiched in one stator pole to enhance the PMs usage efficiency. 2D finite element analysis (2DFEA) method is employed to compare the performance of V-shape magnets sandwich PMFSM with salient rotor topology with that of V-shape magnets sandwich PMFSM with modular rotor, in terms of flux linkage, flux distribution, induced back EMF, and cogging torque. From the results it is shown that the salient rotor V-shape magnets sandwich PMFSM and V shape magnets sandwich PMFSM with modular rotor produces 0.03Wb and 0.02Wb respectively.

Paper ID: 85

TITLE: Distribution of Semiconductor Device Losses in Photovoltaic Transformerless Grid Connected Inverter Topologies

AUTHOR(S): Maaspaliza Azri

Abstract:

This paper examines losses distribution of devices in various H-Bridge Single-Phase grid-connected transformerless inverter systems. Topologies of the transformerless inverter with an ac-bypass circuit and dc-bypass circuit are investigated and verified by simulation results. To achieve maximum efficiency, the selected power semiconductor (IGBT and Diode) plays an important part in the inverter system design. Therefore, the power losses in the devices are also studied and analyzed in this paper. The power losses consist of power conduction losses and power switching losses. The estimation of the power semiconductor losses is verified by PSIM 9.0 software with the thermal module. This estimation is based on the insulated gate bipolar transistors (IGBTs) and diode manufacturer datasheets, which are included in the thermal module. The calculation of device losses has been discussed in this paper. The parameters given in the thermal module devices datasheet contribute to the level of power semiconductor losses in various photovoltaic H-Bridge transformerless grid-connected inverters. In this paper, the HGTG20N60A4D Fairchild Semiconductor and PS21A79 Powerex IGBT antiparallel diode de-vice have been simulated and analyzed. In conclusion, with the good thermal module in PSIM 9.1 software, the distribution losses in devices can be manageable. Therefore, regarding losses in the devices, the high performance of various inverter circuits can be designed. This thermal module is calculated accurately with the experimental so the user can identify which device is recommended before hardware is built

Paper ID: 106

TITLE: TCSC Optimization for Loss Minimization in Power System Using Computational Intelligence Techniques

AUTHOR(S): N. Balasubramaniam, I. Musirin, N. A. M. Kamari, A.A. Ibrahim

Abstract:

Minimizing power loss in transmission systems is crucial for achieving energy efficiency, lowering temperature rise and less monetary losses leading to a sustainable power system network in a utility. Flexible AC Transmission Systems (FACTs) have been vastly adopted in minimizing power loss and enhancing voltage profiles in power transmission systems. However, the effectiveness of FACTs devices in achieving these benefits relies heavily on their optimal placement and sizing within the transmission system. Suboptimal solutions on FACTs devices' location and sizing result in under-compensation or over-compensation, both of which are undesirable outcomes. Therefore, robust optimization techniques are necessary to attain optimal solutions. This study applies evolutionary programming (EP) and artificial immune system (AIS) as computational intelligence techniques to examine the effects of thyristor-controlled static compensators (TCSC) for loss reduction in power systems. Transmission real power loss is to be minimized, and the voltage profile of the transmission power system is to be improved. This study shows that the installation of TCSC substantially minimizes power system loss. The IEEE 30-Bus Reliability Test System (RTS) is used to validate the proposed application and compensation scheme The application of evolutionary programming and artificial immune system techniques provides valuable insights and solutions to power loss reduction ultimately improving the performance of transmission power systems. It was discovered that both techniques are comparable in minimizing the transmission loss in the system.

Paper ID: 107

TITLE: Congestion Management for Voltage Security Control in Power System

AUTHOR(S): Nur Arina Rabuan, Ismail Musirin, Norbaiti Sidik, Nor Azwan Mohamed Kamari, Norziana Aminudin, Dalina Johari, A.V. Senthil Kumar

Abstract:

Congestion in the power system can result from progressing load in the power system. This phenomenon may cause system instability which leads to failure in power delivery to the consumer. Thus, congestion management needs to be performed in power system operation and planning. This initiative will require a robust optimization technique so that power failure can be avoided. This paper presents Integrated Accelerated Mutation Evolutionary Programming for Congestion Management in Power Systems. In this study, a new optimization technique is introduced termed Integrated Accelerated Mutation EP (IAMEP). IAMEP is utilized to identify the optimal sizing and locations for distributed generation installation as an option to manage the congestion in the power system. A pre-developed voltage stability index, FVSI is utilized as the indicator for congested lines. Validation on the IEEE 30-Bus RTS demonstrates that the proposed technique managed to reduce the congestion in the power system. A comparative study with EP also reflects its superiority in managing the congestion phenomenon. The result would be beneficial to power system operators and planners for their transmission system management.

Paper ID: 35

TITLE: Analysis of Mismatch Power Loss and Degradation in Aged PV Modules and Arrays: Insights from an Indoor Experimental Investigation

AUTHOR(S): Md. Imamul Islam, Ahmed Al Mansur, Mohd Shawal Bin Jadin, Md. Hasan Maruf, ASM Shihavuddin

Abstract:

Once PV modules are subjected to extreme internal and external stress over an extended period, their performance suffers. The PV system arrays met such variables that resulted in mismatched power losses in the array while producing ener-gy at a large scale. The purpose of this research is to comprehend how irradiance and ageing contribute to mismatch loss, which occurs in PV arrays. In this study, three array configurations—series, parallel, and series-parallel—are taken into consideration while evaluating the output performance degradation of PV mod-ules at two distinct irradiances, 1000 W/m2 and 800 W/m2. The results of the ex-periment show that the deterioration of module power is caused by both irradi-ance and age. At 800 W/m2, the MML% for the series, parallel, and series-parallel topologies are 44.73%, 38.01%, and 42.2%, respectively. At 1000 W/m2, the MML% for the same configurations falls to 30.9%, 22.51%, and 27.9%. Fur-thermore, for both irradiances, the parallel setup displays a lower MML than the other two configurations. Additionally, Mono 1 (0.344/year) is the most deterio-rating panel out of the four, according to the examination of the deterioration rate of 10-year-old modules. These results emphasize the need to address irradiance and ageing in solar energy systems by stressing their negative impacts on power degradation and MML in PV modules and arrays.

PARALLEL SESSION 4

Paper ID: 87

TITLE: Design and Analysis of Filtration Membrane for Artificial Kidney

AUTHOR(S): Shazlina Johari, Nurul Izzatul Ain Ahmad Kamar, Bibi Nadia Taib, and Mohd Hafiz Ismail

Abstract:

Filtration membrane for artificial kidney has been developed and introduced to the medical line as a replacement for hemodialysis and hemofiltration treatment. In this work, three different filter designs made of Silicon Nitride with varying membrane thickness were studied and the mechanical behavior of filtration membrane which is displacement and stress are analyzed using ANSYS. During the simulation, it was observed that the highest deflection occurred at the central region of the membrane. The relationship between membrane thickness and displacement can be observed from the results. Thinner membranes were found to generate higher displacement, as evidenced by Design 3, where a membrane thickness of 15nm resulted in a recorded maximum deflection of 1.6um. Conversely, an increase in membrane thickness led to a decrease in deflection. It was also found that, Design 1, featuring the thinnest membrane of 15 nm, recorded the highest stress of 2.42 N/m^2. The simulated results obtained from the simulation of filtration membrane can serve as a valuable reference for the future fabrication of filtration membranes for artificial kidneys.

Paper ID: 25

TITLE: Free Fatty Acid Detection in Heated Palm Cooking Oil using an Open Path Optical Method

AUTHOR(S): W.S. Salleh, S. Nurulain, M.A.S. Aspar, M. R. Salim, H. Manap

Abstract:

Palm cooking oil is widely used worldwide due to its affordability and excellent oxidative stability during frying. However, continuous usage of cooking oil can lead to chemical deterioration, resulting in the formation of harmful compounds for human health, specifically the presence of free fatty acids. In this study, an open-path optical technique combined with spectroscopy was employed to identify these free fatty acids. With the open-path optical approach, a beam of incident light passes through the palm frying oil sample at a specific angle before being collected by a spectrometer. The intensity of the emitted light was then evaluated using the Spectrasuite program. The research findings revealed that each heated palm oil sample exhibited a unique absorbance spectrum. The detection of free fatty acids was successfully achieved at two specific wavelengths, namely 347.50 nm and 364.18 nm. Notably, the detection sensitivity for heating durations of 0 to 3 hours was found to be superior at the wavelength of 364.18 nm, as reported in the study.

Paper ID: 65

TITLE: Vandalism Detection in Videos using Convolutional Feature Extractor and LSTM Classifier

AUTHOR(S): Yau Alhaji Samaila, Patrick Sebastian, Aliyu Nuhu Shuaibu, Sulaiman Adejo Muhammmad and Isiaka Shuaibu

Abstract:

Actions or behaviors are typically categorized as being normal or abnormal. A technique used to find rare or unusual patterns, events, or data points that significantly differ from a dataset's expected or typical behaviour is known as abnormal activity detection, sometimes referred to as Anomaly detection or outlier detection. Walking, running, and crossing oil pipelines are seen as regular actions in the context of this study, whereas excavating, drilling, and sawing on the pipeline are regarded as anomalous action. A dataset designed exclusively for oil pipeline Vandalism detection (anomaly) is not publicly available, a new dataset was created and used to train and test the algorithm. The two main activity/action recognition processes are typically feature extraction and classification. Feature extraction entails collecting significant feature vectors from a dataset (videos) that can capture the features of the behaviours, whereas classification looks for the presence or absence of specific patterns to classify a video dataset as normal or abnormal. For feature extraction, Google and Xception Fine Tuned Networks are utilized, and a comparison is done to determine the best Network. Evaluation metrics such as elapsed time and accuracy served as the benchmark for comparison/selection. Experimental results reveal that Xception Net outperforms Google Network. Utilizing the feature vectors obtained from the Xception Network, Long Short-Term Memory (LSTM) is used to categorize the activity. To reduce crimes like oil pipeline vandalism, which has a significant impact on people's health, safety, the environment, and the economy, it is essential to have an automated anomaly detection system.

Paper ID: 69

TITLE: Hevea Brasiliensis-Based Lightweight Cement Brick: Development and Microwave Absorbing Properties

AUTHOR(S): Shafaq Mardhiyana Mohamat Kasim, Hasnain Abdullah, Nazirah Mohamat Kasim, Mohamad Nasir Taib, Ahmad Puad Ismail, Nur Shafikah Rosli, Ali Othman, and Basharudin Abdul Hadi

Abstract:

Services in telecommunications, particularly wireless communications, are in high demand as a result of the expansion of information technology through commu-nication media. However, while this progress is good for the populace, it also ex-poses people to high levels of radio frequency radiation especially from the telecommunications tower that located close to residential which could be harmful to all human races. This study was demonstrated the effectiveness of Hevea Brasili-ensis-based biomass as absorbing material in cement brick to eliminate radio fre-quency or more specifically microwave radiation. The absorption performance of anti-microwave Hevea Brasiliensis-based Non-autoclaved Aerated Cement (NAAC) brick was compared to commercial cement bricks in the frequency range of 1 to 12 GHz using the free-space arch reflectivity measurement method. Hevea Brasiliensis-based NAAC brick which uses carbon powder sawdust has the highest absorption performance compared to commercial cement brick in which show that it has potential as an anti-microwave material that can reach maximum absorption peak – 52.56 dB while for the commercial brick was only reaches maximum absorption peak at -12.74 dB. In overall, Hevea Brasiliensis-based NAAC brick performed up to -10 dB of absorption while the absorption for commercial brick were below -10 dB.

Paper ID: 118

TITLE: Enhancing Image Segmentation: Multilevel Thresholding using Artificial Bee Colony Algorithm

AUTHOR(S): Nor Farizan Binti Zakaria , Muhammad Nazmi bin Mohamad Rosly, Mohd Herwan Sulaiman, Rohana Abul Karim and Nurul Wahidah Arshad

Abstract:

Thresholding is a type of segmentation that involves dividing the pixels into separate groups based on their intensity level according to one or more threshold values. Thresholding is a popular image segmentation technique for converting gray-level images to binary images. This paper will demonstrate a Multilevel Thresholding (MTH) for image segmentation based on Artificial Bee Colony (ABC) algorithm. This paper shows the designing process for an image segmentation module using multilevel thresholding. The multilevel thresholding algorithm divides pixels into discrete zones, that segment the objects in the image, and it is the greatest solution for segmenting real-world pictures. The grey level histogram is used to determine the threshold point. It shows that each image has its own set of optimum threshold values. From there, we can get the optimum threshold value for multilevel thresholding based on the Artificial Bee Colony (ABC) algorithm. To get the optimum threshold value, Otsu's method has been used. After applying Otsu's Method, the algorithm is then analyzed by comparing the performance of multilevel thresholding using well-known benchmarks, Peak Signal-to-Noise Ratio (PSNR) and Structural Similarity Index (SSIM). The result shows that the ABC algorithm performs almost the same as the other three methods, which are Harmony Search (HS), Differential Evolution (DE) and Particle Swarm Optimization (PSO). This can be seen from the results of PSNR and SSIM which show small margins of difference between the four algorithms. It can be concluded that the ABC algorithm is proven to perform well in image segmentation. From the collected data, there are significant changes in the PSNR and SSIM values due to the various multilevel thresholding techniques. As the level rises, so does the quality of the segmented image.

Paper ID: 71

TITLE: Resting state EEG for Personality Traits Classification

AUTHOR(S): Umay Kulsoom, Dr. M. Naufal B.M. Saad, Dr. Syed Saad Azher Ali

Abstract:

Personality classification plays a vital role in providing a deeper understanding of human behavior and individual differences. The pandemic has brought about significant changes and challenges that have underscored the importance of personality classification. Personality classification facilitates understanding individuals' cognitive and emotional responses to stressors, and their potential implications for mental health, tailored support, workforce adaptation, communication, and public health messaging. Power spectral features extracted from EEG and self-reported assessments (NEO-FFI scores) are used as inputs to the Support Vector Machine (SVM) classifier to determine the feasibility of classifying personality from resting state EEG.

Paper ID: 80

TITLE: IoT-Enabled Water Quality Sensor: Detecting Concentration of Saccharomyces Boulardii Bacteria to Enhance Water Safety

AUTHOR(S): Muhammad Aqil Hafizzan Nordin, Mohd Faizal Jamlos and Abdelmoneim A. Bakhit

Abstract:

Internet of Things (IoT)-based sensors have transformed the measurement of water quality parameters such as a pH, dissolved oxygen (DO), electrical conductivity (EC), total dissolved solids (TDS), or temperature sensor. A recent study using Saccharomyces boulardii as a model microorganism at the Universiti Malaysia Pahang (UMP) biotechnology facility demonstrates this. After an hour of bacterial inoculation, the DO sensor was able to detect the presence of bacteria in the water, with the maximal DO reading increasing from 4 ppm to 8 ppm. However, after five hours, the DO level returned to normal due to the yeast's acclimation process. When the concentration of Saccharomyces boulardii was increased from 50 to 100 percent, the study found that the DO readings fluctuated. The 50% sample required up to 4 hours to normalize from 7.824 mg/l to 4.804 mg/l, whereas the 100% sample required 6 hours to normalize from 6.288 mg/l to 4.36 mg/l. This was due to the yeast depleting more oxygen from the culture medium, which harmed the yeast in the long run. The study concluded that IoT-based sensors can accurately measure water quality parameters and detect the presence of microbes in water. The study also revealed that the concentration of Saccharomyces boulardii can impact the DO reading, with higher concentrations taking longer time to normalize. This emphasizes the significance of employing IoT-based sensors to accurately measure water quality parameters.

Paper ID: 83

TITLE: Deep Learning-Based Yield Prediction for the Die Bonding Semiconductor Manufacturing Process

AUTHOR(S): Muhammad Ali Akbar, Ahmad Jazlan, Azhar Mohd Ibrahim and Arfah Ahmad

Abstract:

In the semiconductor manufacturing industry, consistently achieving a high yield is the primary target to meet customer demands and ensure continuous profitability. The ability to predict the yield of a particular manufacturing process at either the Front of Line and End of Line facilities is therefore essential in order to analyze Return of Investments (ROI), predictive maintenance and condition monitoring. However achieving high quality predictions with good accuracy is challenging due to the various uncertainties in the manufacturing process such as unexpected machine downtime and stoppage for maintenance. In this paper we propose a method using Deep Learning Long Short Term Memory Recurrent Neural Networks (LSTM-RNN) to perform day ahead forecasting of the yield from the Die Bond process at a particular semiconductor manufacturing facility. The method was implemented using MATLAB software, and the results demonstrate that the proposed approach achieves accurate yield forecasts with less than 8% error. Further improvements can be made by utilizing hourly data instead of daily data

Paper ID: 27

TITLE: Development of Readout Circuit using Nodal Array Approach (NAA) for Five Resistive Sensors Arrangement

AUTHOR(S): Fairuz Rizal Bin Mohamad Rashidi, Muhammad Farid Akmal Bin Fahrurrazi and Airul Sharizli Bin Abdullah

Abstract:

This paper applies a readout circuit to improve measurement output when reading the grouped resistive value in a matrix array format. The circuit is designed to address the main challenge faced in utilizing resistive pressure sensor arrays for foot plantar applications. The proposed approach, called the Nodal Array Approach (NAA), modifies the Wheatstone Bridge Circuit using nodal analysis technique and Kirchhoff's Current Law. By solving simulta-neous equations derived from the voltage readings of the readout circuit, the NAA accurately calculates the resistance values of the sensors. The readout circuit connection is of low complexity, utilizing resistive elements as the major components of the reading technique with only three iterations in-volved for each voltage node. Hardware results demonstrate that the NAA achieves high accuracy in obtaining a sensor's resistance value, while adher-ing to several limitations to avoid miscalculation (with an average calcula-tion error of less than 5%).

Paper ID: 110

TITLE: Investigation of Sensor Probe Performance on Soil Moisture Conditioning Monitoring System

AUTHOR(S): Nik Adham Faris, Muhammad Arif Osman, Aisyah Illani Sulaiman, Roshahliza M. Ramli and Nadzirah Mohd Mokhtar

Abstract:

The Internet of Things (IoT) is continuously advancing with improved inter-net technology, providing new opportunities for innovation such as in agri-culture that can benefit from IoT devices. This paper focuses on investigat-ing the performance of a sensor probe in an environmental conditioning monitoring system. The project aims to develop an IoT-based moisture sen-sor capable of collecting and storing data on the cloud using a cloud server. This study explores optimal conditions for accurate data collection and ana-lyzes the sensor's performance in different soil conditions, including dry, waterlogged, and normal. A wireless sensor network integrated with the moisture sensor is designed and implemented for real-time data collection through the IoT infrastructure. Then, the acquired information is stored on a cloud platform. By varying soil conditions, the sensor's performance is thor-oughly examined, providing insights into its accuracy and reliability. This knowledge is valuable for effective strategies in agriculture and water re-source management, improving decision-making and resource allocation. The research contributes to the advancement of environmental conditioning monitoring systems, informing the development of enhanced sensor technol-ogies, and promoting more efficient and sustainable agricultural practices.

Paper ID: 88

TITLE: Hand Vein ROI Extraction using Faster R-CNN

AUTHOR(S): Marlina Yakno, Junita Mohamad Saleh, Mohd Zamri Ibrahim, Syamimi Mardiah Shaharum, Rohana Abdul Karim

Abstract:

The extraction of the region of interest (ROI) in hand vein images plays a crucial role in their detection. Accurately extracting the vein area faces chal-lenges such as variations in hand poses, lighting conditions, orientation, ap-pearance, and noisy background. Although numerous techniques have been proposed for ROI extraction of hand veins, their capabilities are often limited to a specific hand pose and location. To addresses this limitation, this paper presents a deep learning- approach using Faster R-CNN for adaptive ROI vein extraction. The proposed system is evaluated using two hand vein data-bases: self-acquisition and SUAS, encompassing diverse hand poses. To as-sess the performance of the proposed technique, it is compared to two exist-ing ROI vein extraction techniques. The comparative results demonstrate that the proposed technique achieves impressive performance in accurately locating the ROIs for various hand poses and locations. By employing a deep learning-based approach and evaluating its effectiveness on different hand vein databases, this appear offers a promising solution for adaptive ROI vein extraction, overcoming the limitations of existing techniques.

PARALLEL SESSION 5

Paper ID: 77

TITLE: The modified ARIMA predicting algorithm apply on Glucose Values Prediction.

AUTHOR(S): Bian QingXiang, Azizan As'array, Cong XiangGu, Khairil Anas bin Md Rezali, and Raja Mohd Kamil bin Raja Ahmad

Abstract:

In order to predict the blood glucose values of diabetic patients, this study uses two Autoregressive Integrated Moving Average Model (ARIMA) models—the self optimized ARIMA model and the ARIMA model based on Bayesian optimization to analyze historical data from the continuous blood glucose monitoring system (CGM) and the equipment calibration value as the training data set to foretell a patient's blood sugar level in the future in order to prevent hypo- and hyperglycemic episodes. CGM data from 8 patients obtained by Suzhou Municipal Hospital in Jiangsu Province, China, was used to validate the data in this paper on the two models. Obtain and compare the minimum Mean Square Error (MSE) values of the prediction results of the two models at 15 minutes, 30 minutes, and 45 minutes. In order to improve the accuracy of the patient's blood glucose level prediction, the model using the smallest MSE value among the two ARIMA models was used as a method for predicting the patient's blood glucose level prediction.

Paper ID: 124

TITLE: Experimental Evaluation of Sensor Readings in Invasive Electrical Capacitance Tomography for Conducting Pipe Applications – Initial Study

AUTHOR(S): Haziq Syakir Hamzah, Yasmin Abdul Wahab, Ain Eazriena Che Man, Nurhafizah Abu Talip @ Yusof, and Mohd Mawardi Saari

Abstract:

Electrical Capacitance Tomography (ECT) is a promising imaging technique for monitoring gas-liquid flows in industrial pipelines. In this study, we de-veloped an ECT system with eight electrodes to detect the presence of static gas inside oil, specifically for oil-gas regime. We optimized the sensor design using a Design of Experiment (DOE) method and developed a signal genera-tor and signal conditioning system to collect data offline. Our experimental approach involved the use of an invasive approach with the placement of sensors within the pipe to improve the accuracy of the measurements. We conducted a series of experiments with different oil-gas regimes to evaluate the performance of the ECT system. The results demonstrate that the inva-sive approach significantly enhances the sensor readings, leading to im-proved imaging accuracy and reliability for detecting static gas inside oil. This study contributes to the understanding of the sensor reading perfor-mance in invasive ECT for oil-gas regime and provides valuable insights for optimizing the measurement process. The findings have implications for the development of more robust and accurate ECT systems in industrial settings.

Paper ID: 76

TITLE: Predictive Analysis of a Lift Motor using Autoregressive Integrated Moving Average (ARIMA) Model for Vibration-based Condition Monitoring

AUTHOR(S): Sharafiz Rahim, Adnan Dehghani, Khairil Anas Md Rezali, Abdul Murad, Siti Nor Azila Khalid, Azahar bin Mohd, Zamil Hisyam, Mohamad Fikri Bin Mohamad Yunus

Abstract:

Condition based monitoring (CBM) has emerged as a promising technique for assessing the condition and performance of various mechanical systems, including lift motors. This paper focuses on the application of vibration signal analysis for SHM of lift motors, enabling the early detection of potential faults and ensuring reliable and safe operation. Lift motors are subjected to various mechanical stresses, vibrations, and operational loads during their service life. These factors can lead to wear, fatigue, and other structural is-sues that may compromise the motor's performance and reliability. Vibration analysis has proven to be an effective non-intrusive method for monitoring the dynamic behavior of lift motors and detecting early signs of degradation. The acquired vibration signals are processed and analyzed using various techniques, such as Fourier analysis, time-frequency analysis and Auto-regressive Integrated Moving Average (ARIMA) model. The ARIMA model is capable of capturing the underlying patterns and trends in time series data, making it suitable for forecasting and anomaly detection in vibration signals. This paper also compares the measured vibration signatures with reference baselines or established thresholds for possible early fault detection and diagnosis.

Paper ID: 40

TITLE: Application of Granitic Residual Soil and Palm Oil Fuel Ash as an Absorbing Material to Develop High-Strength Anti-Microwave Brick Walls

AUTHOR(S): Nur Hashira Narudin, Hasnain Abdullah, Khairunnisa Ab Razak, Mohd Nasir Taib, Basharudin Abdul Hadi

Abstract:

Electromagnetic pollution from modern technologies has resulted in electromag-netic radiation. Wireless communication, power transmission, and communica-tions gadgets utilized in our daily lives, such as mobile phones, tablets, and laptop computers, expose people to electromagnetic pollution. The pervasiveness of these technologies has raised concerns regarding the safety of human radio fre-quency radiation exposure. The effectiveness of radiation-absorbing materials (RAM) in absorbing microwave energy has led to an increase in attention in re-cent years. Substantial research has been conducted to produce new radiation-absorbing materials with great absorbing performance. In this research, anti-microwave brick walls were developed. As we know, brick is a fundamental building unit and the most often used construction material. However, the exist-ing brick is incapable of absorbing microwave energy. This study aims to exam-ine the absorption performance of solid anti-microwave brick walls with various raw material composition ratios incorporating granitic residual soil and Palm Oil Fuel Ash (POFA) as absorbing materials. Agricultural waste is high in lignin content, with about half of the components containing carbon which is a good electromagnetic wave absorbent. The absorption performance of the anti-microwave bricks was tested using the Naval Research Laboratory (NRL) Arch free-space method, and the findings were studied over a frequency range of 1 to 12GHz. According to the results of the investigation, solid anti-microwave bricks containing 15% landslide and 35% POFA achieved the best absorption perfor-mance, with a maximum absorption of -39.19dB with great compressive strength, 13.615MPa.

Paper ID: 13

TITLE: Designing GMR Sensor Probe using Transmitter Coil for Artificial Crack Identification on Brass and Mild Steel Calibration Block

AUTHOR(S): Kharudin Bin Ali, Nazry Abdul Rahman, Damhuji Bin Rifai, Zulfikri Salleh. Ahmad Anwar Zikri Othman

Abstract:

Giant Magnetoresistance (GMR) sensors have become increasingly popular for Non-Destructive Testing (NDT) applications, especially in eddy current inspec-tion. GMR sensors have high sensitivity and low noise characteristics, and they have been used for detecting surface cracks in conductive materials and monitor-ing the structural health of steel bridge cables. According to the GMR sensor ap-plication, it also can be used for detecting corrosion on pipelines compared to conventional eddy current systems that are only applicable to measure the coating thickness and depth of defect on pipeline. In this work, the designing of a GMR sensor probe by using coil as the excitation signal transmitter has been done for measuring the depth of defect based on a calibration block on two types of mate-rial within brass and mild steel material. This system will measure the lower depth is 0.5mm and the higher depth 5mm. The turn of coil for the excitation sig-nal transmitter is set on 600turns where the diameter of the coil is 0.17mm. Based on the Brass steel calibration block, a sudden increase occurs at a defect depth of 5mm which is as much as 2.443Vp compared to the previous one which is 2.427Vp (4.5mm) and 2.421Vp (4mm). In addition, a sudden increase also oc-curred for mild steel, which is in the defect depth of 3.5mm, which is 2.458Vp compared to the previous 2.441Vp (3mm) and 2.431Vp (2.5mm). Finally, the re-sult shows that when the depth of defect is increased then the value of signal Voltage peak (Vp) also increases.

Paper ID: 44

TITLE: Performance evaluation of Smoothed Functional Algorithm based methods for Sigmoid-PID Control optimization in MIMO Twin-Rotor Systems

AUTHOR(S): Mok, RenHao; Ahmad, Mohd Ashraf

Abstract:

This paper explores the tuning of the Sigmoid Proportional-Integral-Derivative (SPID) controller using variations of the Smoothed Functional Algorithm (SFA) for the underactuated Multiple-Input Multiple-Output (MIMO) twin-rotor system. The SPID controller, incorporating a sigmoid function, extends the applicability of traditional PID controllers to complex, non-linear systems. However, SPID tuning presents challenges due to the added control parameters and the inherent non-linearity of the sigmoid function. To effectively tune the SPID con-troller, SFA is recommended, which stochastically optimizes the parameter space without requiring an explicit mathematical model. However, the standard SFA suffers from unstable convergence issues, necessitating modified approaches such as the Norm-Limited SFA (NLSFA) and Memory-Based SFA (MSFA). NLSFA constrains gradient approximation within boundaries, preventing excessively large approximations that lead to divergence but at the cost of an additional optimization parameter. The MSFA introduces a memory function to consider optimal solutions from previous iterations, promoting continuous convergence. The effectiveness of these SFA variations in optimizing SPID controllers for a MIMO twin-rotor system is compared, offering insights into the control and optimization of complex non-linear systems.

Paper ID: 63

TITLE: Monitoring Case Study for Motion Crowd State Transitions in Mina

AUTHOR(S): Sami A. M. Saleh, A Halim Bin Kadarman, Waheed Ghanem, Sanaa Ghaleb, Antar Abdul-Qawy, Zainal Abidin Arsat, Solehuddin Shuib

Abstract:

Crowd collectiveness paradigm is a promising field for a practical monitoring and controlling the mass of pilgrims during the Hajj period. This technique describes the degree of the individuals union on a collective motion. In this paper, a coherent motions merging is applied to detect and investigate the collectiveness of the pilgrims in three states of lane formation during the Hajj; laminar, stop-and-go and turbulent flow. The experiment has been conducted on simulated agents-series dataset of Hajj crowd. Experimental results show that the collectiveness degree has changed and it has been affected by the coherent motion nature of the crowd based on these three states.

Paper ID: 75

TITLE: Pick and Place Robot Arm Using PLC Modeling of LLD and PN

AUTHOR(S): Zulfakar Aspar, Nurul Huda Abd Rahman and Mohd Zhafri bin Baharudin

Abstract:

Robot Arm is extensively being used in the industry for various applications. With advances in microcontrollers and various other digital controllers, this re-search is going to investigate if it is still feasible to develop a robot arm applica-tion by using a Programmable Logic Controller (PLC). Since PLC modeling has become more complex, the project is limited to the functions of the robot arm for pick and place activities which are limited to two axes. A flowchart is good for controller planning while the actual implementation is done by using a Ladder Logic Diagram (LLD). This project is going to discuss in detail the development of the robot structure, pneumatic control and PLC modeling using LLD. This project is also going to compare the robot arm with another pick and place robot arm which has similar functions. The pick and place robot arm was verified by running a simple Printed Circuit Board (PCB) as a load in an actual operation. For PLC modeling improvement, Petri Net was used to develop the PLC model followed by automatically generate the equivalent LLD model. By modeling at a higher level of abstraction, it is easier to develop, improve and maintain the LLD model. In the future, the pick and place robot arm can also be modified to fulfill a specific mission by modifying the PLC model.

Paper ID: 23

TITLE: Development of a Differential Magnetic Probe to Evaluate Metal Loss due to Corrosion

AUTHOR(S): Mohd Aufa Hadi Putera Zaini, Mohd Mawardi Saari, Ummi Sabihah Mohd Yusdi, Nurul A'in Nadzri and Zulkifly Aziz

Abstract:

Corrosion is one of the most common problems associated with steel structures. The occurrence of corrosion may lead to metal loss, at which point might threaten the integrity of a steel structure. Therefore, the employment of magnetic flux leak-age (MFL) and eddy current testing (ECT) is beneficial in providing detection of metal loss due to corrosion. Thus, a differential magnetic probe using both meth-ods is developed. The probe consists of two fluxgate sensors and an excitation coil. Then, a line scan measurement is conducted on a 6-mm mild steel sample with metal loss defects. From the result of the line scan measurement of the MFL signals, the presence and depth of the defects could be identified. Meanwhile, on-ly the defect presence can be identified from the ECT signals, although only re-stricted to higher frequencies detection

Paper ID: 20

TITLE: Magnetic Field Sensor Based on Corroded Multi-mode Fiber Structure

AUTHOR(S): Nurainie Husin, Chew Sue Ping, Latifah Sarah Bt. Supian, Anis Shahida Niza Bt. Mokhtar

Abstract:

Magnetic field detection is an important area in magnetic field sensing as it has various usages such as measuring earth's magnetic field strength, detecting mag-netic anomalies of different characteristics as well as detecting submarines for the military. This paper proposed magnetic field optical sensor based on magnet-ic fluid (MF) using the singlemode-multimode-singlemode (SMS) structure. The SMS structure was corroded with hydrochloric acid (HCl) to enhance its sensitiv-ity in detecting magnetic field strength. The short segment of MMF in the SMS sensor acts as sensing element and has occurrence of multimode interference (MMI). The sensor was proven can detect magnetic field strength from 1.5 mT to 7.4 mT.. The achieved magnetic field strength sensitivities are -795.2 pm/mT and -327.9 pm/mT, corresponding to the length of MMF for 39mm and 45mm, respec-tively as the sensors are corroded for 900s. The linear fitting coefficient achieved for 39mm and 45mm of MMF are 0.8884 and 0.9814.

Paper ID: 115

TITLE: Classification of Palm Oil Quality using Case-Based Reasoning Base on Odor and Optical Data

AUTHOR(S): Mujahid bin Mohamad, Muhammad Sharfi bin Najib, Razali bin Muda, Saiful NIzam bin Tajuddin and Mohammad Fakhireen Aminudin

Abstract:

This study aims to develop an advanced categorization mechanism using e-nose and optical sensor technologies to effectively evaluate the quality of palm oil. The objective is to enhance the precision and effectiveness of palm oil classification by integrating odor and color concentration assessment. By utiliz ing an optical sensor that relies on color concentration, the primary focus is on categorizing the quality of palm oil based on its chromatic characteristics. This approach ensures an impartial and effective evaluation of the oil. Additionally, the study evaluates palm oil quality by employing e-nose and optical techniques to consider both aroma and chromatic properties. The electronic nose captures the olfactory profile, while the optical sensor measures chromatic concentration. By combining these measurements, a comprehensive assessment of palm oil quality is achieved, encompassing sensory and visual attributes. This research significantly contributes to improving quality control and assurance procedures in the palm oil sector through the development of an intelligent classification system that integrates e-nose and optical sensor data. The proposed system offers an enhanced and unbiased method for grading palm oil, promoting sustainable production techniques, and meeting the increasing demand for premium palm oil commodities.

PARALLEL SESSION 6

Paper ID: 62

TITLE: A Novel Active Cell Balancing Approach Based on Reinforcement Learning for SoC Balancing Of Four Lithium-ion Battery Cells.

AUTHOR(S): Neha khan and shreasth

Abstract:

. Battery lifetime and performance are critical concerns for electric vehicles (EV's)and energy storage systems (ESS). However, factors such as environmental variations and manufacturing defects often result in charge imbalance among battery cells, leading to reduced energy capacity and power performance of the entire battery pack. To address this issue, cell equalization becomes necessary. In recent years, the advancements in deep reinforcement learning (DRL) have made it a viable tool for battery management systems in electric vehicles. In this research paper, a new method is introduced for active cell balancing of a battery pack consisting of four series connected lithium-ion batteries. The approach utilizes deep reinforcement learning (DRL) within a MATLAB simulation. A deep Q-learning (DQL) algorithm is used for the training of DRL agent, and a dc-dc Zeta converter is used to transfer the excess charge from the overcharged cell to the under-charged cell in the battery pack. Additionally, the proposed equalization topology focuses on selecting the specific cells that requires balancing, aim-ing to enhance the speed of the equalization process. The simulation results demonstrated that SoC convergence among four Li-ion cells (with an SoC difference of as little as 0.5 %) occurs within 500 seconds using the pro-posed novel integration.

Paper ID: 8

TITLE: Performance Comparison of Conventional and V-Shape Magnets Sandwich Flux-Switching Permanent Magnet Machines with Modular Rotor Topology

AUTHOR(S): Irfan Ali Soomro, Mahyuzie Bin Jenal, Erwan Sulaiman, Md Zarafi Ahmad, , and Nur Afiqah Binti Mostaman

Abstract:

Conventional flux-switching permanent magnet brushless machines (PMFSM) gained a lot of attraction due to their high torque densities, simple and robust ro-tor structure, and the permanent magnets and coils on the stator. The sandwich PMFSM and V-shaped magnets PMFSM machine has been proposed to im-prove the torque density of the machine in which two PM pieces are sandwiched in one stator pole to enhance the PMs usage efficiency. 2D finite element analysis (2DFEA) method is employed to compare the performance of conventional and V-shape magnets sandwich PMFSM with modular rotor topology, in terms of flux linkage, flux distribution, induced back EMF, cogging torque and average torque. From the results it is shown that both motors have almost produced same flux linkage and Sandwich PMFSM generates slightly high torque than V-shape magnets sandwich PMFSM with modular rotor.

Paper ID: 9

TITLE: Assessing the Effects of DG Types and Penetration Levels on Transmission System Loss Control through Computational Intelligence-Based Technique

AUTHOR(S): Mohd Helmi Mansor

Abstract:

This paper presents a study on the impact of Distributed Generation (DG) types and penetration levels on loss control in transmission systems. To achieve this, an Artificial Immune System (AIS) algorithm is utilized in conjunction with MATLAB simulations on the IEEE 30-Bus Reliability Test System (RTS). Penetration level is defined as the number of DGs installed within the system, and four types of DGs are considered based on their real and reactive power delivery/consumption characteristics. The simulation results are divided into two parts: the first part focuses on randomizing DG location and sizing to obtain the minimum total system loss, while the second part investigates the effect of DG penetration level on total system loss reduction with fixed DG capacity. The study demonstrates that installing four Type-1 DGs leads to the highest total system loss reduction. Moreover, higher DG penetration levels result in greater total system loss reduction with DGs of the same capacity. These findings offer insights for optimizing DG deployment strategies in transmission systems, thus enhancing their efficiency and reliability.

Paper ID: 11

TITLE: Optimal Placement of Renewable Distributed Generation and Capacitor Bank to Minimize losses with Particle Swarm Optimization

AUTHOR(S): SN Syed Nasir, T Sohail, JJ Jamian and R Ayop

Abstract:

Power loss is an important aspect of the power system that must be kept as low as possible. The optimal siting and sizing of distributed generation (DG) and shunt capacitor at distribution networks for the purpose of minimizing real power loss is attracting a lot of attention from electric power utilities these days. DG is expected to play an important role in the power system's residential, commercial, and industrial sectors. Traditional electricity sources can be replaced with DG, which can also be used to improve the current electrical system. Capacitor bank and DG combined will improve system performance even further. This paper presents a method based on an analytical approach for optimal allocation (sizing and siting) of DG and capacitor bank to reduce overall real power losses in the distribution network subject to equality and inequality constraints. It is common practice to reduce power losses and im-prove the voltage profile of a distribution system by placing DG and capacitors in the best possible locations. For this research, the IEEE-33 and IEEE-69 bus systems are used. A backward-forward sweep load flow analysis will be performed using MATLAB software to investigate power losses and voltage magnitude. Particle swarm optimization was used to optimize the placement of the DG and capacitors in this project to achieve the lowest possible power losses. The research demonstrates that the proposed method effectively reduces real power losses in the distribution network. The optimized allocation of DG and capacitors resulted in improved voltage profiles and minimized power losses.

Paper ID: 99

TITLE: Performance Analysis of GA and PSO Based PI Controller for Cascaded H-bridge Multilevel Inverter Output Voltage Regulation

AUTHOR(S): Nur Huda Binti Ramlan, Habri bin Marzuki, Suliana Ab. Ghani, Nizaruddin M. Nasir, Muhammad Afiq Iqmal Norazman

Abstract:

This paper presents a performance analysis of Genetic Algorithm (GA) and Par-ticle Swarm Optimization (PSO) based Proportional-Integral (PI) controllers for regulating the output voltage of a Cascaded H-Bridge Multilevel Inverter (CHMI) during load variations. Proportional-Integral (PI) controller is the most common controller used to solve this issue due to its simple structure, high stabil-ity, minimal steady state error and ease of implementation. However, the perfor-mance of this controller is sensitive to parameter variation and has limited per-formance for nonlinear systems such as CHMI. The study aims to evaluate and compare the effectiveness of GA and PSO in achieving voltage regulation in the CHMI system using MATLAB Simulink. GA and PSO are applied to optimize the parameters of the PI controller to maintain the desired output voltage despite load variations. The simulation experiments are conducted under load variations to assess the performance of the controllers. The simulation results demonstrate that both GA and PSO based PI controllers effectively regulate the output voltage of the CHMI system during load variations. However, a comprehensive analysis reveals that the PSO algorithm outperforms the GA algorithm in terms of voltage regulation accuracy and response time.

Paper ID: 68

TITLE: The Impact of Cleaning Bird Drops for PV Power Increment: An Experimental Study in Dhaka, Bangladesh

AUTHOR(S): Ahmed Al Mansur, Sabbir Hasan Tohid, Md. Mostafizur Rahman, Md. Shahin Alom, Md. Sabbir Alam, Shaquar Islam Leyon, Chowdhury Shajjad Haider, Md. Imamul Islam, Mohd Shawal Jadin, and Ratil H Ashique

Abstract:

Non-uniform shading causes significant Power reduction in rooftop Photovoltaic (PV) systems. Bird drops are one of the key factors which cause non-uniform shading on the PV module. Regular cleaning of dusty PV modules can enhance the output power significantly. In this work, a water-based cleaning method is applied on a 2×2, 40W PV array with bird-dropping conditions to investigate the output power enhancement. The experimental test is done for seven different cases of the interconnection of the PV modules for both clean and unclean conditions. The experimental results show that the output power is increased significantly after cleaning the bird drops. The maximum output power, 35.2 W is achieved for case 6, while the percentage of power enhancement (PPE) is made at 6.21%. The highest PPE is achieved at 16.69% for case 7.

Paper ID: 97

TITLE: Enhancing Power System Resilience through Evolutionary Programming for High Impact Low probability Events

AUTHOR(S): Fathiah Zakaria, Ismail Musirin, Nor Azwan Mohamed Kamari, Norziana Aminuddin, Dalina Johari, Sharifah Azwa Shaaya, Abdullah Akram Bajwa, A. V. Senthil Kumar

Abstract:

The sustainability of power systems is a vital need for modern societies. The increasing frequency of power shutdowns triggered by severe weather events, which are worsened by the effects of climate change, has intensified research efforts aimed at enhancing the resilience of power systems. Reme-dial action needs to be planned for improving the power system's resilience. The installation of distributed generation (DG) is one of the suitable efforts to alleviate this phenomenon. This paper presents enhancing power system resilience through evolutionary programming for high-impact low probability (HILP) events. Validation on IEEE 30-Bus Reliability Test System (RTS), solved us-ing Evolutionary Programming (EP) under extreme weather demonstrates its capability in improving the power system resilience. In this study, the EP technique is used to find the optimal location and sizing of DG for the pur-pose of improving the power system's resiliency in the case of HILP events. The results demonstrate that this algorithm effectively quantifies the system's resilience under extreme weather events. The results could be beneficial to power system operators and planners.

Paper ID: 56

TITLE: Development of Flood Early Warning System by Monitoring Pagoh River Water Level and Rainfall Distribution

AUTHOR(S): Atiqah Amiera Kamarudin, Muhammad Rusydi Muhammad Razif, Omar Abu Hassan, Muslim Abdullah Zaik and Nurul Hasyimah Mohd Mustapha

Abstract:

Floods occur on a yearly basis in Peninsular Malaysia, mainly during the monsoon seasons, which begin in October for the second inter monsoon and end in November and December for the early Northeast monsoon. This project is being carried out to provide locals living near the Pagoh River with an early warning system. The goal of this project is to monitor the river's water level, measure the intensity of rainfall around the river, and collect live stream footage of the river before, during, and after the flood to help citizens keep informed about the river's current status. Flooding frequently causes both physical and financial damage. By utilizing a centralized Internet of Things (IoT) application, Blynk, the output from these three components can give actual results regarding the current state of river water levels and the danger of impending floods. This project will be able to wirelessly alert individuals about the river's water level and the current status in the river near them.

Paper ID: 128

TITLE: DC-DC Buck Converter Control using Super Twisting Sliding Mode Control

AUTHOR(S): Maziyah Mat-Noh, Ng Yu Jun, M.S Bakar

Abstract:

This paper presents voltage control in a DC-DC buck converter for the output tracking problem of DC-DC converters with varying in input voltage. Switching dc-dc converter systems are non-linear and time-varying in nature. Therefore, achieve stable output voltage, a super twisting sliding mode controller algorithm (STWA) is proposed. The STWA is proposed to assure the sliding surface con-verge in finite time with reduction in chattering effect as discontinuous of conven-tional SMC causes high frequency oscillation in control input and sliding surface. The performance of the proposed controller is compared to conventional SMC in order to see the effectiveness of the controller in reducing chattering effects and improve steady-state error. The simulation results have shown that STWA able to improve chattering effect improve the transient performance and reduce stead-state error

Paper ID: 47

TITLE: Virtual Power Plant Management Using PID Controller

AUTHOR(S): Aisyah Bukhari, Siti Hajar Yusoff, Muhammad Sharir Fathullah Mohd Yunus, Siti Nadiah Mohd Sapihie, Nur Syazana Izzati Razali

Abstract:

Virtual Power Plant (VPP) is a reliable system for energy production and the at-tractiveness comes from the fact that VPP can control the energy production in order to fulfill the demand of consumers. However, the delay in communication and the varying output of the Distributed Energy Resources (DER) can cause in-stability to the system and the VPP will then operate in a suboptimal condition. Therefore, this project aims to design a VPP system that uses a PID controller to achieve stable signal that can deliver the power efficiently with minimal delay for a solar and wind farm with load. From observation, the tuning of the PID con-troller's Kp, Ki and Kd results in a signal with reduce rise time and overshoot, eliminate steady state error, improve transient response and increase stability of the system. The simulation observes the performance of PID with reference volt-age of 25V and 30V. The output voltage is constant throughout the simulation proving the stability of the circuit while eliminating errors.

Paper ID: 19

TITLE: Optimal Coordination of Overcurrent Relays using Barnacles Mating Optimizer (BMO)

AUTHOR(S): Noor Zaihah Jamal ; Muhammad Yusuf Shamsuddin

Abstract:

The purpose of optimal coordinating Overcurrent Relays (OCR) is to establish a precise time interval, known as the coordinated time interval, CTI between the primary and backup relays' operations. In order to reduce all primary relays' tripping time and ensure power system dependability the value of TDS and PS must be optimized. A nature-inspired meta-heuristic algorithm called Barnacles Mating Optimizer (BMO) is implemented to solve this optimal OCR coordination problem. BMO is tested to the IEEE 8-bus test system with normal inverse characteristic curve (IDMT) as in the IEC guideline. The findings are then compared to the other well-known optimization algorithms, such as GA and PSO to evaluate the BMO's feasibility and efficiency performance of the method. The study showed that the proposed method improves OCR coordination's OF in an IEEE-8 bus system better than other selected methods tested

ABSTRACTS (ONLINE EVENT)

PARALLEL SESSION 7

Paper ID: 104

TITLE: UMP FPGA Cube: An Ariel Monitoring System Design for Environmental Surveillance using FPGA

AUTHOR(S): Nurul Hazlina Noordin, Amir Farhan Bin Mohd Rasidi, Rosdiyana Samad, Mohamad Shaiful Abdul Karim

Abstract:

This project presents the development of an aerial monitoring system, known as a UMP FPGA-Cube, designed for environmental surveillance ap-plications. The UMP FPGA-Cube incorporates an FPGA DE10-Lite Devel-opment Board, an Arduino Uno R3 Microcontroller, and various sensors in-cluding temperature and humidity, GPS, barometric, and accelerometer sen-sors. The system aims to collect real-time telemetry data from below 1km al-titude and transmit it wirelessly to a ground station for analysis. By integrat-ing FPGA technology, Arduino control, and a selection of sensors, the UMP FPGA-Cube enables accurate and reliable data acquisition. The wireless communication system ensures timely transmission of telemetry data, en-hancing efficiency in environmental monitoring. The analysis of data col-lected from different locations and altitudes provides valuable insights into environmental conditions, contributing to informed decision-making and ef-fective environmental management. This research offers a cost-effective and versatile solution for environmental surveillance, showcasing the potential of the UMP FPGA-Cube system in gathering and analyzing telemetry data for a wide range of environmental applications.

Paper ID: 109

TITLE: Empowering Traffic Management: Anomaly Detection in Vehicle Traffic Flow using XGBoost and Isolation Forest Algorithms

AUTHOR(S): Qamil Zhafri bin Ahmad Nizam, Mohd Zamri Ibrahim, Norasyikin Fadilah, Md Rizal Othman and Ahmad Afif bin Mohd Faudzi

Abstract:

Anomaly detection in vehicle traffic flow plays a crucial role in ensuring efficient transportation systems and maintaining public safety. However, traditional methods for anomaly detection present certain limitations. For instance, older techniques often rely on statistical-based approaches, such as using standard deviation and assuming a normal data distribution, to identify anomalies based on statistical attributes. While these methods have paved the way for more advanced approaches, such as XGBoost and Isolation Forest, which capture complex patterns and relationships in the data, providing improved accuracy and flexibility in anomaly detection. This paper proposes a method for anomaly detection in vehicle traffic flow using XGBoost and Isolation Forest algorithms. XGBoost is a powerful gradient boosting framework that effectively captures complex patterns in the data, while Isolation Forest is an unsupervised learning algorithm that isolates anomalies based on their unique characteristics. The approach involves preprocessing the traffic data, extracting relevant features, and training the models using XGBoost and Isolation Forest. Experimental results on real-world traffic datasets demonstrate the effectiveness of the proposed method, achieving a high accuracy using a threshold of 75% for XGBoost and 40% for Isolation Forest in detecting anomalies. This approach has the potential to enhance traffic management systems and improve overall traffic flow efficiency.

Paper ID: 111

TITLE: Enhanced Horse Stable Security Monitoring using Deep Learning: Investigating YOLO Techniques and Architecture

AUTHOR(S): Nurul Alea Ashifah, Syamimi Mardiah Shaharum, AAM Faudzi, Marlina Yakno, WSW Samsudin and Paiza Md Dom

Abstract:

The aim for this paper is to develop an enhanced horse stable security monitoring using deep learning. The YOLO techniques are developed using normalized standard initialization and trained with a dataset of sample photos from horse stables, encompassing both humans and horses. The trained weights are validated using a test video from a horse stable at Tanjung Lumpur. The implementation of the findings is carried out using the Python language. Consequently, this study investigates the YOLO techniques and their architecture, analyzing the best approaches for the proposed system. The proposed approach achieves a high precision of 80% for optimum video detection and 86% for real-time detection. The performance analysis identifies YOLOV4 with a threshold value of 0.7 and a larger dataset as the most effective system to implement. Overall, this research delves into the investigation of YOLO techniques and their architecture, contributing to the improvement of security monitoring in horse stables. By employing deep learning and advanced object detection methodologies, the performance and reliability of security monitoring systems in equestrian environments are enhanced.

Paper ID: 119

TITLE: Optimizing Image Segmentation: A Multilevel Thresholding Based On Differential Evolution

AUTHOR(S): Nor Farizan Binti Zakaria, Luqman Hakim Bin Amirol Husainy, Mohd Herwan Sulaiman, Rohana Abul Karim and Nurul Wahidah Arshad

Abstract:

Thresholding is a sort of segmentation that divides pixels into discrete groups depending on their intensity level according to one or more threshold values, as we all know. Thresholding is a popular image segmentation technique for converting grey-level images to binary images,. This project is a Multilevel Thresholding Algorithm for image segmentation based on Differential Evolution. We have design an image segmentation module using Multilevel Thresholding (MTH). The Multilevel Thresholding (MTH) technique separates pixels into discrete zones that respect the image's objects and is the best option for segmenting real-world images. The histogram of an image determines the threshold point. It demonstrates that each image has a unique set of optimal threshold values. From that, we get the optimum threshold value in Multilevel Thresholding (MTH) based on Differential Evolution. We apply the Otsu method to identify the best optimum threshold value. After using Otsu's techniques, we examine the system by comparing Multilevel Thresholding (MTH) performance with different optimization, which is called benchmark function, Peak Signal-to-Noise Ratio (PSNR) and Structural Similarity Index (SSIM). The outcome demonstrates that the Differential Evolution algorithm almost matches the performance of the Harmony Search (HS), Artificial Bee Colony (ABC), and Particle Swarm Optimization (PSO) approaches. This is evident from the PSNR and SSIM values, which reveal little differences across the four techniques. It can be concluded that the Differential Evolution algorithm performs well and achieves nearly the same PSNR and SSIM value as other image segmentation techniques. Due to the numerous multilevel thresholding techniques, the PSNR and SSIM values from the obtained data show substantial variations. The quality of the segmented image increases with level.

Paper ID: 125

TITLE: Design of 5 GHz H-Shaped Patch Antenna

AUTHOR(S): Nurfarhana Mustafa, Muhammad Khairul Ikhwan Tahir, Nur Sofia Idayu Didik Aprianto, Nurul Hazlina Noordin, and Mohamad Shaiful Abdul Karim

Abstract:

This paper presents the design and analysis of an H-shaped patch antenna for wireless communication at 5 GHz. The antenna design process considers important factors such as geometrical parameters, substrate selection, and feeding technique. Copper is used for the ground plane and patch element, while Roger RT 5880 is chosen as the substrate material. Computer software technology software is used to design the antenna together with simulated results for return loss, voltage standing wave ratio, radiation pattern, and gain. Through parametric analysis, optimal values for various dimensions are determined to achieve a desirable return loss value. The results demonstrate a well-matched impedance with a return loss value of -67.55 dB at 5 GHz, indicating efficient signal propagation. Overall, the proposed antenna design offers promising performance for wireless communication applications at 5 GHz.

Paper ID: 133

TITLE: An Analysis of Driver Drowsiness Detection Using Electromyography (EMG) Facial Muscles

AUTHOR(S): Faradila Naim, Ashvien Kumar Subramaniam, Mahfuzah Mustafa, Norizam Sulaiman

Abstract:

Drowsiness during driving can lead to fatal vehicle crashes and deaths. Facial responses when drowsy is a useful signal to detect driver drowsiness. Most driver drowsiness studies that uses facial responses are vision, EEG or EOG based inputs. There is lack of studies using facial EMG. This project aims to analyse the effectiveness of using electromyography (EMG) signals from fa-cial muscles (Masseter and Orbicularis Orris) to detect driver drowsiness. 12 participants drove for 1 hour in a simulated driving were taken as samples. 7 time domain features were extracted from the raw EMG and kNN classifier was used as the signal processing model to detect driver drowsiness. The highest accuracy achieved is 85.71% with 70:30 training and test data ratio, k values (kNN) of 2 and 4, seven-time domain features, for both Masseter and Orbicularis Orris muscles. The study concludes that it is possible to de-tect driver drowsiness with high accuracy using EMG signals from facial muscles

Paper ID: 135

TITLE: Non-Contact Heart Rate Estimation using mmWave High Radio Frequency Radar

AUTHOR(S): Al-Hasanol Gumanti Sudirman, Mohd Zamri Ibrahim, Ikhwan Hafiz Muhamad, Rosdiyana Samad and Wan Nur Azhani W. Samsudin

Abstract:

Heart rate, a critical health indicator, is typically measured using contact methods such as electrocardiography (ECG). However, there is a growing interest in the development of non-contact monitors, which offer considerable advantages. These include eliminating skin irritation, reducing discomfort, and minimizing the risk of infection, making them perfectly suited for long-term, continuous monitoring. Importantly, when patients are unaware of being measured, it can prevent intentional or subconscious alterations in their heart rate, thereby enhancing the reliability and accuracy of the results. This study aimed to examine the comparative efficacy and precision of two heart rate measurement devices the mmWave high radio frequency radar and oximeter, at varying distances and conditions, including situations with and without obstruction. The devices were tested for accuracy and consistency in readings at distances of 30 cm, 60 cm, 90 cm, and 120 cm. The findings demonstrated that both devices provided highly accurate and consistent readings when there were no obstructions, regardless of the distance. The waveforms produced by the devices were comparable, suggesting minimal deviation and a strong correlation between the two sets of results. Even in the presence of obstructions, the devices maintained their high degree of accuracy, with only minor variations in readings. At 60 cm, the margin of error was found to be just plus or minus 4 bpm, indicating a remarkable tolerance to obstacles. When compared at greater distances, i.e., at 90 cm and 120 cm, with obstructions, the error margin slightly increased but remained within an acceptable range. This underlined the devices' robustness and their ability to deliver reliable results under less-than-ideal conditions. In conclusion, the mmWave radar demonstrated high levels of precision and consistency across various distances and conditions to estimate the heart rate value.

PARALLEL SESSION 8

Paper ID: 94

TITLE: Detecting Anomalies in Unmanned Aerial Vehicles via the Optimization Method

AUTHOR(S): Fatimah Dg Jamil, Mohammad Fadhil Abas, Vasantha Raj Rajaram, Norhafidzah Mohd Saad, Mohd Firdaus Abas

Abstract:

This study investigated the usability of optimization for anomaly detection of unmanned aerial vehicles (UAV). This research detects anomalies via the particle swarm optimization (PSO) method, focusing on the motor and blade faults. The vibration of fault data was measured via acceleration. Combining the PSO method with the monitoring-based fitness function identified the exact place where the fault had happened. The vibration velocity increased two times from the usual velocity when the fault was detected. The fitness function was developed via three stages, i.e., frame setting, tolerance checking, and computing the PSO standard to differentiate among faulty, turning, and usual data peaks. This study achieved a high detection accuracy of 76% using simulation programs of mission planner, ardupilot, and flight gear

Paper ID: 116

TITLE: Investigation of Odor from Surface Water Intensity Based on Pressure Variations Using an Intelligent Classification Approach

AUTHOR(S): Mohammad Danial Izzuddin bin Razali , Muhammad Sharfi Bin Najib, Mujahid bin Mohamad, and Suhaimi bin Mohd Daud

Abstract:

This article presents an investigation of odor intensity in surface wa- ter based on pressure variations using an intelligent classification approach. The study aims to develop a reliable method for assessing odor levels in water bod- ies, which can have significant implications for environmental monitoring and management. A dataset of pressure variations and corresponding odor intensity levels was collected and used to train a k-nearest neighbors (k-NN) classifier. The performance of the classifier was evaluated, and real-time simulations were con- ducted to demonstrate the applicability of the proposed method. The results show promising accuracy in odor intensity classification, suggesting the potential of the proposed approach in practical odor monitoring systems.

Paper ID: 127

TITLE: Enhancing Navigation Accuracy of Turtlebot3 Burger Mobile Robot through Initial Covariance Matrix Determination

AUTHOR(S): Muhammad Haniff Gusrial, Muhammad Luqman Hakim Abdullah, Nur Aqilah Othman and Hamzah Ahmad

Abstract:

This project aims to identify the initial covariance value of a ROS-based mobile robot, specifically the Turtlebot3 Burger. The basic navigation of the robot re-quires a significant amount of data and resources to process the output path. To address this challenge, the Kalman Filter algorithm is implemented in this robot, as it is widely used for mobile robot navigation and system integration. One crucial parameter for implementing the Kalman Filter is the covariance matrix, which needs to be determined. Understanding the specifications of the robot is essential for programming and operating it effectively. The system model of this robot is developed based on the kinematic model of a two-wheeled mobile robot. To exe-cute this project, an experimental setup consisting of a laptop and a robot, serving as the ROS Master and ROS Slave respectively, is required. Furthermore, the project aims to comprehend the function and efficiency of the robot's performance, including the LiDAR sensor, Inertial Measurement Unit (IMU) sensor, and Odometry sensor. These sensors are mounted on the robot to achieve accurate localization. An indoor experiment was conducted to determine the covariance value. Different sources of sensor information are fused into a single representational format called sensor fusion. By using an extended Kalman filter (EKF), data from Odometry and IMU sensors were combined to estimate the position and orientation of the mobile robot. The identified covariance value will serve as the initial covariance matrix for the implementation of the Kalman Filter-based system using this robot. The experimental results indicate that the proposed method is suitable and practical for real-world applications

Paper ID: 129

TITLE: Development of Portable Solar Fertigation System

AUTHOR(S): Najwa Ayuni Abdullah, Muhammad Shakirin Shapee, Muhammad Arif Osman and Roshahliza M Ramli

Abstract:

Portable solar fertilization devices offer numerous benefits in agricultural systems, including cost reduction and increased efficiency. The proposed development utilizes solar energy to power fertigation systems, making them ideal for gardens, farms, and agricultural settings. The fertilization process involves using a liquid drop system that ensures plants efficiently absorb the available nutrients. A 12 V solar panel converts solar energy into electrical power, which is stored in a battery for later use. By utilizing timers, the fertigation system can be activated at specific times each day, further streamlining operations. The integration of the Internet of Things (IoT) concept has revolutionized farming practices. Real-time monitoring and control of the pump, facilitated through the IoT, enhance water usage efficiency and enable convenient farming operations. A portable and eco-friendly water pump, powered by a solar panel, can be controlled remotely using a mobile application that also provides environmental monitoring. Temperature and humidity sensors measure air conditions, while a soil moisture sensor detects changes in moisture levels, alerting the system to the need for fertilization. A rain sensor module detects raindrops and measures intensity, ensuring that plants are not overwatered during the rainy season. The system incorporates Blynk software, which displays temperature and humidity conditions and enables remote control of the fertilization system via Wi-Fi communication. Using this efficient fertilizer system can lead to a steady income for farmers. Compared to traditional agriculture, labour costs are significantly reduced, resulting in lower operational costs and the ability to sell crops at more affordable prices.

Paper ID: 131

TITLE: Analysis of Heated Olive Cooking Oil Using A Spectroscopy Technique

AUTHOR(S): N.F.M Fadzila, W.S. Salleh, S. Nurulain, M.A.S. Aspar, H. Manap

Abstract:

Olive oil, a vegetable oil with numerous health benefits, possesses distinctive nutritional characteristics closely linked to its chemical composition. The formation of these characteristics primarily takes place during the oil's production, storage, and handling of raw materials. It is worth noting that olive oil also contains acidity, which can present challenges. Consumption of olive oil can potentially contribute to disorders associated with saturated fat. Hence, the primary objective of this project is to examine the level of free fatty acids (FFA) in heated olive oil and identify the optimal absorption wavelength. Spectroscopy techniques will be employed to analyse free fatty acid in olive oil. UV/Vis spectroscopy allows the investigation of a sample's electronic structure and facilitates the identification of compounds present. Four different olive oils are tested at varying heating times. By measuring the FFA due to heating, the impact of different heating conditions on the oil can be assessed. Prolonged heating leads to a greater degree of oxidation. Through this analysis, consumers will gain a better understanding and be more cautious when using olive oil.

Paper ID: 132

TITLE: Formulation Of Fitness Function To Estimate PH Value Of Adjacent Block Via PH Value And Water Flow

AUTHOR(S): Nurul Najihah Mohd Radzi, Mohammad Fadhil Abas, Muhammad Syukri Bin Ahmad, Norhafidzah Mohd Saad, Mohd Hisyam Mohd Ariff

Abstract:

Water quality is measured by several factors, such as the potential of hydrogen (pH), the concentration of dissolved oxygen (DO), bacteria levels, salinity, or turbidity. This project focuses on the pH of water as it gives more impact on determining the quality of water. It is noticed that the speed of water flow does manipulate the value of pH water. A large set of data which comprises five locations, four of the locations pH and water speed are used to determine the fifth location pH (known as unsampled pH). To estimate the un-sampled pH, a fitness function has been formulated using Multi-Layer Neural Network by Genetic Algorithm (MLNN-GA) and compares the results in terms of accuracy between the estimation of pH without water speed and pH with water speed. Both estimated results will be compared with the actual pH value. The results of the estimated data pH with speed is 94.27% compared to the estimated data without speed is 93.83%. The result showed that speed is one of the factors that can be used to increase accuracy in estimating the pH value.

Paper ID: 122

TITLE: Empowering Food Thawing with IoT: Design and Development of a Smart Fridge System

AUTHOR(S): Chai Kuan Jie, Syamimi Mardiah Shaharum, Mohd Ali N. Z

Abstract:

This paper presents the development of an IoT-based smart fridge sys-tem aimed at improving the efficiency of food thawing for working mothers and young professionals. Traditional thawing methods are known to be time-consum-ing and unreliable, compromising food safety and quality. The project seeks to provide a safe, convenient, and cost-effective solution for preparing healthy meals. The objectives include investigating and developing a customized thawing model for the smart fridge, designing the system using Arduino programming, and conducting performance analysis. The research incorporates Salvadori and Masheroni's thawing time prediction method based on different food types. The system is implemented using the Arduino Uno board and the Blynk application, with real food samples used for testing. Experimental results show a close corre-lation between predicted and actual thawing times for slab beef, but significant deviations are observed for cylinder fish samples. In conclusion, this paper con-tributes to enhancing the defrosting process, prioritizing food safety, and offering a convenient solution for individuals with busy schedules. By harnessing IoT technology, the proposed smart fridge system improves convenience and effi-ciency in food thawing.

PARALLEL SESSION 9

Paper ID: 18

TITLE: Breaking Free from Cords: Enhancing Wireless Power Transfer with a Hybrid Coupling Topology

AUTHOR(S): Anisya Sakinah Abdol Samat, Mohd. Shafie Bakar, Mohd. Shawal Jadin, Omar Aliman

Abstract:

Wireless power transfer (WPT) technology eliminates the need for cables and cords, providing a convenient and efficient method for transferring electrical power. The transmitter sends out electromagnetic waves that are converted into electrical energy by the receiver, with the power transferred through an air gap. This study aims to enhance the performance of WPT by developing a hybrid coupling topology that combines Inductive Power Transfer (IPT) and Capacitive Power Transfer (CPT) to create a high-efficiency system. The hybrid topology is simulated using MATLAB@Simulink in both Series-Series (SS) and Parallel-Parallel (PP) compensation. The simulations vary in frequency and duty cycles and different load resistances at the receiving end to obtain precise results. The study evaluates the output power and efficiency to minimize any losses in the system and maximize efficiency and power transfer. The results provide insights into how the hybrid coupling topology can be optimized for WPT, leading to more efficient and effective wireless power transfer systems. Such systems have a wide range of applications in various industries, including transportation, healthcare, and consumer electronics. With the growing demand for wireless power transfer, more efficient systems can lead to significant advancements in these industries.

Paper ID: 41

TITLE: Maximum Power Point Tracking (MPPT) based Particle Swarm Optimization (PSO) for Hydrokinetic Energy Harnessing

AUTHOR(S): Wan Ismail Ibrahim

Abstract:

This paper presents a design and modeling of the Particle Swarm Optimization (PSO)-based maximum power point tracking (MPPT) algorithm specifically tailored for variable-speed fixed-pitch vertical axis hydrokinetic turbines. The proposed algorithm can maximize electrical power without requiring additional sensors and prior knowledge of the water turbine characteristics. Unlike the conventional MPPT algorithm, the PSO-based MPPT algorithm exhibits minimal oscillations at the maximum power once the true peak is located. The PSO MPPT algorithm is characterized by its simplicity, flexibility, accuracy, and efficiency in tracking the maximum power under different water velocities. The simulation results by MATLAB/ Simulink indicated that the PSO MPPT can achieve 83 % efficiency in terms of output power and reduce the oscillation during dynamic steady-state.

Paper ID: 73

TITLE: State of Charge Estimation by Using Artificial Neural Networks for Lithium Polymer Battery of Electric Vehicle

AUTHOR(S): Mohd Izzat Mohd Zalam, Mohd Herwan Sulaiman, Zuriani Mustaffa, Addie Irawan Hashim

Abstract:

Battery State of Charge (SOC) estimation is of utmost importance for the ef-ficient operation of battery systems. Artificial Neural Networks (ANN) have emerged as powerful tools for accurately estimating SOC. This study explores the application of ANN for SOC estimation in batteries using a comprehensive dataset obtained by simulating the usage of a lithium poly-mer cell model, specifically the ePLB C020, in an electric car resembling the Nissan Leaf. The dataset encompasses various battery parameters, including voltage, current, temperature, and other relevant variables. The research fo-cuses on developing an optimized ANN architecture, training methodology, and evaluation metrics to ensure precise SOC estimation. The proposed ANN architecture consists of input, hidden, and output layers with careful-ly optimized neuron numbers and activation functions. Through an iterative training process employing backpropagation and gradient-based optimiza-tion algorithms, the weights and biases of the ANN are adjusted to enhance its performance. Evaluation metrics such as Mean Squared Error and corre-lation coefficient are employed to assess the accuracy and reliability of the SOC estimations. The experimental findings underscore the effectiveness of the ANN model in achieving accurate SOC estimation for the simulated electric car battery. This study highlights the potential practical applica-tions of ANN in battery management systems, enabling reliable SOC esti-mation for improved control and optimization strategies. Additionally, a comparison between the proposed ANN model and Extreme Learning Ma-chines (ELM) reveals superior performance of the ANN in SOC estimation for the simulated electric car battery.

Paper ID: 78

TITLE: Optimal Distributed Generation (DG) Allocation for Transmission Losses Minimization using Arithmetic Optimization Algorithms (AOA)

AUTHOR(S): Abdulah, Nor Rul Hasma; Mustafa, Mahfuzah; Samad, Rosdiyana

Abstract:

This research paper presents research on the optimal placement and sizing of distributed generation (DG) units in power systems. The integration of DG units plays a key role in addressing the growing demand for renewable energy sources and improving grid stability. The objective of this study is to minimize transmission losses using Arithmetic Optimization Algorithms (AOA). Extensive experiments and analyzes are conducted with a focus on testing AOA performance on both weak and secure bus scenarios. The results demonstrate the effectiveness of AOA in achieving optimal DG place-ment, resulting in reduced transmission loss and improved system performance. Findings from this research provide valuable insights for power system planners and operators, assist decision-making processes in optimizing DG integration, and increase the overall efficiency of power systems.

Paper ID: 82

TITLE: Local Feature Descriptor Based on Directional Structure Map for Improving the Hotspot Detection in the Multispectral Aerial Image of a Large-Scale PV System

AUTHOR(S): Tan Li Ven, Mohd Shawal Bin Jadin, Muhammad Khusairi Osman, Mohd. Shafie Bakar, Md. Imamul Islam Ahmed Al Mansur and Mohammad Asif Ul Haq

Abstract:

To maintain the long-term reliability of photovoltaic modules while maximizing the power output, possible faults in the photovoltaic modules need to be diagnosed early. Aerial thermal image inspection is commonly used to detect and locate the hotspots of the photovoltaic modules. However, detecting a hotspot from this image can be severely affected by noises and thus can wrongly locate the hotspot due to thermal reflection from the surrounding. One of the solutions is by examining both visual and thermal images of the photovoltaic modules. This paper presents multi-spectral image matching of the photovoltaic modules. First, absolute structure map (SMi) and directional structure map (DSMi) are proposed. A histogram of the oriented gradient is then used to describe each interest point's local region based on the SMi and DSMi. Next, the Gabor wavelet filter is applied to the SMi, whereas the average filter is applied to the DSMi to construct the histogram bins. Finally, the normalized feature vectors are conjoined. Experiments were conducted to evaluate the proposed structure map feature descriptor's performance. The results showed that this method could provide Precision and recall up to 0.82 and 0.97, respectively.

Paper ID: 90

TITLE: Economic and Emission Dispatch Solution using Evolutionary Mating Algorithm

AUTHOR(S): Ahmad Shahier Abdul Aziz, Mohd Herwan Sulaiman, Zuriani Mustaffa

Abstract:

This paper presents the Evolutionary Mating Algorithm (EMA) as a novel evolutionary algorithm for addressing economic emission load dispatch (EELD) problems. The optimization of power systems with respect to eco-nomic and emission considerations is of utmost importance in contempo-rary power system engineering. Emphasizing cost and emission reduction is essential for efficient power system operation. In this study, the economic and emission dispatch problem is tackled using the Evolutionary Mating Algorithm (EMA). The performance of the EMA algorithm is evaluated on a 10 and 40-unit generator test system. Comparative analyses are conducted with other algorithms, namely the Cuckoo Search Algorithm (CSA), Flower Pollination Algorithm (FPA), and Barnacles Mating Optimizer (BMO). The results indicate the effectiveness of the Evolutionary Mating Algorithm in solving economic emission dispatch problems, thereby demonstrating the efficacy of the proposed EMA approach for addressing EELD problems.

Paper ID: 91

TITLE: Predictive Model for Electricity Consumption in Malaysia using Support Vector Regression

AUTHOR(S): MUHAMMAD AIMANDZIKRI MOHD NIZAM ; Sahimel Azwal Sulaiman ; Nor Azuana Ramli

Abstract:

Electricity consumption is a significant indicator of modern society's development and advancement. It is influenced by factors such as population growth, urbanisation, and economic activity. However, predicting electricity consumption is a tough task due to the complexity and fluctuations of the energy market. In this paper, Support Vector Regression (SVR) was proposed in developing a predictive model for Malaysian electricity consumption. SVR was chosen as our proposed method as it can handle nonlinear and high-dimensional data using kernel functions. Data used for this study were retrieved from various sources including macrotrends.net, the World Bank's Climate Knowledge Portal, and the World Bank's indicator database. The dataset consists of relevant variables such as temperature, population density, and economic growth to anticipate future electricity demand. Results from this study showed that the SVR model outperforms other methods in terms of accuracy and error metrics. Additional components, hyperparameter fine-tuning, ensemble approach research, and long-term forecasting are all advocated for further improvement.

PARALLEL SESSION 10

Paper ID: 36

TITLE: The Design and Analysis of Fast Fourier Transform Processor using VLSI Technique

AUTHOR(S): Kuan Pei Xian, Fahmi Samsuri

Abstract:

Power consumption, area, and timing affect the efficiency of the processor. There is an increasing demand for higher standards and improved performance in chip technology. The pursuit of better performance has become a prevailing objective among individuals and industries. As technology continues to advance, the stand-ards for chip performance will undoubtedly rise, motivating researchers and manufacturers to strive for even greater achievements. The aim of this project is to study and analyse the performance requirements in terms of area, power con-sumption, and speed of a 16-point Radix-4 Fast Fourier Transform (FFT) pro-cessor. Furthermore, this project aims to create an efficient FFT processor chip. The simulation was carried out using Mentor Graphics QuestaSim, and the syn-thesis was done using Mentor Graphics Oasys-RTL. The project focused on the front-end design part, implementing the design with 130nm CMOS process tech-nology. The research methodology of the study implemented a modified flop-based design to facilitate timing optimization. The design has a low power con-sumption of 620.105mW, a cell area of 1374521μm², and high overall perfor-mance. The design exhibits high speed and a smaller cell area. The performance of the proposed design has improved compared to the original design.

Paper ID: 37

TITLE: Face Detection Through Conceal with Deep Learning

AUTHOR(S): Eswaran Rasentheran, Fahmi Samsuri

Abstract:

The presented research paper purposes a method to detect concealed faces using the pre-trained model, Convolutional Neural Network (CNN) and using Tensor-Flow as the deep learning method. Concealed face detection has emerged as a critical field of research and application due to its relevance in numerous domains. With the growing concerns regarding security, law enforcement, public health, and privacy, the need to accurately detect and identify individuals whose faces are concealed has become paramount. In this paper there will be 2 approaches used to detect concealed faces utilizing the above stated model and technique.

Paper ID: 38

TITLE: Design and Analysis of an Early Diabetes Mellitus Detection Using OpenCV

AUTHOR(S): Loh Shu Yi, Fahmi Samsuri

Abstract:

This technical report summarizes the whole developing process of this project. The project is about developing a web application to detect early diabetes mellitus. The problem statement for this project is the lack of convenience in detecting dia-betes. The only way to diagnose diabetes is through blood test but blood test is not recommended to conduct frequently. There is also lack of application to help to detect diabetes. To solve the problem, we have found the most accurate ma-chine learning algorithm which is Random Forest to detect diabetes. Random Forest algorithm will be the prediction model and will be deployed into the web application. The web application is developed by using Visual Studio Code with the assistance of Streamlit framework. To develop this web application, there will be two parts, which are prediction model development and user interface devel-opment. Prediction model development involves choosing the most suitable ma-chine learning algorithm to be the prediction model. User interface development consists of the UI of the web application. There is only one result discussed in this report.

Paper ID: 45

TITLE: Epileptic Seizure Classification in EEG Signals Using KNN and SVM

AUTHOR(S): Fathin Naadiah Mohd Razif, Mahfuzah Mustafa, Rosdiyana Samad, and Nor Rul Hasma Abdullah

Abstract:

Epilepsy is a neurological disorder that affects millions of people worldwide, and accurate classification of epilepsy based on seizure type and epilepsy syndrome is crucial for effective treatment. However, distinguishing between different types of epilepsy can be challenging due to the complexity of EEG signals. This study investigated the effectiveness of using eight key features extracted from EEG signals in accurately classifying epilepsy using KNN and SVM algorithms, achieving an accuracy of 100% for both algorithms. The study's findings provide a promising approach to accurately classify epilepsy, which can potentially improve the accuracy of epilepsy classification and develop more effective treatment strategies for epilepsy patients.

Paper ID: 117

TITLE: Evaluating JA-ABC5 Hyperparameter Optimisation with Classifiers

AUTHOR(S): Ravindran Nadarajan, Noorazliza Sulaiman, Junita Mohamad-Saleh

Abstract:

Because of its simplicity, flexibility, and robustness, the Artificial Bee Colony (ABC) algorithm, a swarm intelligence-based optimisation method, has been widely applied in a variety of fields. However, its application in hyperparameter optimisation for machine learning classifiers deserves exploration. The effectiveness of ABC and its modified version, JA-ABC5, for hyperparameter optimisation across various classifiers, including Support Vector Machine (SVM) and K-Nearest Neighbour (KNN), is studied in this re-search. The Wisconsin dataset is used to evaluate the performance of these classifiers, and the hyperparameters are optimised using the JA-ABC5 algorithm. The performance of JA-ABC5 is compared to that of grid search, standard ABC, Bayesian optimisation, and random search. The results show that JA-ABC5 performs well in terms of SVM, which is accuracy, specificity, and sensitivity, while its performance in KNN is comparable. This re-search contributes to a better understanding of machine learning model optimisation, with the potential to improve the performance of these models in a variety of applications.

Paper ID: 103

TITLE: Enhancing Squat Safety and Performance with Computer Vision and Deep Learning Model

AUTHOR(S): Muhamad Aqil Hilman Hazlan, Ikhwan Hafiz Muhamad and Mohd Zamri Ibrahim

Abstract:

Exercise is good for one's health and fitness, however, it can also be ineffective and potentially dangerous if done improperly by the user. Exercise mistakes are made when users don't use Correct form or pose. Poor squat posture for example can damage the knee health for a long period. Thus, maintaining a healthy squat posture is crucial for a person to workout effectively. This project introduces the use of computer vision to develop a model using the MediaPipe Pose, that recognizes and classifies the best squat posture and provides recommendations on how users can improve the form. The data is collected from exercise videos of correct squat posture by a professional coach. The developed algorithm successfully classifies correct posture with overall accuracy of 85%.

Paper ID: 123

TITLE: Signature Verification using CNN Deep Learning-Based Approach (FYP Student)

AUTHOR(S): Wan Nur Azhani W. Samsudin, Mohd Zamri Ibrahim, Muhammad Haziq Zainul Asri, Wan Syahirah W. Samsudin, Suraya Abu Bakar

Abstract:

A signature is a handwritten representation of a person's name, nickname, or other mark affixed to papers to verify their identity and intent. A hand-written signature identifies the work as well as its creator. Every person's signature is different, make it crucial to recognize a person's handwritten signature. Besides, doing human verification might be imperfect and uncertain at times. In some cases, signatures on papers are occluded by document texts or rubber stamp, which making them difficult to verify. The same might be said for antique documents, which the signatures may not always be visible. Others, when a client's signature has slight alterations in the pattern, some financial transaction requests cannot be validated precisely. Handwritten signature verification is a challenging task that has been widely studied in recent decades to solve all the problems. Despite the progress that has been made, it remains as an active area of research, with new techniques and approaches being developed all the time. Researchers are experimenting with a variety of methods for distinguishing between genuine and forged signatures. Motivation to these problems, a novel method is proposed for reliably recognizing of signatures in documents and performing identification checking using CNN-based deep learning algorithm. The proposed algorithm's validity is determined by the matching sign with the online signature database. An autoencoder is utilized to create random distortions in genuine photos from the database, which were then given to the classifier during training to create false signatures. The proposed algorithm is based on Siamese Network, which works on two inputs from VGG-16 with the same weight and same structure, and pro-duce two features. The classification results of the proposed algorithm are about 99% accurate.

PARALLEL SESSION 11

Paper ID: 101

TITLE: Analysis of AI-Powered Human Detection Method for Social Distancing Monitoring

AUTHOR(S): Nur Aina Syafinaz Mohd. Atfan, Rosdiyana Samad, Nor Rul Hasma Abdullah, Mahfuzah Mustafa1, Nurul Hazlina Noordin, Dwi Pebrianti

Abstract:

Social distancing is a non-medical practice that helps slow down the trans-mission of viruses which is suggested by the World Health Organization (WHO). However, as every country has battled the spread of the virus for almost three years, social distancing practice now seems ignored by public people due to some reason such as they are in a rush. This study aims to analyze human detection using deep learning methods in various positions and to develop social distancing detection using the proposed method. Thus, human detection and social distancing detection using a deep learning algo-rithm which is You Only Look Once (YOLO) version 3 is developed. This method uses custom datasets and the Euclidean distance formula to compute the distance between two people for the social distancing detector. The out-put distance is measured in the real world (centimetres). As a result, the cur-rent datasets for each position such as front view, back view, side view, and the crowd gives the result of human detection at 94.44%, 91.67%, 97.50%, and 88.89% respectively. Hence, the highest accuracy of human detection goes to the side view position with a percentage accuracy of 97.50%. Next, the distance between the two people is calculated correctly with the accepta-ble range of ±0.3cm.

Paper ID: 98

TITLE: Child Left in the Car Detection: Image Enhancement for Day and Night

AUTHOR(S): Rohana Abdul Karim, Hong Zhuang Shen, Marlina Yakno, Yasmin Abdul Wahab, Mohd Zamri Ibrahim

Abstract:

Despite the government's awareness campaign on the safety of children in non-moving vehicles, the cases of children being trapped and suffocated in unattended cars keep rising. Children are often being ignored by their par-ents with the engine off. Furthermore, there are also children being ignored due to unstoppable calls from work. Next, existing systems with only 1 de-tection used have a limit either detecting face or signal detection. Most of the software tools have a limitation in detecting human face in a low light situation. Other than that, the obstacle like hand will decrease the accuracy of face detection. This project aims to develop a complete and adequate face detection system for detecting the presence of children in the car by detect-ing human physical features with temperature and sensor technology. The objective is to enhance the visualization of images for human identification and to measure the performance of the features selections for detection sys-tem. There are 100 sample images of child faces being collected, and three filters are being compared for image enhancement: fastNIMe-anDenoisingColored, histogram equalizer and median filter. During normal daylight, fastNIMeanDenoisingColored achieves the highest percentage of accuracy of face and hand detection with 90%, followed by without filter and Median Filter with 90% accuracy. During 100 to 150 value of dimmer images, Histogram Equalizer achieves the highest accuracy percentage of face and hand detection with 85%, followed by FastNIMeanDesnoisingCol-ored and without filter with 81% accuracy.

Paper ID: 89

TITLE: Comparative Analysis of Superpixel and Gabor Methods for Exudate Feature Extraction in Diabetic Retinopathy Fundus Images

AUTHOR(S): Nur Munirah Suhaimi, Rosdiyana Samad, Nor Rul Hasma Abdullah, Mahfuzah Mustafa, Mohd. Zamri Ibrahim, Dwi Pebrianti

Abstract:

Diabetic retinopathy (DR) is a prevalent health issue associated with long-term diabetes, often leading to various complications. One characteristic manifestation of DR is the development of exudates in the retinal region. Fundus image analysis serves as a common method for diagnosing DR, rely-ing on the expertise of ophthalmologists. Recently, computer-assisted diag-nostic tools have enhanced the speed of diagnosis, provided diverse perspec-tives, and evaluated treatment outcomes. Consequently, numerous studies have focused on identifying diabetic retinopathy lesions in fundus images. This research aims to extract exudate features using the superpixel and Ga-bor methods in fundus retinal images. A combination of image processing with the superpixel algorithm is compared with the Gabor feature extraction method. The findings reveal that the superpixel method outperforms the Ga-bor method in accurately extracting exudate characteristics. The achieved re-sults indicate a 90% accuracy for the superpixel method and 78.3% accuracy for the Gabor method. These outcomes underscore the superior performance of the superpixel method in exudate extraction from fundus images. This study contributes to advancing the field of diabetic retinopathy analysis and highlights the potential of the superpixel method in improving diagnostic accuracy and efficiency.

Paper ID: 60

TITLE: Passenger's Demographic Analytical System in an Artificial Intelligence of Things (AIoT) Edge Device for Public Busses

AUTHOR(S): Syafiq Fauzi Kamarulzaman

Abstract:

Busses has become crucial resources in metropolitan area where public transport were widely utilized efficiently. Such resources can be overused or underused at a certain period of time, making management of the resources are not optimized on a certain period of time. Artificial Intelligence (AI) can be embedded as one of the optimization approaches on a bus passengers analytic. This proposed project utilizes the AI to detect and analyze the demographic of the bus users in real-time environment. In this project, we utilized an AI edge device to capture facial characteristics of the passengers for demographic analysis, where the results of the analytic are presented in a dashboard based on time the passengers board the busses. This aim of this proposed system is to optimize the bus resources and increase the efficiency and reliability of the public busses management.

Paper ID: 102

TITLE: Harnessing Computer Vision and Deep Learning Model for Optimal Sitting Posture Detection

AUTHOR(S): Muhamad Mirza Azfar Damanhuri, Ikhwan Hafiz Muhamad and Mohd Zamri Ibrahim

Abstract:

Sitting is a basic action and resting position in which the body weight is supported primarily by lower parts of the body that are in contact with the ground or a horizontal surface such as a chair seat. Poor sitting posture can damage the spine health for a long period. Thus, maintaining a healthy sitting posture is crucial for a person who needs to sit for a long time. By detecting the sitting posture of a person able to repair and warn the bad sitting posture. This project proposed the use of computer vision to develop a human skeleton model using MediaPipe Pose by plotting the landmarks on the joint point throughout the body that is called the keypoint. The pipeline's posture estimation component predicts the location of all 33-person keypoints with three degrees of freedom. These keypoints will be used to calculate body angle and classifies the best sitting posture. This project able to produce overall precision of 92.5% for straight sitting posture and recall result that achieve 84.091% in real-time data and image. The overall accuracy for this project is 82%.

Paper ID: 136

TITLE: Region of Interest Detection in Thermal Image of DC Motor Using Image Processing for Average Temperature Calculation

AUTHOR(S): Ahmad Afif Mohd Faudzi, Tuan Nur Atikah Tuan Shukri, Mohd Zamri Ibrahim, Syamimi Mardiah Shaharum and Mohd Azri Hizami

Abstract:

Anomalies in temperature, such as excessive heat, often indicate potential equipment breakdown or malfunction. Therefore, it is crucial to implement preventive maintenance programs that closely monitor these variations. In mo-tor thermal modeling, calculations involving the convection thermal coeffi-cient are necessary. The coefficient relies on the average temperature of the motor surface, traditionally measured using a thermocouple. However, using the predefined shapes provided by Testo Software may include irrelevant are-as, which can affect the accuracy of the average temperature calculation. To address this limitation, this paper proposes an image-processing technique to segment only the relevant area of interest. By utilizing this technique, the av-erage temperature can be calculated more accurately. Furthermore, a compara-tive analysis will be conducted to compare the average temperature obtained through the image-processing technique with that obtained using Testo Soft-ware. This analysis aims to demonstrate the effectiveness of the proposed technique in achieving more precise temperature measurements in the context of motor thermal analysis.

Paper ID: 121

TITLE: Eye Blinking Assessment of Bell's Palsy Patient

AUTHOR(S): Wan Syahirah W. Samsudin, Ellina Farzana Zarini, Wan Nur Azhani W. Samsudin, Syamimi Mardiah Shaharum , Kenneth Sundaraj and Mohd Zaki Ahmad

Abstract:

Bell's palsy is one the main causes of facial nerve paralysis and it is a condition in which the muscles on one side of the face become suddenly weak. The weakening causes the lower half of the face to droop. One-sided smile is common in Bell's palsy cases and the affected eye refuses to close. This can cause the eye to become extremely dry and inflamed, often leading to exposure keratitis. By studying the differences of eyes blinking between normal and Bell's palsy patient, the aim of this study is to design a computer-assisted diagnosis tool in evaluating of the facial nerve function. This study aims to extract the significant features by using the Viola-Jones algorithm. A combination of image processing methods with the Viola-Jones algorithm achieved the promising result where the developed tool is successfully detected the differences between the normal and Bell's palsy patient during the eyes movement. This study contributes as a great aid tool to clinicians or medical professionals for an efficient facial nerve evaluation.

PARALLEL SESSION 12

Paper ID: 92

TITLE: Comparison of Stress and Deformation due to Electromagnetic Torque in SynRM with Flux-Barrier and Segmented Rotor

AUTHOR(S): C. Yik How, M. S. Mat Jahak and M. A. H. Rasid

Abstract:

In an application with a high temperature and restricted volume constraints, the synchronous reluctance (SynRM) machine with passive rotor is a prevalent solu-tion. To attain a high torque density, the rotor structure exhibits complex geome-try of either flux barrier or segmented rotor to achieve a high saliency ratio. This study evaluates the consequence of having the flux barrier and segmented rotor structure on the stress and deformation of a small SynRM with a rotor diameter measuring 25.24 mm. The analysis is conducted using FE where torsional force and centrifugal for were affected to the rotor structure at a torque of 0.2 Nm and rotational speed of 10,000 rpm. The results show that the centrifugal force is more critical as it generates higher stress for both rotor designs. The flux-barrier rotor experiences less centrifugal-induced stress at 5.46 MPa compared to 10.92 MPa of the segmented rotor. However, both rotors will not suffer from perma-nent deformation. A hypothetical dimension scale-up indicates that the flux barri-er has a higher stress of 547.56 MPa and deformation due to centrifugal force and exceeds the material yield strength at 10 times its current dimension.

Paper ID: 105

TITLE: Optimal Planning of Photovoltaic Distributed Generation Considering Time-Varying Loads

AUTHOR(S): Ahmad Syahmi Aiman Mohd Zuri, Norhafidzah Mohd Saad, Nur Syazana Mohd Sayuti, Mohammad Fadhil Abas, Suliana Ab Ghani, Norazila Jaalam, Abid Ali

Abstract:

The integration of photovoltaic distributed generation (PVDG) into power systems has gained significant attention due to its potential for renewable energy generation and the reduction of greenhouse gas emissions. However, the intermittent nature of solar power and the presence of time-varying loads pose challenges to the optimal planning and utilization of PV systems. This research focuses on addressing the optimal planning of PVDG considering time-varying loads. The backward/forward sweep power flow (BFSPF) with mix-integer optimization by genetic algorithm (MIOGA) methods are used to optimally size and locate PVDGs in the radial distribution network (RDN) while considering the dynamic nature of loads over time. There are three time-varying load cases: residential, commercial, and industrial. In MATLAB, the approach is evaluated using a conventional 33-bus RDN. With the installation of PVDG, the simulation results show a reduction in total power loss and an improvement in voltage magnitudes for the network. According to the findings, multi-PVDG installation in the residential, commercial, and industrial load models can minimize power losses by up to 58.96%, 54.49%, and 56.92%, respectively. Aside from lowering losses, installing PVDG also helps to enhance the voltage profile of the radial distribution network. The findings highlight the importance of considering load fluctuation to achieve optimal integration of PVDG into power distribution networks, ultimately contributing to the transition towards a sustainable energy future.

Paper ID: 126

TITLE: Development of EV Charging Pillar with IoT (Smart Energy Meter) Features

AUTHOR(S): Muhammad Ikram bin Mohd Rashid

Abstract:

This paper presents the development of an Electric Vehicle (EV) Charging Pillar integrated with Internet of Things (IoT) technology and Smart Energy Meter features. The system aims to address the challenges of EV charging by providing efficient energy consumption, real-time monitoring, and a convenient user experience. The EV Charging Pillar incorporates IoT capabilities, allowing for seamless communication between the charging infrastructure and EVs. This enables real-time data exchange, effective control, and monitoring of the charging process. The Smart Energy Meter feature enhances efficiency through accurate energy measurement, billing, and load balancing. The hardware components include charging sockets, communication modules, and energy meters, interconnected through a central control unit. The software component comprises an IoT plat-form facilitating data exchange, charging control, and user interaction through a mobile application or web interface. The developed system offers benefits to both EV owners and infrastructure providers, such as convenient access to charging stations, monitoring capabilities, and optimized energy consumption. Infrastructure providers can benefit from centralized monitoring, proactive maintenance, and integration with the grid. The proposed EV Charging Pillar with IoT and Smart Energy Meter features provides a comprehensive solution to enhance the accessibility, efficiency, and reliability of EV charging infrastructure, promoting sustainable transportation systems.

Paper ID: 130

TITLE: Prediction of Solar Power Generation using Random Forest Regression Model

AUTHOR(S): Nur Zahirah binti Mohd Ali, Muhammad Zulfadhli bin Mohd Azhar, Syamimi Mardiah Shaharum, Wan Syahirah W. Samsudin

Abstract:

Renewable energy sources include sunshine, wind, flowing water, internal heat, and biomass. Solar energy is a significant source of electricity generation due to its accessibility. Knowing the real generation and consumption of power is the first step of making a good electrical system. To save resources and reduce costs, power utilities are required to balance between produced power and customers' consumption. Prediction is essential for the future operation of smart grids. To predict the generation, input features must be evaluated based on historical data on ISolarCloud. Supervised machine learning algorithm is used to create a predictive model. In this project, Random Forest (RF) Regression model have been chosen to predict the power generation from solar energy. By finding the best-fit algorithm, more investigation would be taken place for improvement in future work such as Correlation Coefficient (R), Mean Absolute Error (MAE), Root Mean Square Error (RMSE) and Root Relative Squared Error (RRSE). The best technique ensures excellent precision in energy forecasting with a very low error rate and the results.

Paper ID: 137

TITLE: Fusion Colour Model for Photovoltaic (PV) Segmentation

AUTHOR(S): Azura @ Nurul Shuhada Binti Daud, Rohana Binti Abd Karim, Mohd Shawal Bin Jadin

Abstract:

Several factors cause the output degradation of the photovoltaic (PV) module. The main affecting elements are the higher PV module temperature, the shaded cell, the shortened or conducting bypass diode, and the soiled and degraded PV array. However, one key factor in making photovoltaic installations a profita-ble investment is regular and effective inspections in order to detect occurred defects. Unmanned aerial vehicles (UAV) are increasingly used in various in-spection fields in Large Scale Solar (LSS). Nowadays, infrared thermography (IRT) technology is widely used for hotspot detection. Compared with manual inspection, the use of unmanned aerial vehicles (UAVs) can improve work efficiency greatly in large-scale PV plants. The IRT image processing of PV modules is important for hotspot detection. Without the segmentation of PV modules, the hotspot location cannot be determined. In this paper, we proposed a method to combine mask images with IRT images to acquire segmentation. MATLAB image processing and computer vision using color threshold are used. This paper shows experimental results for thirty photovoltaic (PV) mod-ules. From thirty photovoltaic (PV) modules, there are five photovoltaic (PV) modules that cannot be segmented very well. The color and temperature of the IR image cannot be simply to segment. The hotspot cell may occur due to re-flection from the sunlight to the photovoltaic. Quantitative evaluation is used to assess our quality method. The average quality of the output mask is 83.3%, which indicates the method performs well in segmentation.

Paper ID: 108

TITLE: Solar-Powered IoT-Integrated Air Quality System with ESP-NOW for Real-Time Outdoor Monitoring

AUTHOR(S): Liphia Law Li Wen, Norasyikin Fadilah, Mohd Zamri Ibrahim, Ikhwan Hafiz Muhamad and Rohana Abdul Karim

Abstract:

Air quality in Malaysia is worsening due to increased vehicle usage and wildfire in Indonesia. These activities contribute to higher pollutant levels which are harmful to human health. Therefore, there is a need for a portable, self-sufficient air quality monitoring system that is easy to install, maintain, transport, and does not rely on a fixed power source. Additionally, a system that seamlessly integrates with other devices and networks is required to provide real-time data for timely analysis and access by authorities. This paper presents a solar-powered system that integrates with the Internet of Things (IoT) and measures various air quality parameters, including temperature, humidity, particulate matter 2.5, carbon monoxide, and nitrogen oxide. Real-time data transmission to a remote server enables authorities to analyze and access data promptly. The system also incorporates an alert system for surpassing measurement thresholds, enabling swift actions. By facilitating effective monitoring and addressing of air quality concerns, this system supports authorities, researchers, and stakeholders. Moreover, its long-range wireless capability using ESP-NOW technology allows communication up to 10m for indoors with obstacles, 20m for indoors without obstacles, and 40m for outdoors.

Paper ID: 93

TITLE: Fabrication of Dye-Sensitized Solar Cells (DSSC) using Copper (I) Iodide: A Sustainable Approach to Solar Energy Conversion

AUTHOR(S): Ali Imran Bin Rozli Sham, Muhamad Firdaus Naim Bin Rozilani@Azman, Ayib Rosdi Bin Zainun, Izan Izwan Bin Misnon, Lin Jin Kiong, Mohd Hisham bin Arif, Norazian Binti Subari, Noor Zirwatul Ahlam Binti Naharuddin

Abstract:

Dye-sensitized solar cells (DSSCs) have emerged as a promising technology for converting solar energy into electrical energy due to their cost-effectiveness and environmentally friendly nature. This paper presents a fabrication process for DSSCs utilizing copper (I) iodide (CuI) as a key component, which offers an attractive alternative to conventional materials. The DSSC was fabricated with four different sizes, producing current from 27.8μV to 1.1μV. The intervention is the use of eco-friendly copper (I) iodide or cuprous iodide (CuI), a p-type semiconductor material, with the incorporation of a organic ligand, called Tetramethylethylenediamine (Tmed) in the preparation for solid state dye sensitized solar cells (DSSC).

Paper ID: 55

TITLE: Reliability Assessments of Distributed Generation Penetration Level on Power System Networks

AUTHOR(S): Ahmad Zairi Mohd Zain and Mohd Ikhwan Muhammad Ridzuan

Abstract:

Reliability assessment represents a crucial role in assessing the stability and performance of power system networks. With the integration of distributed generation (DG), the reliability dynamics of these networks have undergone significant transformations. However, most of the existing research in this area has predominantly focused on voltage and power loss-based DG placement strategies, neglecting the importance of reliability-based placement methods. Therefore, this paper aims to bridge this gap by investigating the impact of placing DGs with different penetration levels on the effectiveness of network reliability. To achieve this objective, the study utilizes the IEEE 9-bus and 14-bus systems as test cases for simulating network reliability. The widely adopted Monte Carlo Simulation (MCS) approach is employed within comprehensively evaluate both customer-related and system reliability performance. The simulation outcomes yield important reliability indices, including System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI), and Customer Average Interruption Duration Index (CAIDI). The results demonstrate the varying impacts of DG placement and penetration levels on network reliability, unveiling the intricate relationship between these factors and overall system reliability.

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