InECCE2021

The 6th International Conference on Electrical, Control and Computer Engineering

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UNIVERSITI MALAYSIA PAHANG

PROGRAM BOOK

The 6th International Conference on Electrical, Control and Computer Engineering (InECCE2021)

'AI FOR POWER ENGINEERING'

MBOT

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All accepted papers will be published in

LNEE
Springer **Scopus**

FTKEE

**Faculty of Electrical
and Electronics Engineering
Technology**

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Associate Professor Dr. Hamdan Bin Daniyal

Assalamualaikum wrt and greetings to all.

First and foremost, welcome to our distinguished keynote speakers and all participants to this virtual conference.

On behalf of the Faculty of Electrical and Electronics Engineering Technology (FTKEE), Universiti Malaysia Pahang (UMP), I would like to express my heartfelt gratitude to our Vice Chancellor for his support in organising this event, named "The 6th International Conference on Electrical, Control, and Computer Engineering" or better known as InECCE2021. We are also glad and honored to have Professor Dr. Hobara Yasuhide from the University of Electro-communication Tokyo, Japan and Associate Professor Dr. Seyedali Mirjalili from Torrens University, Australia as our keynote speakers at this virtual conference with the theme "Artificial Intelligent (AI) for Power Engineering".

Before I go any further, I would want to extend the FTKEE's and the entire UMP staff's heartfelt apologies to all participants and family members who have been experiencing various hardships caused by COVID-19. Please accept our heartfelt condolences for your loss (if any). Due to implementation of Movement Control Order (MCO), all physical meetings or events, including this conference, can no longer be physically held as previous InECCEs. As a result, the best alternative has been determined to be online using a video conference platform. It is hoped that the goals of this conference will be met in the same way that the physical conference was.

It is worth noting that this is our first experience of hosting a virtual conference. Although this new experience puts us under pressure to ensure our conference runs smoothly, we can also take this opportunity to disseminate knowledge in the new norms. For info, there were 143 papers submitted for this conference, however only 103 were found to be relevant and of good quality. It is also a good time to discuss recent developments in electrical, electronic, and computer engineering, such as power, energy, and artificial intelligence (AI), among other topics. The conference is held virtually, and it covers a wide range of topics that are both intriguing and beneficial to the theme of AI and power.

Last but not least, on behalf of the FTKEE, I am pleased to congratulate all of the research scholars and paper presenters from various backgrounds and countries, who have made it to this conference. These papers would educate us all on the value of research culture, particularly in the field of electrical and electronic engineering. It is anticipated that all the knowledge presented here will be utilised for the betterment of humanity and the environment for future generations.

Thank you and see you again!

DR. AMIR IZZANI MOHAMED

Welcome to the InECCE2021

Selamat Datang (Welcome! Yokoso!) to the 6th International Conference on Electrical, Control & Computer Engineering or more warmly known as InECCE2021. This 6th edition flagship conference organized by Faculty of Electrical & Electronics Engineering Technology UMP (previously Faculty of Electrical & Electronics Engineering) gathers experts, research scholars, academicians and engineers from the field of electrical, electronic, control and computer engineering.
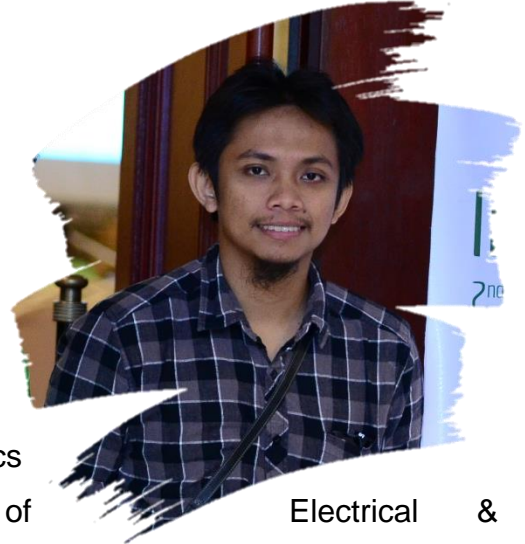
It has a good reputation for quality and a forum for valuable exchange of novel ideas, knowledge and research outputs regarding the issues related to the advancement of new technologies for shaping the future of engineering in our civilized society.

This year, 143 papers were submitted by local and international authors. After a thorough review process to ensure the accepted paper possesses high quality technical publication,103 papers were accepted to the conference. All the presented papers will be considered for inclusion in a Springer's Lecture Notes of Electrical Engineering (LNEE) series, a Scopus-indexed proceeding.

On behalf of the InECCE2021 committee members, I would like to express our gratitude to all authors who have contributed high quality technical and research papers. I would like to extend my appreciation to all committee members for their dedication, hard work and efforts to make the 6th edition of InECCE a great success.

Our appreciation to all reviewers, who shared their expertise to review the submitted papers with constructive and valuable comments to ensure high quality level of the accepted papers.

Appreciation also goes to our respective keynote speakers Prof Dr Hobara Yasuhide from University of Electro-Communication, Tokyo Japan and Associate Prof. Dr Seyedali Mirjalili from Torrens University Australia for agreeing to share their knowledge on their respective field.

Appreciation also goes to Faculty of Electrical & Electronics Engineering Technology University Malaysia Pahang for financial support, Malaysian Board of Technologist for approving Continuing Professional Development (CPD) points.

Finally, InECCE2021 has always been envisioned and targeted as a platform for networking and long-lasting collaborations between a group of like-minded people in the electrical engineering field. With this aim, on behalf of the organizing committee, I encourage you to make full use of the opportunities available to connect and share, and contribute greater achievements to the body of knowledge.

Let's have a pleasant, beneficial and memorable moment in InECCE2021!

Hope to see you in our future event.

Professor Hobara Yasuhide, PhD

Professor Yasuhide Hobara joined the Department of Communication Engineering and Informatics, Graduate School of Informatics and Engineering in The University of Electro-Communications (UEC) in 2009. Following his graduation from the UEC in 1997, he worked at various different educational and research institutes such as Institute of Applied Physics Russian Academy of Sciences in Nizhny Novgorod, Earth observation research center, JAXA, Laboratoire de Physique et Chimie de l'Environnement et de l'Eespace Centre National de la Recherche Scientifique (France), Swedish institute of space physics (Sweden), The university of Sheffield (United Kingdom), and Tsuyama National College of Technology (Japan). Terrestrial and space electromagnetic environment is his main field of research such as space plasma physics, seismo-electromagnetics, atmospheric electricity from ground-based and satellite measurements. Currently he engages in both experimental and theoretical research projects to understand the physical mechanisms of Lithosphere-Atmosphere-Ionosphere Coupling (LAIC) including seismo-ionospheric perturbations by operating the UEC VLF observation network, FDTD numerical computations to simulate electromagnetic wave propagations. He research will contribute to monitor and predict the Earth environment and mitigate the natural disasters. He is a head of the Center for Space Science and Radio Engineering, Earth Environment Research Station, Research station on seismo-electromagnetics in UEC.

Assoc. Professor Seyedali Mirjalili, PhD

Seyedali Mirjalili is an Associate Professor at Torrens University Center for Artificial Intelligence Research and Optimization and internationally recognized for his advances in nature-inspired Artificial Intelligence (AI) techniques. He is the author of more than 150 publications including five books, 100 journal articles, 20 conference papers, and 30 book chapters. With over 15,000 citations and H-index of 45, he is one of the most influential AI researchers in the world. From Google Scholar metrics, he is globally the most cited researcher in Optimization using AI techniques, which is his main area of expertise. He has been the keynote speaker of several international conferences and is serving as an associate editor of top AI journals including Neurocomputing, Applied Soft Computing, Advances in Engineering Software, Applied Intelligence, IEEE Access, and the Journal of Algorithms

Program Schedule

Monday: 23rd August 2021

Time	Program
08.00 am – 09.00 am	Registration
09.00 am – 09.30 am	Opening ceremony
09.30 am – 10.30 am	Keynote Sessions
10.30 am – 11.00 am	Break
11.00 am – 12.30 pm	Parallel Session 1 to Session 5
12.30 pm – 02.00 pm	Lunch Break
02.00 pm – 03.30 pm	Parallel Session 6 to Session 10
03.30 am – 04.00 pm	Break
04.00 pm – 05.00 pm	Closing Ceremony

Parallel Session

Time	23rd August 2021				
8:30 AM	Preparation				
9:00 AM	**Welcoming note by Chair InECCE 2021**				
9:10 AM	**Opening Speech by Professor Ir. Dr. Wan Azhar Wan Yusoff Vice Chancellor UMP**				
9:30 AM to 9: 50 AM	**Keynote 1 by Professor Dr. Hobara Yasuhide The University of Electro-Communications, Japan *"Spatio-temporal Distributions of Lightning Stroke Charge using ELFand Meteorological Data"***				
10:00 AM to 10: 20 AM	**Keynote 2 by Assoc. Professor Seyedali Mirjalili Torrens University, Australia *"Optimization Problems and Algorithms"***				
	Photography session				
	Room Break				
10:30 AM to 12:40 PM (7 minutes presentation and 3 minutes Q&A session for each presentation)	**Parallel Session 1**	**Parallel Session 2**	**Parallel Session 3**	**Parallel Session 4**	**Parallel Session 5**
	Paper ID:	Paper ID:	Paper ID:	Paper ID:	Paper ID:
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	28	30	17	14	1
	39	34	26	16	27
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1:30 PM to 2:00 PM	Break				

	Parallel Session 6	Parallel Session 7	Parallel Session 8	Parallel Session 9	Parallel Session 10
	Paper ID:	Paper ID:	Paper ID:	Paper ID:	Paper ID:
2:00 PM to 4:00 PM (7 minutes presentation and 3 minutes Q&A session for each presentation)	25	53	2	137	133
	37	63	6	19	141
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4:00 PM to 5:00 PM	**Award & Closing Ceremony by Assoc. Prof. Dr. Hamdan Daniyal, Dean of Faculty of Electrical & Electronics Engineering Technology**				

Clusters
Instrumentation & Control Engineering
Applied Electronics & Computer Engineering
Sustainable Energy & Power Electronics

InECCE 2021
The 6th International Conference on Electrical, Control and Computer Engineering

PAPER ID: 1

TITLE: Dynamic Partial Discharge Characteristic for Onsite Measurement Based on Zero Crossing in Power Cable

AUTHOR(S): Ir. Ts. Dr. Ahmad Zaidi Abdullah, Zul Hasrizal Bohari, Assoc. Prof. Dr. Muzamir Isa and Nurhafiza Azizan

Abstract: This paper analyzed the dynamic Partial discharge (PD) characteristic for on-site measurement based on zero crossing in high voltage power cable. Ac-cording to IEC60270, high voltage measurement characteristic is required to identify correct PD signal. There is currently limited research operating on the trait, especially zero crossing, and because of this, comprehensive PD detection characteristics need to be further established in certain severe conditions. This occurrence has an erratic and sporadic characteristic that is challenging to identify. This paper explored the time of zero crossing for onsite measured PD signal for power cable through MATLAB simulation. This task is crucial to choose the range of zero crossing time based on the highest peak of detected PD signal. Based on the detailed analysis, it is substantially identified that there is an specific time only for PD signal with the highest amplitude, and based on detected times, a range of zero crossing characteristic was described for PD signal. It provided a useful analysis result for the guideline during onsite PD measurement for power cable.

PAPER ID: 2

TITLE: Comparative Study of Controller Performance for Variable Speed Compressor Using R600a Refrigerant

AUTHOR(S): Wan Azani Wan Mustafa and M. Saifizi

Abstract: R600a is a refrigerant that is more environmental-friendlier compared to other types of refrigerant. However, it required the use of a Variable Speed Compres-sor (VSC) in order to be able to regulate its thermophysical properties, which vary the temperature drastically with the slight change in pressure. In order to ef-ficiently control the speed of VSC, three types of controllers, namely, Adaptive Proportional Controller (P-ARMAX), Fuzzy-Logic (FL) controller and Sliding Mode Controller (SMC) are studied and compared the performance of each con-troller. The performance of each type of controller was evaluated based on the cri-teria of its settling time, steady state error, control effort and response tempera-ture. From the studied conducted, it was found that the fuzzy logic controller has the most efficient control effort between the three with an acceptable settling time and steady state error. However, sliding mode controller gave the best settling time performance.

Abstract

PAPER ID: 4

TITLE: U-Slot Microstrip Patch Array Antenna for UHF RFID Reader

AUTHOR(S): Mohd Hisyam Mohd Ariff, Imran Saifullah Ishak, Rahimah Jusoh, Mohammad Fadhil Abas, Mohammed Nazmus Shakib, Waheb Abdul Jabbar Shaif Abdullah and Razali Muda

Abstract: This paper aims to design and analyze a microstrip patch array antenna for the application of Radio Frequency Identification (RFID). Array antennas are widely used in the RFID applications as it offers high gain and directivity to allow long distance read range. The microstrip patch is arranged in 2x2 array and is printed on FR-4 materials. In compliance with the Malaysian RFID regulated range of frequency of 919 MHz to 923 MHz, the antenna is designed to meet its specifications. The operating frequency of the microstrip patch antenna array is 921 MHz. The FR-4 substrate with a dielectric constant of 4.7 and height of 0.16 cm. Theoretical studies and calculations on this topic have been done in order to design the microstrip patch antenna array with the correct dimensions. By using the CST Microwave Studio 2014 as the primary software to model and simulate the results, there are a few parameters that are going to be analyze which includes reflection coefficient, Voltage Standing Ratio (VSWR), gain, directivity, radiation pattern and bandwidth.

PAPER ID: 6

TITLE: A Retention Ability of Velocity Profile in Multi-Stage Fluidization Systems

AUTHOR(S): Muhamad Silmie Mohamad Shabri, Mohd Al Hafiz Mohd Nawi and Muhammad Syamil Zakaria

Abstract: Fluidization is a process that enables fine solids to be converted into a liquid like state by interaction with gas or fluid. In the real application, fluidized circulating beds are primarily used in chemical, mineral, pharmaceutical, energy related processes and catalyst processes for drying. Current fluidized bed system which involved single stage processes facing an issues such as the efficiency of the fluidization process as it would use high load energy to the make the velocity uniformity and might possess in high bed pressure. The aim of this study is to investigate the airflow characteristics of multi-stage fluidization system through Computational Fluid Dynamics (CFD) analysis. The present study used a fixed blade distributor numbers (30) via a variant horizontal inclination angles (10°, 12° and 15°). Moreover, this study only focus one velocity component that is tangential velocity (TV). The TV can cause swirling and fluidized on the bed. The findings of this study shows that at 15° blade inclination angle with 30 blades number has high mean tangential velocity and tend to form a velocity uniformity.

PAPER ID: 8

TITLE: Partial Discharge Detection Performance Using Multi-Cylindrical Slots Antenna with Parasitic Suppression Patch for Power Transformer

AUTHOR(S): Zul Hasrizal Bohari, Assoc. Prof. Muzamir Isa, Ir. Ts. Dr. Ahmad Zaidi Abdullah, Assoc. Prof. Ping Jack Soh, Dr. Ayob Nazmy Nanyan and Mohamad Fani Sulaima

Abstract: This paper focused on analyzing multi-cylindrical slots' performance combining with parasitic suppression patch for partial discharge detection. Both proposed slots antenna and conventional monopole are simulated using CST Microwave Studio software before being fabricated and tested with real partial discharge signal. Performance comparison will be focused on scattering parameter, radiation pattern and surface current distribution. Both antennas are subjected to a partial discharge signal from lab scaled power transformer for the field test. Based on the result, the proposed performed better in both simulation and field testing with the dual-frequency operation, with better gain improvement by 14%. For the field test, the proposed antenna generated better detection result with reduced noises by 50%.

PAPER ID: 9

TITLE: Assessing the Chaotic Map Population Initializations for Sine Cosine Algorithm Using the Case Study of Pairwise Test Suite Generation

AUTHOR(S): Fakhrud Din, Kamal Z Zamli and Abdullah B. Nasser

Abstract: Sine Cosine Algorithm (SCA) is a new population based meta-heuristic al-gorithm that exploits both the sine and cosine functions for its update op-erators. The main strength of SCA is its simplicity and straightforward im-plementation as well as provides no parameter control adjustment. For these reasons, SCA can be adopted in many optimization problems quickly and without much tuning. Despite the aforementioned advantages, SCA convergence can still be problematic depending on the initial starting posi-tions of initial populations. In this work, we propose to assess the effec-tiveness of pseudo random (i.e., Random) as well as three chaotic map ini-tializations (i.e., sine map, circle map, and logistic map) for SCA using the pairwise test case generation as our case study.

Abstract

PAPER ID: 13

TITLE: Reliability Performance in Distribution System based on the Amount of Power supply by Generators and Synchronous Compensators in the System

AUTHOR(S): Noorfatin Farhanie Mohd Fauzi, Nur Nabihah Rusyda Roslan and Mohd Ikhwan Muhammad Ridzuan

Abstract: One of the main aspects in power quality is the reliability in power system. Reliability is known as the continuous supply of the electricity to the consumers. People depend mainly on the electricity in order to continue in their daily life. The performance of reliability can be evaluated by these three main reliability indices which are SAIFI (System Average Interruption Frequency Index), SAIDI (System Average Interruption Duration Index) and CAIDI (Customer Average Inter-ruption Duration Index). The interrupted of the electricity is due to any failure in the network system and inadequate of the power supplied to the system. In power system, the electricity is supplied to the load by generators which supply both real power and reactive power. Other than generators supply the power, the presence of synchronous compensator also is very important as it stabilize the system. This synchronous compensator is only supplies the reactive power to the system. Since, the failure of the reactive power sources rarely considered. Hence, in this paper the amount of power for both reactive power and reactive power are ana-lyzed to observe the effect to the reliability performance in the network.

PAPER ID: 14

TITLE: Optimal Loading Analysis with Penalty Factors for Generators Using Brute Force Method

AUTHOR(S): Mohammad Khurshed Alam and Professor Madya Dr Mohd Herwan Bin Sulaiman

Abstract: Optimal load dispatching is an important challenge for the modern electric and computational engineering. Considering different linear and nonlinear constrains optimal load analysis is done to predict the utility and operating duration of the different power stations. This paper reports optimal loading analysis method us-ing Brute force method with and without considering the penalty factor of power line loss. In this work, two different algorithms are discussed with their mathe-matical explanation and analyzing feasibility. The algorithms are designed and an-alyzed in MATLAB 2018a. Several conditions are examined by the proposed al-gorithms and the yields are explained with numerical and graphical presentation. The results prove the affectivity of the proposed algorithms. Furthermore, the pros and cons of the proposed methods are also discussed in this work.

Abstract

PAPER ID: **16**

TITLE: Using the Barnacles Mating Optimizer with Effective Constraints Handling Technique for Cost Minimization of Optimal Power Flow Solution

AUTHOR(S): Mohd Herwan Sulaiman, Zuriani Mustaffa, Mohd Mawardi Saari and Ahmad Johari Mohamad

Abstract: One of the active researches in power system operation is finding the solution of Optimal Power Flow (OPF) problems. OPF is a non-linear optimization problem where the determination of economical and efficient operation should be done by obtaining the steady state parameters of electrical networks. There are numerous metaheuristic algorithms that have been proposed in the last decades to solve OPF. However, the constraints of OPF are normally solved by implementing the penalty function approach which require appropriate selection of penalty coefficients by tedious trial and error. This paper proposes the performance evaluation of constraint handling technique namely superiority of feasible solution (SF) that integrated with the recent metaheuristic algorithm, Barnacles Mating Optimize (BMO) to be implemented of OPF problem, specifically in cost minimization. The technique is tested on IEEE 30-bus system and compared with the other metaheuristic algorithm with SF approach too. From the comparison, it can be concluded that the performance of SF-BMO is better compared to others in terms of obtaining the minimum cost of power generation.

PAPER ID: 17

TITLE: Levy Slime Mould Algorithm for Solving Numerical and Engineering Optimization Problems

AUTHOR(S): Julakha Jahan Jui, Mohd Ashraf Ahmad and Muhammad Ikram Mohd Rashid

Abstract: The proposed Levy Slime Mould Algorithm (LSMA) is a novel metaheuristic algorithm that integrates the Levy distribution into a new metaheuristic called Slime Mould Algorithm (SMA) for solving numerical and engineering problems. The SMA is a newly developed metaheuristic algorithm that is inspired by the slime moulds natural oscillation mode. Adaptive weights are used in the conventional SMA to simulate the process of generating positive and negative feedback of a slime mould propagation wave centered on a bio-oscillator to shape the best path for linking food with excellent exploratory capacity and exploitation propensity. However, in solving a variety of optimization problems, SMA-like metaheuristics are often trapped in local optima. Therefore, for solving the SMA algorithm local optima problem, we used the Levy distribution rather than the conventional uni-form distribution in the candidate selection procedure. We took advantage of Levy flight, which solved the local optima problem and improved traditional SMA efficiency. The proposed LSMA algorithm performance was evaluated using 23 well-known benchmark test functions, namely unimodal benchmark functions, multimodal benchmark functions, and fixed-dimension multimodal bench-mark functions, as well as compared with the traditional SMA. One classical engineering problem known as the welded beam structure problem is used to test the proposed LSMA algorithm's efficacy. Experimental findings have shown that the proposed LSMA algorithm delivers better performance with 23 benchmark test functions, and one engineering problem has been investigated regarding statistical performance evaluation and convergence curve.

PAPER ID: 19

TITLE: Prostate Cancer Prediction Using Feedforward Neural Network Trained with Particle Swarm Optimizer

AUTHOR(S): Julakha Jahan Jui, M.M. Imran Molla and Mohammad Khurshed Alam

Abstract: Prostate cancer has been one of the most commonly diagnosed cancers in men and one of the leading causes of death in the United States. Because of the complexity of masses, radiologists are unable to diagnose prostate cancer properly. Many prostate cancer detection methods have been established in the recent past, but they have not effectively diagnosed cancer. It is worth noting that most current studies employ machine learning techniques, especially when creating prediction models from data. Despite its possible benefits compared to standard statistical analyses, these methods break down the problem statements into different parts and combine their results at the final stage. This makes complexity, and the prediction accuracy not consistently high. The new training method for Feedforward Neural Networks (FNNs) is used in this paper as the Particle Swarm Opti-miser (PSO) for prostate cancer predictions. PSO is one of the novel metaheuristics and frequently used for solving several complex problems. The experimental results are evaluated using the mean, best, worst, and standard deviation (Std.) values of the fitness function and compared with other learning algorithms for FNNs, including the Salp Swarm Algorithm (SSA) and Sine Cosine Algorithm (SCA). The results of the experiments have shown that FNNPSO is well above FNNSSA and FNNSCA in FNN training. FNN trained with PSO is also shown to be better accurate than other trained methods to predict prostate cancer.

PAPER ID: 21

TITLE: An Open-source, Miniature UV to NIR Spectrophotometer for Measuring the Transmittance of Liquid Materials

AUTHOR(S): Anas Mohd Noor, Ahmad Nasrul Norali, Zulkarnay Zakaria, Chong Yen Fook and Basri Noor Cahyadi

Abstract: The primary disadvantages of commercial spectrophotometers are expensive, heavy, and not portable. Furthermore, conventional instruments are only suitable to be used in a specialized laboratory. Even though some commercially available small-size instruments or devices are available, the price is still high. Therefore, a low-cost device is necessary without sacrificing accuracy and sensitivity. In this work, a low-cost, configurable, open-source and accurate portable spectrophotometer device was developed for education and laboratory analytical use. Commercially available photodetector is utilized as main component of the device due to broad spectral range from ultraviolet to near infra-red. The device performs well over a wide range of spectral wavelengths with small errors. We presume that the use of this work can offer a good alternative for affordable and accurate device that is comparable to the commercially available products which also suitable for many applications

PAPER ID: 23

TITLE: Modelling of Power Curve Equation for Small-Scale Vertical Axis Hydrokinetic Turbine

AUTHOR(S): Wan Ismail Ibrahim

Abstract: In this paper, the power curve equation model using a vertical axis turbine for small-scale hydrokinetic energy harnessing real-time simulation is proposed. The modelling technique is based on an analytical approximation method on the CP-TSR curve characteristic of the H-Darrieus turbine. In this work, the CP-TSR curve characteristic is generated and derived through a simulation process using QBlade and MATLAB software. The Root Mean Square Error (RMSE) method is implemented to obtain the most accurate polynomial approximation equation to represent the H-Darrieus tur-bine. The 6th polynomial equation has been chosen as a turbine power equation mod-el due to the least RMSE value. The results indicated that the proposed power equation model enhanced the energy conversion with 86.92 % efficiency compared to the other model.

PAPER ID: 25

TITLE: Emotion State Recognition Using Band Power of EEG Signals

AUTHOR(S): Norfatin Halim, Norfaiza Fuad, Mohd Erwandi Marwan and Engku Mohd Nasri Engku Mat Nasir

Abstract: Emotion plays a key role in human life and is not consciously controlled. Some emotions can be easily conveyed through facial expressions, speech, behaviour, and gestures, and also handwriting, but some are not. This study examines the recognition of emotions using an electroencephalogram (EEG) signal. In this research, we will prove the intensity and reliability of the EEG signals as a framework for the identification of emotions for two distinct emotions that are happy and sad. Data from 26 subjects were obtained using Emotive Insight which consists of 5 channels but the data only selected from two channels which are AF3 and AF4. The pre-processing stage was per-formed to remove the unwanted signals and two frequency bands were ex-tracted from the selected signals which are alpha and beta. The alpha and Be-ta band power is gain by using power spectral density in order to identify the emotion of the subjects.

Abstract

PAPER ID: 26

TITLE: Levy Tunicate Swarm Algorithm for Solving Numerical and Real-World Optimization Problems

AUTHOR(S): Julakha Jahan Jui, Mohd Ashraf Ahmad and Muhammad Ikram Mohd Rashid

Abstract: The proposed Levy Tunicate Swarm Algorithm (LTSA) is a novel metaheuristic algorithm that integrates the Levy distribution into a new metaheuristic algorithm called Tunicate Swarm Algorithm (TSA) to solve numerical and real-world optimization problems. TSA has been newly designed to mimic the propulsion of jets and swarm behavior of tunicates during navigation and feed processes. However, in solving a variety of optimization problems, TSA like metaheuristics are often trapped in local optima. Therefore, we used the Levy distribution rather than the conventional uniform distribution in the candidate selection procedure to solve the TSA algorithm local optima problem. We took advantage of Levy flight, which solved the local optima problem and improved traditional TSA efficiency. The proposed LTSA algorithm performance was evaluated using 23 well-known benchmark test functions, namely unimodal bench-mark functions, multimodal benchmark functions, and fixed-dimension multi-modal benchmark functions, as well as compared with the traditional TSA. The effectiveness is tested by identifying one real-world engineering application known as the twin-rotor system. The performance is evaluated based on the mean, best, worst and Std. value and the convergence curve. Experimental findings have shown that the proposed LTSA algorithm delivers better performance with 23 benchmark test functions and successfully modelled the twin-rotor system.

Abstract

PAPER ID: 27

TITLE: High Gain Boost Converter for Electrical Vehicle (EV) Application

AUTHOR(S): Muhammad Zaid Aihsan, Muhammad Mokhzaini Azizan, Muhammad Izuan Fahmi Romli, Ahmad Muhyiddin Yusof and Mohd Hariz Faizal Mohd Fakri

Abstract: This paper presents the high gain boost converter in the concept of SMPS DC/DC Circuit with proposed topology. The circuit can level up a small DC voltage into a tremendous level of DC voltage with a single unit of the semiconductor switch. A normal DC/DC boost converter has its own limitation and will cap the boosting generation at a certain level before the system started to be saturated. The proposed topology introduces the integration between the transformer and the high switching state resulting in the voltage production of the proposed converter in the ratio of 1:10. The simulation is done through PSIM software and the stage of the simulation is in a closed-loop system. The topology used in this paper level up the small 100 VDC in-to a constant 500 VDC range with a balance load system. The high gain boost converter commonly pairs with the traction inverter in electrical vehicle applications. The comparative performance with the conventional boost converter is also presented in this paper.

Abstract

PAPER ID: 28

TITLE: Feature Selection and Prediction of Heart Disease Using Machine Learning Approaches

AUTHOR(S): M.M. Imran Molla, Md. Sakirul Islam, A. S. M. Shafi, Mohammad Khurshed Alam, Md. Tarequl Islam and Julakha Jahan Jui

Abstract: Heart Disease (HD) is the world's most serious illness that seriously impacts human life. The heart does not push blood to other areas of the body in cardiac disease. For the prevention and treatment of cardiac failure, accurate and timely diagnosis of heart disease is critical. The diagnosis of cardiac disease has been considered via conventional medical history. Non-invasive approaches like machine learning are effective and powerful to categorize healthy people and people with heart disease. In the proposed research, by using the cardiovascular disease dataset, we created a machine-learning model to predict cardiac disease. In this paper, it is capable of recognizing and classifying the heart disease patient from healthy people by using three standard machine learning algorithms: Random Forest (RF), Support Vector Machine (SVM), and K-Nearest Neighbor (KNN). In addition, the ROC/AUC curve is calculated for each classification algorithms. In the proposed scheme, we also used the feature selection algorithm to reduce dimensions over a qualified heart disease dataset. After that, the whole structure for the classification of heart disease has been created. On complete features and reduced features, the performance of the proposed approach has been verified. The decrease in features affects the accuracy and time of execution of the classifiers. With the selected features, the highest classification accuracy is obtained for the KNN algorithm is about 93%, with a sensitivity is 0.9750 and specificity is 0.8529. Therefore, with the complete features, the classification accuracy is about 91%.

Abstract

PAPER ID: **29**

TITLE: Sine-based Barnacle Mating Optimization for PD Control of an Inverted Pendulum System

AUTHOR(S): Ahmad Nor Kasruddin Nasir

Abstract: This paper presents an improved optimization algorithm namely Sine-based Barnacle Mating Optimization (SbBMO) algorithm. The Barnacle Mating Optimization (BMO) applies a mating strategy to retain the survival of their colony. A Sine-based position update strategy is applied to all barnacles that are located at a distance away from their parent. This is to guide the barnacles towards the current best barnacle in the colony. It balances the mating strategy considering the dynamic step size of the sine-based strategy. The proposed SbBMO is tested on 10 dimensions of CEC2014 benchmark functions. The proposed algorithm is also applied to optimize Proportional-Derivative (PD) controller for controlling an inverted pendulum system. Result of the benchmark functions shows that the proposed SbBMO achieved a significant improvement on accuracy performance. For the inverted pendulum application, both algorithms have satisfactorily optimized the controller. However, the SbBMO-based PD achieved a more satisfactory control performance as compared to BMO-based PD.

PAPER ID: 30

TITLE: Optimizing Machine Learning For Yield Improvement Opportunity

AUTHOR(S): Aeizaal Azman Abdul Wahab

Abstract: The drift in development of Internet of Things (IoT) technology and Industry 4.0 enable massive amount of data been generated day by day in semiconductor manufacturing area. This creates a lot of opportunity for improvement as those data can be translated into useful information to help in decision making, learn from previous occurrences, and predict the incoming output. This piece of information is able to discover new opportunity to kill the units upfront, before assembly which will improve the class yield, save manufacturing capacity, save material cost and increase revenue. There are tremendous number of ways of doing analysis been established by researchers in finding the sort to class correlation such as CART, Regression, GBT and many more. In supervised learning, each of machine learning having its own algorithm and computer instruction to learn from past data and come out with a predictive model. However, despite all of the possible ways to find sort to class correlation, there are still some considerations that need to be taken into account, which optimizing the control parameters. This will help to further improve the predictive model based on engineer preferences and situation.

Abstract

PAPER ID: 32

TITLE: A New Hybrid Image Encryption Technique using Lorenz Chaotic System and Simulated Kalman Filter (SKF) Algorithm

AUTHOR(S): Nurnajmin Qasrina Ann Ayop Azmi, Dwi Pebrianti, Mohd Fadhil Abas and Luhur Bayuaji

Abstract: Nowadays, encryption is one of the most popular and effective security methods used by company and organizations. A new hybrid technique, Lorenz chaotic system and an optimization algorithm, Simulated Kalman Filter (SKF) had been proposed to solve image encryption problem. The objectives of the hybrid tech-nique are to improve the security and add noise from the optimization algorithm and generate chaotic secret key. To achieve that, Lorenz chaotic system is imple-mented to this method and produce secret key sequence. SKF is one of the opti-mization methods that had been proved to have great performance in engineering applications from prediction, measurement, and estimation process. Thus, the proposed method is outperformed the results and analysis compared to literature as benchmarks. In short, the proposed hybrid approach is agile and efficient to apply in image encryption problem.

Abstract

PAPER ID: 34

TITLE: FPGA Implementation of Convolutional Neural Network for Defect Identification on Swiven Cap

AUTHOR(S): Mohd Shahrimie Mohd Asaari, Wong Ngei Siong and Bakhtiar Affendi Rosdi

Abstract: In this work, Convolutional Neural Network (CNN) is applied for defect identification of Swiven Cap (one type of medical component) based on Field-Programmable Gate Array (FPGA) implementation. Caffe is used as the platform to develop the CNN model. After training phase, a confusion matrix is used to validate the accuracy, precision and recall rate of the trained model. Once the validation is confirmed, OpenCL software is used to develop cross-compile algorithm for System on Chip FPGA (SoC FPGA) implementation on SoC FPGA. This hardware implementation is then used to perform inference of the trained model. Considered surface defects are dent, scratch and black dot. By using a confusion matrix as the evaluation criteria, an accuracy of 88.9 percent is achieved. The well-trained model is further implemented on FPGA using Altera DE1-Soc development board. PipeCNN framework is used to support FPGA-based inference of the trained CNN model. The inference time for one test image using Altera DE1-SoC is around 300 to 400 milisecond (ms) whereas the inference time using CPU is around 19 to 21 second(s). The performance of Altera DE1-SoC is nearly 63 times faster than the performance of CPU. This proves that the FPGA implementation is applicable alternative for hardware accelerator to speed-up the CNN inference process.

Abstract

PAPER ID: 36

TITLE: Classification of Domestic Electrical Appliances Based on Starting Transient Using Artificial Intelligence Methods

AUTHOR(S): Tarmizi Ahmad Izzuddin, Norlaili Mat Safri, Zamani Md Sani and Moahamad Na'Im Mohd Nasir

Abstract: With the rising implementation of Home Energy Management Systems (HEMS), active studies had been done relative to power monitoring alternatives. Load monitoring is an essential block of HEMS; therefore, the improvement of simplicity and convenience in load monitoring is crucial for the HEMS market expansion. This paper proposes the use of Artificial Neural Network models for the classification of common electrical appliances based on the extracted distinctive current starting transient features of electrical appliances. This research's main challenges are: conducting reliable instrumentation practice with an appropriate choice of instruments, extracting distinctive features in the current transient, and analysing the ANN classifier for good performance using artificial intelligence methods. The analysis would compare the performance of time-domain inputs and frequency-domain inputs to the ANN classifier. By selecting appropriate frequency-domain features as input to the ANN classifier, it was shown that up to 86% classification accuracy could be obtained using the proposed method, justifying our hypothesis that multiple non-intrusive load monitoring using a single sensor is indeed plausible.

PAPER ID: 37

TITLE: A Digital Dual-phase Lock-in Amplifier for MFL and ECT NDT Applications

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

Abstract: The phase sensitive detection is crucial in the separation of complex magnetic signals in the electromagnetic methods of NDT. Therefore, a lock-in amplifier is required to fulfill this purpose. Compared to the analog lock in amplifier, the digi-tal lock-in amplifier is advantageous compared to its analog counterpart due to several reasons. Also, a dual-phase lock in amplifier excels in term of overcom-ing the error caused by the phase shift circuit compared to the single-phase lock-in amplifier. In this study, a digital dual-phase lock-in amplifier is developed via NI-LabVIEW. A data acquisition card (NI-DAQ 6212, National Instruments, USA) is used for the data acquisition purpose. With the 16-bit ADC converter of the NI-DAQ 6212, the input range of the DAQ was set from -5 V to 5 V. Then, the frequency, phase and noise characteristics of the developed lock-in amplifier are studied. From the results, in terms the characteristics of frequency and phase, it can be said that the developed lock-in amplifier does fulfill its job in extracting the correct amplitude and phase. Meanwhile, in term of noise characteristics, the performance of the developed lock-in amplifier is still reliable with some margin of errors.

Abstract

PAPER ID: 39

TITLE: Development of Savonius Vertical Windmill with Charging System

AUTHOR(S): Nadhirah Al Wani Abdul Halim, Diyya Hidayah Abd Rahman, Nur Irwany Ahmad, Habibah Hj. Mokhtaruddin, Norhanisa Kimpol, Nurhafiza Azizan, Ahmad Zaidi Abdullah and Noor Shazliza Zakaria

Abstract: The goal of the project is to achieve an output voltage at range 1 V until 13 V. The outcomes investigation result from Savonius vertical windmill affordable to produce output voltage of 2.33 V. In recent years, the use of small-scale green energy technologies has grown exponentially. This further highlights the need for innovation in this area, especially for small-scale applications. Global warming results from carbon dioxide gas accumulation in the atmosphere and the depletion of the ozone layer and carbon dioxide emissions from fossil fuels. To get the clean energy sources are not only an alternative to a finite supply of fossil fuels but also a way of helping to mitigate the harm that have been caused. Researchers around the world are looking into cheaper, renewable, and more reliable sources of energy which is wind turbine to produce kinetic energy and transformed into electrical energy. Usually the size of wind turbine was larger and heavy. There-fore, this research aims to design the Savonius vertical windmill with a charging system that displays the desired output. This research used SolidWorks software to design the blade and generator part and using Arduino software to control the charger circuit.

PAPER ID: 40

TITLE: Development of IoT based Smart Sorting Recycle Bin us-ing Raspberry Pi3 B+

AUTHOR(S): Yasmin Abdul Wahab

Abstract: Nowadays, the increment in population and settlement make the en-vironment polluted due to the easy-going attitude of the community itself, this problem increases the management costs of the authorities and cause problems to the environment. Hence, this paper aims to develop an automat-ed system for sorting the recycle bin with monitoring indicator both local and remote using Raspberry Pi3 B+. The IoT based smart recycle bin was de-signed and fabricat-ed by using locally available materials. The recycle bin was powered by a 5V/2A rechargeable battery which drives the system to op-erate. It also had been designed to identify three type of bin such as paper, metal and plastic. Three types of sensor were used to identify each of the bin such as capacitance sensor for paper detection, inductive sensor for metal de-tection and light dependent re-sistor for detect presence of plastic. Hence, the system was able to identify each types of material throw into the recycle bin. Simultaneously, the user also can monitor the level of the recycle bin through their smart phone. In short, devel-opment of this IoT based smart recycle bin can help to ensure the cleanliness and environment friendly of the surrounding.

PAPER ID: 41

TITLE: Analysis on the Projectile Speed for Different Initial Voltage and Projectile Position for 6-Stage and 10-Stage Reluctance Accelerators

AUTHOR(S): Anwar Hasni Abu Hassan, Khairul Amin Abu Johan and Nabil Fikri Idris

Abstract: With the aid of discharged current from capacitor banks, reluctance accelerators are used to drive forward ferromagnetic armatures at a specific velocity. The initial supplied voltage, the number of stage coils in the reluctance accelerator, and the initial projectile starting position are all variables in this experiment that affect projectile exit velocity and reluctance accelerator efficiency. An experiment was conducted to see if these parameters influenced the projectile exit velocity and efficiency. The maximum value efficiency of the accelerator was found 4.19% with 200V being supplied at 6-stage coil accelerator and 4.18% with 150V being sup-plied at 10-stage coil accelerator. The starting position that produces maximum exit velocity of 48.48 m/s is found at 7.5 mm, 250V being supplied at 10-stage accelerator. For 6-stage and 10-stage accelerator, the efficiency of the accelerator decreases as the voltage increases. As the voltage and number of stage coil accelerator increase, the speed increases. The best position to setup the projectile is at range 3.0 mm to 17.5 mm according to 80% of maximum speed for both accelerators.

Abstract

PAPER ID: 42

TITLE: Water Based Energy Production using PI Controller

AUTHOR(S): Nurul Izzah Hani Muhammad Ali, Nur Irwany Ahmad, Muhammad Zaid Aihsan, Diyya Hidayah Abd Rahman, Mohamad Shukor Abdul Rahim, Nurhafiza Azizan, Habibah Hj Mokhtaruddin, Baseemah Mat Jalaluddin, Aimi Athirah Hazwani Zaidi and Aiman Saleh

Abstract: Malaysia is now heading for uses of renewable energy for daily use. Nowadays, solar technologist already provides energy for heat, light, hot water, electricity, business and industries. Besides, Malaysia blessed with abundance of water sources and receive high rain volume per year which can be used to generate power. In Malaysia, the ambient temperature is approximately 27 ? but it de-pends on the different location. Even though the peak sun hour in Malaysia is 5 to 7 hours per day, the ambient temperature from 32.2 ? to 35 ?, can be consider as high temperature. The Standard Test Condition (STC) of solar photovoltaic (PV) is 25 ?. Therefore, if temperature higher than 25 ? is used, it will drop the efficiency of the solar PV. To overcome this problem, a new concept of energy production using hybrid system of piezoelectric and peltier generator prototype is developed. In this research, a buck boost converter using Proportional Integrated (PI) controller is designed to boost the output and maintain it in the range of out-put needed from the harvesting system, which is 12 V. MATLAB software is used to design and simulate the circuit. Hence, the performance of water based prototype have been evaluated and analyzed based on voltage, current and the power produced by the prototype.

Abstract

PAPER ID: 45

TITLE: Light Bulbs Comparison from Different Brand and Working Principle

AUTHOR(S): Siddiq Fadhil, Nurulain Shaipuzaman, Nurzuraini Omar, Mohd Rashidi Salim and Hadi Manap

Abstract: Choosing the best light bulbs for energy saving purpose is common for most consumers. Then, this paper reports the comparison between light bulbs with different brands in the market specifically in Kuantan, Malaysia. The comparison is carried out in term of light intensity, energy usage and price. The methodology used was by conducting an experiment that can measure light intensity using a spectrometer. The energy usage is measured and eventually the results is tabulated and analyzed. From the experiment, it can be deduced that every light bulb had its own advantages and deficiencies in term of light intensity, energy usage and price. It is hoped that this paper can be used by the consumer as a reference to choose the best bulb for lighting purpose.

Abstract

PAPER ID: 46

TITLE: Manta Ray Foraging Optimization with Quasi-Reflected Opposition Strategy for Global Optimization

AUTHOR(S): Ahmad Azwan Abdul Razak, Ahmad Nor Kasruddin Nasir and Nor Maniha Abdul Ghani

Abstract: This paper proposes an extension of Manta Ray Foraging Optimization (MRFO) using Oppositional-based Learning (OBL) technique called Quasi Reflected Op-position (QRO). MRFO is a new algorithm that developed based on the nature of a species in cartilaginous fish called Manta Ray. Manta ray employs three forag-ing strategies which are chain, cyclone and somersault foraging. Nonetheless, MRFO is tends to getting trap into local optima due to the redundant of intensifi-cation of the search agents in the search space. On the other side, OBL is a prom-inent technique in reducing chance of local optimum while increasing the conver-gence speed. Thus, QRO is synergized into MRFO to form QR-MRFO, in ob-jective to improve MRFO in term of finding better accuracy of solution and faster convergence rate. Latter, QR-MRFO was performed on a series of benchmark functions and analyzed using statistical non-parametric test of Wilcoxon to meas-ure the significant level of improvement. Results from the test shows that MRFO is undoubtedly defeated by QR-MRFO in term of accuracy.

PAPER ID: 47

TITLE: Design and Implementation of Closed-loop PI Control Strategies in Real-time for Linear ARMAX Models of Vapour Compression Refrigeration System Using R600a Refrigerant

AUTHOR(S): Wan Azani Wan Mustafa and M. Saifizi

Abstract: The objective of the research is to design a control strategy using a Linear Auto-Regressive Moving-Average Exogenous (ARMAX), which is a mathematical modelling method in real time, which to be implemented into the closed-loop Proportional-Integral controller. The ARMAX model is developed using SIMULINK tool from the MATLAB R2020a software. The Vapour Compression Refrigeration System consists of an evaporator, an expansion valve, a condenser and a compressor which was modified to a variable speed compressor. This modification is required due to the usage of R600a refrigerant that has thermophysical properties that can be described as with a slight change in its pressure will cause a considerable change in its temperature. R600a refrigerant was chosen for this paper, despite the difficulty is due to it is more environmental-friendlier refrigerant compared to other types of refrigerant. Two types of ARMAX model were designed, the first type of ARMAX model will have a polynomial order of $n\_a=2, n\_b=2, n\_c=1$ while the second type of ARMAX model will have a polynomial order of $n\_a=2, n\_b=2, n\_c=2$. Both types of controller were tested and compared the performance in terms of settling time, steady-state error, overshoot and peak-time. From the test conducted, it was found that the controller with the ARMAX model will have a polynomial order of $n\_a=2, n\_b=2, n\_c=1$ has a better overall performance.

PAPER ID: 48

TITLE: Particle Swarm Optimization with Modified Initialization Scheme for Numerical Optimization

AUTHOR(S): Wy-Liang Cheng, Koon Meng Ang, Zhi Chuan Choi, Wei Hong Lim, Sew Sun Tiang, Elango Natarajan, Chun Kit Ang and Mohamed Khan Afthab Ahamed Khan

Abstract: Particle swarm optimization (PSO) is a popular optimization algorithm due to its desirable characteristics of fast convergence and easy implementation. Conventional PSO with poor quality of initial population tends to suffer with rapid diversity loss and converge to local optima regions prematurely. In this paper, a PSO with modified initialization scheme (PSOMIS) is proposed to generate the initial population with better quality in terms of fitness and diversity of solutions by leveraging the ergodicity nature of chaotic system and the ability of oppositional based learning to cover wider regions of solution space. Extensive evaluations of the proposed PSOMIS equipped with different chaotic maps are performed by using the test functions of CEC 2014. Simulation studies reported that each chaotic map tends to perform well in solving certain types of optimization problem, where PSOMIS with circle map has shown the best performance.

Abstract

PAPER ID: 49

TITLE: Hotspot Detection in Photovoltaic Array using Thermal Imaging Method

AUTHOR(S): Mohd Shawal Jadin, Shahira Farhana Ahmad Safian, Li Ven Tan and Norizam Sulaiman

Abstract: An increased interest in generating power from renewable sources has led to an increase in solar photovoltaic (PV) system installations worldwide. Power gener-ation of such systems is affected by factors that can be identified early on through efficient monitoring techniques. One of the common factors that need to be moni-tored for this system is the occurrence of the hotspot. The hotspot is the area of elevated temperature affecting only part of the solar module and can result in a decrease of the system efficiency, which results in lower power output and an ac-celeration of the degradation of the material in the affected area. This paper will explain the method of hotspot detection for an aerial image of a PV array by us-ing the thermal imaging method. This is done by using the Parrot ANAFI, a compact and resistant drone with a 4K HDR camera. The statistical data analysis will be used to detect the occurrence of the hotspot

Abstract

PAPER ID: 50

TITLE: Diagnosis of Hearing Impairment Based on Wavelet Transformation and Machine Learning Approach

AUTHOR(S): Md Nahidul Islam, Norizam Sulaiman and Mahfuzah Mustafa

Abstract: Hearing Impairment has become the most widespread sensory disorder in the world, obstructing human-to-human communication and comprehension. The EEG-based brain-computer interface (BCI) technology may be an important solution to rehabilitating their hearing capacity for people who are unable to sustain verbal contact and behavioral response by sound stimulation. Auditory evoked potentials (AEPs) are a kind of EEG signal produced by an acoustic stimulus from the brain scalp. This study aims to develop an intelligent hearing level assessment technique using AEP signals to address these concerns. First, we convert the raw AEP signals into the time-frequency image using the continuous wavelet transform (CWT). Then, the Support vector machine (SVM) approach is used for classifying the time-frequency images. This study uses the reputed publicly available dataset to check the validation of the proposed approach. This approach achieves a maximum of 95.21% classification accuracy, which clearly indicates that the approach provides a very encouraging performance for detecting the AEPs responses in determining human auditory level.

PAPER ID: 51

TITLE: Brainwave Distribution of Cognitive Activities Between Normal and Dyslexia Children

AUTHOR(S): Engku Mohd Nasri Engku Mat Nasir, Norfaiza Fuad, Mohd Erwandi Marwan and Norfatin Akila Halim

Abstract: The purpose of this study is to determine the brainwave or electroencephalogram (EEG) distribution of Normal and Dyslexia children during cognitive activity. EEG is a method for monitoring electrical activity in the brain and has four main signals in the brain: Delta Wave, Theta Wave, Alpha Wave and Beta Wave. Delta wave is a slow wave generated in the deepest meditation, Theta Wave usually occurs in sleep, Alpha Wave is dominant in calming, relaxing condition, and Beta Wave is dominant in waking condition. The raw data collected are analysed using SPSS and Microsoft Excel to analyse the accuracy and pattern of brain waves between normal children and children with dyslexia. For normal versus dyslexia during cognitive activity, the average and standard derivation and correlation are used. Education is a branch of cognitive development. The way people make choices, interpret knowledge, and think about problems. Subjects are asked to remember words in a minute. There were 20 students who were tested, 10 of them normal and 10 of them had dyslexia. All subjects are from special needs school under PPD Batu Pahat. Data is focused on Alpha and Beta wave when people are awake. Brain waves tend to vary through cognitive function.

Abstract

PAPER ID: 52

TITLE: A Device for Evaluating Photovoltaic (PV) Module Output Performance and Degradation

AUTHOR(S): Mohd Shawal Jadin, Athirah Surimin, Norizam Sulaiman, Airul Sharizli Abdullah and Fairuz Rizal Mohamad Rashidi

Abstract: Photovoltaic (PV) systems or solar panels are renewable energy technologies that are known to be the best method for transmitting electrical energy using solar cells to convert energy from the sun to the flow of electrons and have a lifespan of up to 30 years. Nevertheless, due to the various effects caused by extreme en-vironments or harsh conditions, most devices are malfunctioning or fail to operate during their service time, which degrades the quality and durability of the unit. In order to test the degradation and failure of PV modules, this project aims to de-sign and develop a system that can extract the PV module standard test condition parameters of a PV module under real operating condition.

Abstract

PAPER ID: 53

TITLE: Self-Powered Solar Patch Antenna at 5.8 GHz for wireless surveillance monitoring

AUTHOR(S): Noorlindawaty Binti Md Jizat and Keerrthenan Yoorththeran

Abstract: A microstrip patch antennas (MPA) with self-powered ability have shown great interest especially in providing low-cost, green electricity and reliable continuous signal, particularly for wireless surveillance monitoring systems.Although MPA has a low profile, lightweight, and inexpensive, the conventional MPA has limitations in terms of bandwidth and gain. These two components are important to ensure that the transmitted and received signals work properly. A battery-powered device, on the other hand, tends to drain too quickly over time and is bulky to transport. In this paper, a design of high performance MPA that uses a defective ground structure (DGS) and shorting pin techniques are introduced. This proposed MPA is then integrated into a solar cell circuit design for a self-powered system. In the system configuration, the XL4015 DC/DC buck converter's input is directly connected to the 20 Watt solar panel, the output to a TS5828 5.8 GHz transmitter, and the First-person view(FPV) camera to power up the MPA. The MPA results show a return loss of less than -10 dB, directivity of 7.2 dB, a bandwidth improvement of 57.81 percent, and a gain of 6.36 dB. The prototype transceiver module is integrated into the solar panel which can operate up to 16.5 meters away from the receiver and 15.5 meters away from the transmitter. This proposed system will allow it to serve as a self-powered wireless surveillance monitoring system at 5.8 GHz.

Abstract

PAPER ID: 54

TITLE: Discontinuities Classification for Welded Joints using Texture Features and Support Vector Machine

AUTHOR(S): Haniza Yazid, Khairul Salleh Basaruddin, Muhammad Juhairi Aziz Safar and Hafizal Yazid

Abstract: In this paper, a new approach is proposed for discontinuities classification in radiographic images. Two types of discontinuities will be considered namely line and circular discontinuities. To locate the region of interest (ROI), several image processing techniques such as fuzzy c means clustering, region filling, mean filtering, edge detection, Otsu thresholding, and valley detection were used in the first step, followed by inverse surface thresholding to segment the discontinuities. Then, the features were extracted using Segmentation based Fractal Texture Analysis (SFTA). Based on the extracted features, the images were classified using Support Vector Machine (SVM). In this work, 45 images were used for training and 25 images were used for testing. The proposed approach obtained 96% classification rate.

Abstract

PAPER ID: 55

TITLE: Performance of 2-DOF PID Controller in AGC of Two Area Interconnected Power System Using PSO Algorithm.

AUTHOR(S): Peddakapu K, R. Mohamed M, Srinivasarao P and J Krishna Kishore D

Abstract: Automatic generation control (AGC) serves a great performance in conventional power systems for delivering the reliability of power supply to all consumers. The toughest task in the multi-area power system is to stabilize the changes in frequency and inter-area line power. In this work, proportional-integral (PI), proportional integral derivative (PID), and 2-degree freedom of PID (2-DOF-PID) controllers are proposed in the AGC system for nullifying the unnecessary oscillations in frequency and tie-line power. When the system would be complex, then these controllers do not give efficient outcomes because of it having fixed gain values. Therefore, in this work, the particle swarm optimization (PSO) algorithm is formulated for tuning the gain values of the suggested controllers in a multi-area interconnected system. In order to alleviate the frequency and inter-area power line deviations, the tuned 2-DOF-PID controller has rendered a better dynamic performance with respect to settling time, overshoot and undershoot. Likewise, the robustness of the system has ascertained while fluctuating the loading circumstances and system specifications up ±25% from their prescribed values which helped to exhibit the ability of the recommended method. Finally, the simulation outcomes disclosed the PSO optimized 2-DOF-PID has given the favourable dynamic performance over the other control approaches.

PAPER ID: 57

TITLE: Automatic Brain Tumor Detection using Feature Selection and Machine Learning from MRI Images

AUTHOR(S): A. S. M. Shafi, Md. Mahmudul Hasan, M. M. Imran Molla, Mohammad Khurshed Alam and Md. Tarequl Islam

Abstract: A brain tumor is a group of defective cells in the brain. It happens when a cell in the brain develops a dysfunctional structure. Nowadays it becoming a crucial factor of death for a large number of people. Among all the varieties of tumors, the seriousness of a brain tumor is high. Therefore, instant detection and proper care to be done to save a life from brain tumors. Microscopic examination can separate the tumor cells from healthy cells. They are typically less well separated than normal cells. In modern imaging technology, the detection and classification of brain tumors is a primary concern. For a clinical supervisor or radiologist, it is time-consuming and frustrating work. The accuracy of recognition and classification of tumors executed by radiologists or clinical experts is depended on their experience only. Therefore, accurate identification and classification of brain tumors can be determined by image processing techniques. This research suggests a machine learning module to detect brain tumors using magnetic resonance imaging (MRI) of brain tumors. The method consists of pre-processing of nearly raw raster data (NRRD) of the MRI images, feature extraction, feature selection, and the classification learner to evaluate and construct the final model. The classification learner is designed with a support vector machine (SVM) classifier. The classification method performs well with weighted sensitivity, specificity, precision, and accuracy of 98.81%, 98.88%, 98.82%, and 98.81% respectively. The findings may infer a remarkable step for detecting the presence of tumors in neuro-medicine diagnosis.

Abstract

PAPER ID: 58

TITLE: Loss Minimization of Optimal Power Flow with Stochastic Solar Power Generation Using Improved Salp Swarm Algorithm

AUTHOR(S): Zuriani Mustaffa and Mohd Herwan Sulaiman

Abstract: This paper proposes a new improvement of Salp Swarm Algorithm (ISSA) to be implemented on the Optimal Power Flow (OPF) problem. The pro-posed ISSA has been applied to solve one of the OPF objective functions viz. loss minimization. The presence of stochastic solar power generation also has been considered in this paper. To show the effectiveness of pro-posed ISSA, the technique is tested on modified IEEE 30-bus system and compared with original SSA and another metaheuristic algorithm. From the simulations that have been conducted, it can be concluded that the performance of ISSA is better compared to others in terms of obtaining the mini-mum total loss of power in the system

Abstract

PAPER ID: 60

TITLE: Gas Detection System for Dry and Wet Cupping Process

AUTHOR(S): Mohd Riduwan Ghazali, Wan Ismail Ibrahim, Mohd Falfazli Mat Jusof and Nursyazwani Khazanah

Abstract: Cupping therapy is an alternative medical approach that adopts the suction mechanism of cups to withdraw blood towards the surface of the skin. The therapy is hereby differentiated between dry cupping therapy (DCT) and wet cupping therapy (WCT). While both techniques involve releasing gas from the human body, the former merely undertakes suctions, with the latter deliberately includes the process of medicinal bleeding. Upon executions of the cupping process, the released gas can potentially affect involved practitioners in form of diseases. Seeing limited studies conducted within the area of actual gas release detection, mentioned issue, thus, demonstrates value in the study of the gas detection system in dry and wet cupping practices. Hence, the current paper set out to develop a gas detection system that investigates and measures the gas existed release in dry and wet cupping practices. To satisfy this objective, the system used several general sensors comprising a natural gas sensor, carbon monoxides gas sensor, hydrogen gas sensor, and LPG gas sensor to investigate the pattern of type gas occurred. Several experiments were further operationalized on both dry and wet cupping therapies under several conditions and time frames to analyze the contents of the released gas. The operated comparison then uncovered the robustness of the gas detection systems in identifying the gas compositions based on sensor detection for both DCT and WCT processes.

PAPER ID: 62

TITLE: Comparative Study on Hyperspectral Image Enhancement for Low Illumination Outdoor Scenes Images

AUTHOR(S): Rohana Abdul Karim

Abstract: Hyperspectral image is rich with information because it contains wavelength from 400 - 900 nm. However, the quality of the image might be regraded due to low illumination because of uncontrol light exposure to the outdoor scenes either overexposure or underexposure. Difficulty arise for high order image processing such as detection, classification and tracking. In this paper, we conducted a comparative study to identify the suitable enhancement method for outdoor scenes. Four methods were investigated there are; Bio-Inspired Multi-Exposure Fusion (BIMEF), Dehazing, Illumination Estimation, and Multi-deviation Fusion (MF). Experimental revealed that BIMEF is the best approached with the lowest lightness of error.

Abstract

PAPER ID: 63

TITLE: Optimized Set of Parallel Atrous Convolutions for ShuffleNet V2

AUTHOR(S): Siti Raihanah Abdani, Mohd Asyraf Zulkifley and Nuraisyah Hani Zulkifley

Abstract: An automated eye disease detector is one of the crucial tools for the mass screening of eye diseases in rural areas. Early detection of various diseases allows health practitioners to administer the right medicines and procedures while the disease is still treatable and to prevent the worst case of blindness. Therefore, the screening tool must be robust enough so that it can detect the diseases in various conditions. This paper will focus on four types of eye diseases, which are diabetic retinopathy, glaucoma, age-related macular degeneration, and myopia. Hence, a deep learning approach through modified ShuffleNet V2 is proposed to classify the diseases. The original version of ShuffleNet V2 does not have any multi-scale capability, which is crucial for the cases in the rural areas where the fundus images were captured in various settings. To overcome this challenge, an atrous spatial pyramid pooling module is embedded in the ShuffleNet V2 by replacing the first convolution layer of the network. The simulation results show that ShuffleNet V2 with five sets of parallel atrous convolution produces the highest accuracy of 0.837 compared to the original version with 0.821 accuracies. Further-more, this improved accuracy performance is achieved without increasing the total number of parameters, which remains the same at 5,386,908. This modified ShuffleNet V2 with five sets of parallel atrous convolution is also suitable to be implemented as a mobile-based system due to its lightweight nature. The network can be further optimized by analyzing the best placement of the multi-scale module.

Abstract

PAPER ID: 65

TITLE: Application of Deep Learning in Plant Health Monitoring System

AUTHOR(S): Jia Wei Low, Sew Sun Tiang, Wei Hong Lim, Ying Hai Chong and Yoon Nam Voon

Abstract: Recent developments in Deep Learning have allowed researchers to propose fast and accurate computer-based methods that have been applied to detect plant diseases. However, most of the methods typically focus on laboratory-condition images and incorrect detection in field-condition images. In this project, deep learning technique is used in developing a model for plant diseases detection for real-life images is proposed. The model is trained and tested before integrating it into a mobile application. We have implemented the integration of Single Shot MultiBox Detector (SSD) algorithm and MobileNet for multiple objects detection within an image and classification. The system is trained using a real-life image dataset containing two classes of both healthy and unhealthy images of tomato plants. The proposed SSD MobileNet COCO v1 model achieves a detection performance of 90.0% in f1-score and 89.0% in accuracy for detecting and classifying the healthy and unhealthy tomato plant leaves. The results present significant improvement in detecting and recognizing the health status of the tomato plants. The plant leaf monitoring mobile application is very handy and cheap especially to assist farmers in monitoring their planting area.

Abstract

PAPER ID: 69

TITLE: Utilization and Evaluation of Heat From Asphalt Pavement To Produce Power Using Thermoelectric Plate

AUTHOR(S): Khairul Anwar Khalid, Aimie Nazmin Azmi and Aziah Khamis

Abstract: Alternatively, producing electrical energy using renewable energy become com-mon issues due to the reducing amount of fossil fuel. Nowadays, reducing the use of fossil fuels and producing renewable energy has always been important to society. The asphalt pavements exposed to solar radiation, generate a massive amount of thermal energy that could be harvested using thermoelectric generators (TEGs). The thermal energy can convert into electrical energy based on the ther-moelectric effect. Besides, the thermoelectric effect in asphalt pavement could also reduce the temperature of the road surface. Therefore, this paper presents the de-velopment of a system harvesting thermoelectric energy from asphalt pavement (SHTEG) based on the ambient air and road surface in central Malaysia. From the experiment, the result shows that the output voltage produces by the asphalt pavement 300 mm (length) x 300 mm (width) size is 0.2 V. Meanwhile, it can produce 52.74 kWh in 2 km road length with 10 m width size of the road. Thus, the finding was proven an excellent start for the enhancement and application of asphalt pavement with thermoelectric.

PAPER ID: 70

TITLE: Understanding Domain Knowledge in Initialization Method for K-Mean Clustering Algorithm in Medical Images

AUTHOR(S): Xiao Jian Tan, Nazahah Mustafa, Mohd Yusoff Mashor, Khairul Shakir Ab Rahman, Wan Zuki Azman Wan Muhamad, Wai Zhe Leow, Qi Wei Oung and Wai Loon Cheor

Abstract: This work serves as a preliminary study to investigate and identify the applicability of domain knowledge as an initialization method for K-Mean (KM), typically in medical images. For this purpose, 20 breast histopathology images were used as data set and the evaluations are focused on the clustering of the hyperchromatic nucleus. The iteration numbers and clustering results (i.e., accuracy, over-segmentation, and under-segmentation) are benchmarked with KM++ and the conventional random initialization method. The domain knowledge initialization method is found promising by achieving lower iteration numbers (<9), higher percentage in accuracy (85.5% (±2.27)), and lower percentages in over-segmentation (8.25% (± 2.23)), and under-segmentation (7.00% (± 2.14)). From this study, we hypothesize that the domain knowledge initialization method has the potential to be implemented as an initialization method and is posited to over-perform some established initialization methods, typically for clustering tasks in medical images.

PAPER ID: 72

TITLE: A Simple Design of a Matlab-Based Function for Topographical Presentation of FNIRS Data

AUTHOR(S): Talukdar Raian Ferdous, Rifath Hasan, Mohammad Khurshed Alam, Muhammad Muinul Islam and Md. Asadur Rahman

Abstract: Functional Near-Infrared Spectroscopy (fNIRS) has aggrandized the domain of Neurophotonics and Imaging research to reach its apex. With enhanced spatial resolution with the pre-existing temporal resolution, fNIRS can be more promising for the functional analysis of the brain. Hardware integrated software for fNIRS analysis is affluent as well as limited for users. And the analysis based on MATLAB is done with the Guided User Interface (GUI) that are difficult to use because they involve numerous steps, coefficients, and related files. This is a simple MATLAB-based study that includes the generation of the brain activation patterns based on oxygenation and de-oxygenation of hemoglobin and enhancing spatial resolution for the better identification of brain functionality. Brain activation pattern based on the recorded fNIRS data is created in the form of a color-coded map. The map is registered to the brain surface image which provides better visuality of the activation scheme of the brain with an anatomical view. This research intends to encourage prolific researchers in this research area to conduct simplified and cost-effective analyses of the fNIRS study.

Abstract

PAPER ID: 73

TITLE: Analysis of Partial Discharge Activity in High Voltage XLPE Insulation as a function of different Void Sizes and Locations using the Capacitance Model

AUTHOR(S): Mohanned Khalid Elemary, Hadi Nabipour Afrouzi, Chin-Leong Wooi, Zulkurnain Abdul Malek and Jubaer Ahmed

Abstract: Partial Discharge (PD) in power cables occur due to some air impurities in the insulation system, such air impurities lead to void across the insulating system and deterioration of the power cable over time. In this research paper, the PD activity within high voltage XLPE insulation was analyzed in the presence of var-ious void sizes and locations using a modified version of the three-capacitance model. The simulation was carried out by designing a PD model in MATLAB, Simulink, in which a real-life scenario of PD was simulated that consider all void parameters. Three different positions of void were taken as samples for this research study, near to the conductor, near to the middle of insulation and near to the outer sheath. The void sizes considered for this research study were ten different cavity sizes. Results showed that as location of void is closer to the conductor, PD amplitude gets higher.

Abstract

PAPER ID: 74

TITLE: Malware Attack Forecasting by using Exponential Smoothing

AUTHOR(S): Mohd Nizamuddin Abas, Siti Zura A Jalil and Siti Armiza Mohd Aris

Abstract: One of the threats on digital environment is malicious software (malware). Malware can bring harm to computer system that have connection to the internet. Malware may disclose sensitive information such as password and brings economic losses. Predicting the malware attack is vital in supporting decision-making process to avoid further damage on computer systems. The main objective of this study is to develop computational model to predict quantity of malware attack and assess the performance of exponential smoothing in forecasting malware attack. There are two types of exponential smoothing forecasting model involve in this study which is single exponential smoothing and double exponential smoothing. The forecasting performance will be evaluated by using Mean Squared Error (MSE), Mean Absolute Error (MAE) and Mean Absolute Percentage Error (MAPE). Monthly malware detection data in one financial institution's computer servers from November 2014 to August 2019 will be utilized in this research. The result from this study shows that single exponential smoothing produces lower value of MSE, MAE and MAPE, compared to double exponential smoothing. Thus, single exponential smoothing gives a promising result in forecasting the malware attack.

PAPER ID: 75

TITLE: Traffic Light (Circle) Detection and Recognition using Image Processing Technique

AUTHOR(S): Zamani Md Sani, Mohd Iqbal Farez Saari and Tarmizi Ahmad Izzudin

Abstract: This paper present, the technique to detect and recognize the circle shape traffic light with three different colours during day and night conditions. The video stream from the camera is used as the input and the image of traffic light which are extracted use for the training processed. The 'You Only Look Once' (YOLO) method was used as object recognition which to spatially separated bounding boxes and associated class probabilities as a regression problem. Hue – Saturation – Value (HSV) colour space is the used to separates a colour-based image to a binary image (white responding to the colour filtered), which later being smoothed using a median filter to remove noise. Circle Hough transform technique is applied to detect the circle that found on images. The status of the traffic light can be interpreted by using the colour detected in the circle shape detected. The traffic light recognition accuracy is better at daytime with 99.68% vs nighttime at only 70.24%. The three colour detection for daytime also showing better accuracy at average of 95.96% vs 91.48% at nighttime. The detection rate for the circle shape also is much better than nighttime which at 94.5% vs 79.56%.

PAPER ID: 76

TITLE: Improvement of Disparity Measurement of Stereo Vision Algorithm using Modified Dynamic Cost Volume

AUTHOR(S): Ahmad Fauzan Kadmin

Abstract: Interest in a stereo vision system was increasing and applied in several critical applications such as image processing in medical, virtual reality, autonomous navigation and many more. It is challenging to establish accurate correspondences due to several factors such as low texture pixels, illumination variations of environment, inaccurate discontinuities, mismatched and blurry boundaries reflected due to poor segmentation techniques. This work presents an improvement framework of the stereo vision system to measure the depth measurement using modified dynamic cost volume in the matching cost stage. A modified Birchfield Thomas (BT) metric with dynamic histogram are used to provide the cost volume in the matching cost step, while four-way scanline Semiglobal (SGM) used in the cost aggregation to aggregate the cost volume. Winners-Take-All (WTA) optimisation used for disparity selection and bilateral-median filter applied in refinement stage. Based on the dataset of standard Middlebury, the framework developed in this work has better accuracy and outperformed several other state-of-the-art algorithms.

Abstract

PAPER ID: 78

TITLE: Nutrient Pump Controller based on IoT Application for Aquascape Environmental Treatment

AUTHOR(S): Daniel Patricko Hutabarat, Rudy Susanto and Smna Senanayake

Abstract: To make the water plants grow well in the aquascape environment, there are two important things that need to be controlled in the aquascape environment, namely the nutrients needed by plants and levels of Total Dissolved Solids (TDS) in water. In this study, a system is developed to adjust the nutrition schedule, control the number of nutrients given, and detect TDS levels before and after nutrition so that the system can delay the release of nutrients and send water change notifications to users if TDS levels do not meet the standard and a TDS spike occurs after nutrition. The system is successful in distributing nutrients according to the schedule and the number of nutrients that are determined with a success rate of 100%. The system is also 100% successful in detecting the TDS level and sending notification to the user if the TDS parameters do not meet the standard.

Abstract

PAPER ID: 80

TITLE: Human Behaviors Classification using Deep Learning Technique

AUTHOR(S): Cheang Chi Shun, Ibrahim Mohd Zamri and Muhamad Ikhwan Hafiz

Abstract: Human behaviors is an action performed by human. There are various types of human behaviors such as running, walking, jumping, sitting and the others complex movement. In this paper, human behaviors classification using Long Short Term Memory (LSTM) model with multiple layers were proposed to classify the human behaviors. A pre-trained pose estimation model, OpenPose was used to extract the body key points from the MHAD database. Six activities, jumping, jumping jacks, punching, waving with two hands, waving with right hand and clapping hands of MHAD database were used for the training and testing. The individual frame of MHAD database will group into 32 window width. Dataset had been increased by creating the 26 of 32 frame overlapping. The performance of 2 layers LSTM model, 3 layers LSTM model, 4 layers LSTM model without dropout layers and 4 layers LSTM model with dropout layers were evaluated and compared. Result shows that 4 layers LSTM model with dropout layers had better performance as compared to 2 layers LSTM model, 3 layers LSTM model and 4 layers LSTM model without dropout layers reached the testing accuracy of 95.86%. With adding of dropout layers in the LSTM model with 4 layers, generalization performance in training process had been increased.

Abstract

PAPER ID: 83

TITLE: Moth Flame Optimization Maximum Power Point Tracking Algorithm for Photovoltaic System under Partial Shaded Conditions

AUTHOR(S): Meng Chung Tiong, Hamdan Daniyal, Mohd Herwan Sulaiman and Mohd Shafie Bakar

Abstract: This paper presents a study in maximum power point tracking (MPPT) technique in solar photovoltaic (PV) using moth flame optimization (MFO) algorithm. The study aims to identify the performance of MFO based MPPT algorithm under partial shaded conditions. A simulation model of MFO based MPPT algorithm was developed and implemented with DC/DC boost converter in MATLAB Simulink. For comparison, a well-established particle swarm optimization (PSO) algorithm was included in the study. Both MPPT algorithms were examined under MATLAB simulation as well as real-time hardware-in-the-loop (HIL) platform using HIL emulator and digital signal processing (DSP) card. Under 10 partial shaded condition test cases, the MFO has shown its capability in tracking for the maximum power operating point effectively, with zero steady state oscillation. Both algorithms in study have shown their capability in tracking for maximum power operating point with output efficiency up to 99 % in both simulation and real-time platform.

Abstract

PAPER ID: 84

TITLE: Classification of Electromyography Signal from Residual Limb of Hand Amputees

AUTHOR(S): Ahmad Nasrul Norali, Anas Mohd Noor, Zulkarnay Zakaria, Yasser Said Mohammed Al-Mahdi, Chong Yen Fook and Asyraf Hakimi Abu Bakar

Abstract: Several researchers had worked on collecting EMG signal from amputees and come out with dataset that could be utilized for study in EMG signal processing and classification for decoding of amputee movement intention. This paper presents the work on classification of EMG signal based on the residual limb of amputees with intuitive hand movement based on interactive exercises. Dataset is obtained from NINAPRO public database website where 11 amputee subjects performed intuitive exercise of 17 hand gestures and EMG signal is acquired from the residual arm. Eight feature extraction methods is performed to obtain the EMG feature which are Mean, Minimum, Median, Skewness, Kur-tosis, Approximate Entropy, Fuzzy Entropy and Kolmogorov Complexity. Two classifiers is used for EMG classification which are k-Nearest Neighbour and Ensemble classifier. Results shows average accuracy of 87.65% with Ensemble classifier for classification of movement exercise with all features of EMG is used as input to classifier.

Abstract

PAPER ID: 85

TITLE: A systematic approach to accommodate plug-in electric vehicles in distribution networks with optimal integration of distributed generation

AUTHOR(S): Zeeshan Anjum Memon, Mohammad Yusri Hassan, Dalila Mat Said, Zohaib Hussain Leghari and Pervez Hameed Shaikh

Abstract: The recent increase in plug in electric vehicles (PEVs) load has posed severe accommodation issues for the power grids that were not primarily designed to serve PEVs' charging load. Therefore, the unplanned PEVs' integration into the distribution networks will deteriorate the system performance by increasing the power loss and voltage deviation at nodes. In this context, this study proposes a methodology to enhance the distribution networks' PEVs hosting capacity, without degrading the system performance, by optimally allocating the distributed generation (DG). Initially, aiming to minimize the power losses in the distribution network, the optimal siting, sizing and number of the DG units were determined using the particle swarm optimization (PSO) algorithm. Later, the best network bus for PEV accommodation was selected on the criteria of maximum hosting capacity and loss reduction in the distribution network. Then, considering the accessible power output from the grid and the mounted DGs, the PEVs accommodation in the network is evaluated based on different battery capacities (BCs) and state-of-charge (SoC) as decisive factors. The test results on the IEEE 33-bus demonstrate that in the presence of DGs, the distribution network carries a PEV load of 4.418MW with 48.82% reduction is losses (compared to case without optimal DG allocation) and voltage improvement of 6.98%. It was also examined that the PEVs accommodation in the distribution network varied from 2492 units to 61446 units, depending on the size of battery pack and its SoC. The proposed research will enable the distribution companies to handle the large number of PEVs in the long-term planning paradigm.

Abstract

PAPER ID: 86

TITLE: Implementation of Artificial Neural Network to Recognize Numbers from Voice

AUTHOR(S): Fatin Nur Amalina Zainol and Mohd Zamri Ibrahim

Abstract: Speech recognition is a subjective phenomenon which also an important part of human-machine interaction which still faces a lot of problem. The purpose of this work is to investigate and apply the artificial neural network (ANN) to recognize numbers using voice. In this work, MATLAB neural network toolbox has been used to create, train and simulate the ANN. The dataset, consisted a voice from 'one' to 'five' undergo windowing process to view a short time segment of a longer signal and analyze its frequency content and then being filtered by using a band-pass filter to remove the unwanted noise and been converted into histograms as an input for the network. From the experiments, the highest accuracy level obtained is 72.5% by using histograms as Feature Extraction.

Abstract

PAPER ID: 87

TITLE: Analysis of Feed-Forward Connections for Apex Frame Spotting

AUTHOR(S): Sie Min Koo, Mohd Asyraf Zulkifley, Nor Azwan Mohamed Kamari and Asraf Mohamed Moubark

Abstract: The performance of a convolutional neural network can be improved through deepening the network. However, it is a challenging task to optimize a deep network because of the training complexity and vanishing gradients problem. Recent works have suggested that a deeper network can be trained to obtain a decent output if shorter skip connections are provided between the layers. In this paper, we invoke the Residual Networks (summation) and Dense Networks (concatenation) properties on the VGG-M model, whereby a continuous labeling function is used for spotting an apex frame in the micro-expression recognition system. This continuous label is used to locate the apex frame with the help of Maximum Frame and Sliding Window-Maximum Frame approaches. The validity of the model is assessed by using the Mean Absolute Error, whereby the closer the spotted apex frame to the ground truth, the better the continuous label has performed in predicting the optical flow pattern. In other words, it produces a better architecture. Finally, the best result in this study improves the apex spotting by 3.26 frames of MAE value. The system can be further improved by analyzing various parallel skip connections between the convolutional layers.

PAPER ID: 88

TITLE: Comparative Analysis of 5-level Multilevel Inverter with Reduced Switched Topology

AUTHOR(S): Mohd Hafiz Arshad, Baharuddin Ismail, Muhammad Zaid Aihsan, Zainuddin Mat Isa and Siti Khodijah Mazalan

Abstract: A new topology for the single phase 5-level multilevel inverter is pro-posed in this paper. Using multiple semiconductor switches and lower-level DC voltages as input, a multilevel inverter generates more than two voltage levels to achieve high efficiency, smoother, and less distorted alternating voltage. The conventional 5-level multilevel inverter requires 8 switches in configurations of two cascaded H-bridge resulting in cost addition as well in generating more losses in the circuit. The proposed topology offers the same 5-level output voltage with lesser power switches resulting in cost-effectiveness as well as improve the circuit complexity. The proposed topology is simulated using PowerSim software to testify its functionality, performance, and validation. A comparative of harmonic distortion between the conventional and the proposed topology is reported.

PAPER ID: 90

TITLE: Performance Measure of Case Based Reasoning (CBR) for Ammonia in Water by Specific Concentration

AUTHOR(S): Muhamad Zahari, Muhammad Sharfi Najib, Suhaimi Mohd Daud, Mujahid Mohamad, Nur Farina Hamidon Majid and Suziyanti Zaib

Abstract: Toxic gases are very common in industry which can be harmful to living species. This research purpose to monitoring and sustain environment and avoiding pollution and poisoning. The development on monitoring system for ammonia gases is crucial to avoid incident of poisonous air pollutants in com-mercialized industry. Hence, there is need to introduce simple air quality device to monitor the air pollution. Electronic Nose (E-Nose) is one of the device that can help to monitor this air pollution for the odor-profile gas that been harmful to living species. E-Nose is integrated with intelligent classification which is Case Based Reasoning (CBR) to enhanced the monitoring system. The experi-mental result shows E-nose that integrated with CBR was accomplished to clas-sify data above than 70% of accuracy and nearly approach 80% of accuracy with 50% of Specificity and sensitivity.

Abstract

PAPER ID: 91

TITLE: Classification for Ammonia in Water by Specific Concentration using Artificial Neural Network (ANN)

AUTHOR(S): Muhamad Faruqi Zahari, Muhammad Sharfi Najib, Suhaimi Mohd Daud, Mujahid Mohamad, Nur Farina Hamidon Majid and Suziyanti Zaib

Abstract: Water pollution caused by poor management of waste water release or dump need to be monitored. This paper present to monitor on ammonia release by industry which can caused death to plant worker. This monitoring was a com-bination between E-Nose and Classification techniques which is ANN. ANN the most common retrieval method that used in industry nowadays. Furthermore, This classification using ANN technique successful to classify 75% for 5 specific concentration of Ammonia which is 5PPM, 10PPM, 15PPM, 20PPM and 25PPM.

PAPER ID: 92

TITLE: The Classification of Meat Odor-profile using K-Nearest Neighbors (KNN)

AUTHOR(S): Nur Farina Hamidon Majid, Muhammad Sharfi Najib, Saiful Nizam Tajuddin, Tuan Sidek Tuan Muda, Suhaimi Mohd Daud, Muhamad Faruqi Zahari, Suziyanti Zaib and Mujahid Mohamad

Abstract: Meat is a type of food that humans consume and is an important part of their diet. In recent years, there are several cases involving meat product fraud have come to public attention. There have been numerous reports that meat labelled, certified or sold as halal may not be and that some butchers in the market mix beef and pork meat. This is causing problems for customers, particularly Muslim customers. Meat can be distinguished using human sensors such as vision and smell. The limitation is that meat alterations cannot be clearly distinguished by visual evaluation, and unreliable reliance on the human nose to detect odor is highly risky and hazardous to human health. Electronic Nose (E-nose) was proposed in this study in order to work as well as a human sensor that is made up of four Metal Oxide Sensor (MOS) gas sensors to collect the raw data from the beef and pork meat samples. The raw data was then pre-processed and the data was extracted using the mean feature to produce the odor-profile. Finally, the K-Nearest Neighbors (KNN) method was used to classify the data. KNN was then evaluated using a performance measure. As a result, the classification using KNN has 99.24 % highest accuracy at training and testing ratio 70:30 using weight K=1 at Euclidean distance and all rules.

PAPER ID: 95

TITLE: Discrimination of Groundwater Source by using Electronic Nose Technology

AUTHOR(S): Suziyanti Zaib, Muhammad Sharfi Najib, Saiful Nizam Tajuddin, Suhaimi Mohd Daud, Muhammad Faruqi Zahari, Nur Farina Hamidon Majid and Mujahid Mohamad

Abstract: This study was focused on assessing the groundwater as a source based on quality using odor. Water is a finite resource that essential for humans and ecosystem existence. The suitable quality water resources need to be paid attention since it controlled by naturalistic activities such as geology, motion of groundwater, and water-rock interaction. In general, it is tasteless, odorless, and nearly colorless liquid but in other aspect, it also fulfills the need of minerals in human body up to a certain limit. The anthropogenic activities had caused an imbalance of these minerals in water that result in degradation of its quality. The aim of this study is to apply an Electronic nose (E-nose) and to identify odor pattern for ground water samples. It consists sensor array which mimic the olfactory receptor in human nose that ability to sniff volatile odor that usually undetectable by human nose. K-Nearest Neighbor (KNN) is applied in performing the intelligent classification for E-nose with mean feature data as an input. The results are present in term of accuracy, specificity and accuracy with 100% for Euclidean distance.

Abstract

PAPER ID: 96

TITLE: Computer-Vision-Based Integrated Circuit Recognition Using Deep Learning

AUTHOR(S): Yoon Nam Voon, Koon Meng Ang, Ying Hai Chong, Wei Hong Lim and Sew Sun Tiang

Abstract: Computer vision technology is widely implemented in electronic manufacturing industry to detect the defects on printed circuit board (PCB). However, the wrong attachment of electronic components is a notable issue leading to poor production efficiency in PCB assembly line. In this work, a computer-vision-based system is proposed with the use of deep learning neural network technique to perform the detection of integrated circuit (IC). The trained deep learning model is imported to mobile device with the features of object detection and tech recognition on ICs. The experiments reported that the proposed technique has promising component recognition performance in detecting real ICs image datasets.

PAPER ID: 97

TITLE: Malaysian vehicle license plate recognition using deep learning and computer vision

AUTHOR(S): Mohd Zamri Ibrahim

Abstract: License plate recognition has become one of the popular topics under deep learning researches. There are many deep learning models and the suitable model for this project chose according to the ability to meet the system operation requirements such as speed, accuracy and precision of the outcome. Therefore, YOLO (You Only Look Once) model was used which is fast in processing the more images and produce the output at a single look. YOLO is an algorithm designed for multi object detection in a single neural net-work where it only sees once and process to detect object as many as possible in a picture. In this paper, this model is use to detect the position of car registration plate. Next, image warping and slicing applied to straighten the image so it will be easy to feed into character recognition process. Then, the PyTesseract will be used to read the characters from the image together with RegEx function to eliminate the weak predictions from the PyTesseract results. The results obtained from this approach achieved 100% accuracy in recognising vehicle car plate from 5 video collected from Universiti Malaysia Pahang (UMP) main entrance security gate CCTV system.

Abstract

PAPER ID: 99

TITLE: U-Net with Atrous Spatial Pyramid Pooling for Skin Lesion Segmentation

AUTHOR(S): Marzuraikah Mohd Stofa, Mohd Asyraf Zulkifley, Muhammad Ammirrul Atiqi Mohd Zainuri and Ahmad Asrul Ibrahim

Abstract: Skin lesion segmentation plays an important role in the automated skin cancer diagnosis system by masking the regions of interest for more efficient post-processing. A good diagnosis system will enable the disease to be detected at the early stage and thus, improves the survival possibility. Recently, the deep learning approach has gained more popularity because of its state-of-the-art performance as well as its ability to perform segmentation and classification in an end-to-end framework. This work proposes a segmentation method using the base of the U-Net model, in which an atrous spatial pyramid pooling (ASPP) module is embedded to improve the network multi-scale capability. International Skin Imag-ing Collaboration 2017 database has been used to validate the performance of the base model and the modified variants. The simulation results show the best variant is U-Net with ASPP 2 that produces a Jaccard Index score of 0.7572 and an accuracy of 90.74%. The system can be further improved by analyzing the optimal placement of the ASPP module.

Abstract

PAPER ID: 101

TITLE: Comparative Study on Various Type of Lightning Arrester at Solar Farm

AUTHOR(S): Samer Wahdain, Mohamad Sabhi and Amir Izzani Bin Mohamed

Abstract: The Photovoltaic (PV) system is vulnerable to a lightning strike. This over-voltage from lightning strikes could potentially damage PV components, including inverter, cable and panel itself. To cater to this issue, a lightning protection system (LPS) had been installed throughout the solar farm area as a device to attract and assist lightning flow to the ground. Although a proper LPS system had been established, there are still incidents related to lightning strikes on the solar panel, ultimately causing severe damage to the overall PV system. This paper focuses on studying and simulating PV solar farms electrical field behavior in various lighting protection systems. Also, it analyses several types of LPS arrangement, PV panel mounting and construction toward the influence of the lightning electric field. The finite Element Method (FEM) has been used for this research. The simulation results show that most of the lighting attachments affected the PV panel at the corner edge of each side. The sharp point at the edge creates nonuniformity of electric field intensity and increases electric field intensity. This paper will pro-vide the optimum design of PV and LPS systems for better prevention of lightning strike phenomena.

PAPER ID: 103

TITLE: Timing Control of Streamer Initiation and Electrospray Generation for Waste Water Treatment

AUTHOR(S): Shinji Yudate, Ryosuke Tamada, Tatsuya Takahashi, Ryotaro Ozaki and Kazunori Kadowaki

Abstract: This paper presents an experimental study on new water treatment by streamer propagation alternated with electrospray generation. We demonstrate the importance of timing control of both an electrospray generation and streamer initiation. Recently, much attention has been given to the water treatment using discharge plasma in a gas-liquid region. In this study, for a further increase in the contact area between water and discharge plasma, both fine water droplets and discharge plasma are formed in the same region. We have already succeeded in alternate expansion of both fine droplets and streamer corona from the same syringe needle electrode. The purpose of this paper is to expose electrosprayed droplets to streamer discharges by timing control of both an electrospray generation and streamer initiation. To this end, both repetitive pulses and an AC voltage are superimposed on a DC voltage applied to a syringe needle electrode. Peak voltage value, frequency, and phase of these superimposed voltages are optimized. It is observed that streamers propagate through a spray region (gas-liquid region), by using a gated image intensifier. In this case, it is shown that persistent substances in water are decomposed. These results suggest that electrosprayed droplets are exposed to streamer discharges and as a result, active species are generated.

PAPER ID: 104

TITLE: Detecting Mobile Producer's Position in a Wireless NDN environment using Signal Strength

AUTHOR(S): Muhammed Zaharadeen Ahmed, Aisha Hassan Abdallah Hashim, Othman Omran Khalifa, Abdulkadir Hamidu Alkali and Belal Ahmed Hamida

Abstract: Named Data Networking is a new Content Centric Network architecture that can possibly overwhelm most issues of IP mobility and security. The NDN is cen-tered on addressing contents by themselves using names, rather than assigning IP addresses to packets on hosts where information is located on the global Internet. Due to the developing scope of remote access around the world and Wi-Fi acces-sibility, scenarios change as a result of additional networking devices. This paper analyses existing methodologies of mobile device communication using Wi-Fi in NDN. This involves using a mobile producer and a rendezvous node connected via content routers in an NDN scenario. Their location is detected and predicted immediately handoff occur and it send content transmission as a consumer. The approach of transmitting content signals uses sign power pointer (RSSI), TOA, and TSE in the network. Several challenges were noted and pointed out enhance future work

PAPER ID: 106

TITLE: Image Processing Approach for Detection and Quantification of Corrosion Behaviour of AZ91D Magnesium Alloy.

AUTHOR(S): Zuraila Iberahim, Mohd Zamzuri Mohammad Zain, Abdul Halim Ismail, Juliawati Alias, Muhammad Aiman Ahmad Fozi, Nooraizedfiza Zainon and Marina Marzuki

Abstract: The AZ91D magnesium alloy is known for its high strength-to-weight ratio, excellent machinability and good castability making it an ideal material to be used in automotive components fabrication. But due to its weak corrosion resistance towards the environment, identifying and quantifying AZ91D magnesium alloy corrosion behaviour before any manufacturing processes can be a huge impact and may provide useful information to the manufacturers. The limitation of conventional corrosion detection and quantification methods also justify the further needs of image processing approach in this study. This paper study the feasibility of an image processing approach using the automatic thresholding method and various manual thresholding level in order to identify the corrosion attack on the AZ91D magnesium alloy. This method converts the original colour image to grayscale image and then convert it to binary image. Then through image processing approach, the image will be segmented to corroded and non-corroded area and labelled as 0 (black) and 1 (white) and make it easier to analyze. The resulting image of various thresholding shows which thresholding values successfully portray similarity of the original corrosion image. Thus, this increases the reliability of AZ91D magnesium alloy corrosion detection and quantification via image processing approach.

Abstract

PAPER ID: 107

TITLE: Multi-class Imbalanced Classification Problems in Network Attack Detections

AUTHOR(S): Hui Fern Soon, Amiza Amir and Saidatul Norlyana Azemi

Abstract: Nowadays, network anomaly activities can be detected by using machine learning. The performance of the machine learning algorithms depends on the distribution of the dataset. Network anomaly detection is one of the popular topics that contain vast numbers of data and faced imbalanced multiclass classification distribution. However, most researchers have neglect-ed the problem of multiclass imbalanced classification when undergoing their research on network anomaly detection. It cannot be denied that some researchers proposed some methods to solve this problem. Nevertheless, the methods that have been proposed still contains some drawbacks. Hence, in this research, the performance of the machine learning due to the effect of a multiclass imbalanced dataset was studied. Seven machine learning algorithms from different families will be used in this study, and their ability to classify the majority and minority class instances and achieved high classification accuracy will be identified. Besides, seven different performance metrics will also be used to evaluate the performance of the classifiers used in this study. The results show that although the classification accuracy of the Bayesian machine learning algorithms is lower than other classifiers used in this research, they perform well in detecting the minority class instances. Besides, J48 has known as the classifier that can work well in every aspect of this research.

Abstract

PAPER ID: 109

TITLE: KNN: Classification of Agarwood using E-nose

AUTHOR(S): Mujahid Mohamad, Muhammad Sharfi Najib, Saiful Nizam Tajuddin, Suhaimi Mohd Daud, Nur Farina Hamidon Majid, Suziyanti Zaib, Muhammad Faruqi Zahari and Nurdiyana Zahed

Abstract: Agarwood is one of the most expensive woods used in ceremony, religion, medical and more. There are many types of agarwood which give different quality. The most high-demand types were A. Malaccensis and A. Crassna. However, there is still no analytic standard method available to determine the types of agarwood. This study introduces a method of determining the types of agarwood specifically A. Malaccensis and A. Crassna in oil and also in the wooden medium using K-nearest neighbor, KNN. As the result, the introduced method was able to classify both types of agarwood in both mediums with a 100 percent classification rate.

PAPER ID: 110

TITLE: Background Subtraction Algorithm Comparison on the Raspberry Pi Platform for Real Video Datasets

AUTHOR(S): Iszaidy Ismail and Ruzelita Ngadiran

Abstract: Background subtraction is an advance method used for video monitoring and a commonly used for indexing of moveable objects. Over the years several algo-rithms have been implemented and the implementation of algorithms on the em-bedded platform can be difficult because the embedded platform has minimal computing resources. The purpose of this study is to conduct a comparative re-view of background subtraction algorithms available on the embedded platform: - Raspberry Pi. The algorithms are compared using a real video dataset based on segmentation accuracy (precision, recall, and f-measure) and hardware efficiency (CPU utilization and time consumption).

Abstract

PAPER ID: 112

TITLE: Performance Analysis of Single-Phase Inverter using SEPIC Converter

AUTHOR(S): Iman Alyzza Zunnurain, Koh Mun Yumi and Mohd Haris Faisal

Abstract: This paper presents the topology of integration of DC/DC SEPIC Converter with the full bridge DC/AC Inverter. The propose topology can level up the small DC voltage into a higher AC voltage by connecting the circuit in parallel connection. SEPIC converter is chosen to be connected to the full bridge inverter due to its high efficiency and low power consumption characteristic compared to other DC/DC converter. The proposed topology is simulated using MATLAB and validate the results through the hardware implementation. The FPGA controller is selected to provide the pulsation for the main circuit for controlling the switching process. The performance of the converter including total harmonic distortion is analyzed and presented in this paper.

Abstract

PAPER ID: 113

TITLE: A Hybrid Optimization Approach for Power Loss Reduction and Voltage Profile Improvement in Distribution System

AUTHOR(S): Noor Najwa Husnaini Mohammad Husni, Siti Rafidah Abdul Rahim and Mohd Rafi Azman

Abstract: In the past decades, the electrical power system is designed and developed to sat-isfy the owner demand that continuously appears in many variations. On the oth-er hand, engineers have put their full effort into solving the problem related to electrical power systems that come and might arise in the future. Therefore, dis-tributed generation (DG) has been introduced to solve multiple electrical power system problems. The proposed methodology presented in this study focuses on minimizing network power losses, improving the voltage profile of system opera-tion, and security constraints in a distribution. It is known that the location and capacity of DG play significant roles in the system losses in a distribution sys-tem. A hybrid metaheuristic nature-inspired algorithm is presented in this study for optimal location and sizing of multiple DG units. The best location and opti-mal sizing of DGs will be determined through Hybrid metaheuristic of Artificial Immune System Firefly Algorithm (AISFA). The proposed technique will be tested into IEEE-69 test system using MATLAB software. For reducing the power losses, the simulation results have shown that bus 61 is the best location for reducing power losses and improving voltage profile in IEEE-69 test system in the preliminary result. By installing DG at bus 61, the real and reactive power losses improve about 88%, with a voltage profile improvement index up to 1.0890.

Abstract

PAPER ID: 114

TITLE: Lubricant Oil Odor-Profile Classification using Case based Reasoning Intelligent Classification Method

AUTHOR(S): Suhaimi Mohd Daud, Muhammad Sharfi Najib, Saiful Nizam Tajuddin, Muhamad Faruqi Zahari, Mujahid Mohamad, Nur Farina Hamidon Majid and Suziyanti Zaib

Abstract: Lubricant Oil is one of the products from the crude petroleum refinery process. The implementation of lubricant oil is very important in order to makesure the smoothness of moving parts in the vehicles engine. The smoothness of engine of vehicles influence the performance of vehicle at the highest level. Common meth-od used by public to determine the aging level of lubricant oil is by checking the mileage meter mounted on the vehicles dashboard. In the world of research, re-searchers used various methods and instruments such as ICP-MS, AAS and so on. However, these methods involved the complex sample preparation, compli-cated procedures and costly for installation and maintenance. In order to avoid these difficulties, e-nose is used in order to classify the aging level of the lubri-cant oil with simpler sample preparation, less experimental procedures and lower cost compare to other instruments. The signal processing technique is implement-ed in order to process the raw data in order to makesure the data in a very good condition for features extraction phase. The important information that known as odor-profile then will be used for classification using Case-based Reasoning In-telligent Classification method. From this reseach, 100% classification result is obtained.

PAPER ID: 115

TITLE: Three Dimension (3D) Indoor Positioning via Received Signal Strength Indicator in Internet of Things

AUTHOR(S): Nur Haliza Abdul Wahab

Abstract: There are many expensive things and equipment in an organization such as medical equipment, lab tools and equipment and more. In University, stu-dents are freely to use the equipment and it is hard for technicians to handle and take care of all the equipment due to many labs needing to be handled by one technician. As for this, it frequently happens in lost cases. It was a big issue when the cases happen each month and the price to buy new equipment to replace the loss will increase. Due to that, indoor tracking and monitoring are needed to monitor and track the location of expensive equipment. This work will focus on the School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia. The architecture of the School of Computing building is having multiple levels. The indoor tracking and monitoring system need to be in 3 Dimensional (3D) due to the existence of the Z-axis to support tracking when having multiple levels of the building. The main focus of this project is presenting the development of 3D indoor location tracking and monitoring systems to track and monitor equipment in the School of Computing. The indoor tracking and monitoring will sup-port seamless mobility at the services level. The algorithm used is using a Received Signal Strength Indicator (RSSI) with Triangulation technique. The accuracy less than 0.4 meter was achieved from the experimental result.

PAPER ID: 117

TITLE: Study and Analysis of Current Harmonic Generation in Uncontrolled Single-phase Full Wave Diode Rectifier with RLC Load

AUTHOR(S): Noradniazman Bin Abd Aziz and Yushaizad Yusof

Abstract: This paper discusses single-phase bridge diode rectifier as harmonic generator in electrical power system. The current harmonic distortion is drawn by a conventional single-phase bridge diode rectifier with resistor-inductor-capacitor (RLC) load circuit has been simulated using MATLAB Simulink tool. Power factor obtained from this simulation is at 0.796 and calculated Ripple factor is 0.53 THD value is observed increasing gradually with the rising of resistance and inductance value but moderately decreasing with the increment of capacitance value. RMS voltage is determined as 70.71V. On top of that, computed load voltage V_dc is 21.048V while load current idc is 1.052A. Power factor value is calculated at 0.796, while Ripple factor is determined at 0.53.

PAPER ID: 118

TITLE: A Near Infrared Image of Forearm Subcutaneous Vein Extraction Using U-Net

AUTHOR(S): Nuraini Huda Abdul Kadir, Nur Haliza Abdul Wahab and Goh Chuan Meng

Abstract: Machine learning is in demand for acquiring important perceptions from big data or producing advanced revolutionary technologies and helps most the human tasks effortlessly. Healthcare is one of the industries that receive benefits from it. In the medical industry, venipuncture is one of the most crucial procedures, and locating the patient's vein is the challenge faced by clinicians. The difficulty leads to multiple trials of venipuncture and causing harm such as bleeding, bruising, damaging surrounding cells, and other effects on the patient. If the case is worst, the patient might have to go to central venous access. Some technologies such as Transillumination, Ultrasound, and Near-Infrared (NIR) imaging are developed to assist clinicians in lo-cate the forearm subcutaneous vein. NIR has some strong properties such as non-invasive technique, low cost, and small in size for the implementation thus, it is a popular method among researchers. The technique has a weakness in that it requires image processing for the enhancement and the vein is more visible and located. This paper is approaching Deep Learning to automatically extract the forearm subcutaneous vein from the NIR image using the standard convolutional neural network with U-Net architecture and Residual U-Net architecture in comparison. Both architectures is almost similar and slightly different. The purpose of using two types of architecture is to compare the result and will use the highest accuracy method for the fore-arm subcutaneous vein extraction.

Abstract

PAPER ID: 119

TITLE: Deep Neural Network for Localizing Gas Source based on Gas Distribution Map

AUTHOR(S): Ahmad Zaffry Hadi Bin Mohd Juffry, Kamarulzaman Kamarudin and Abdul Hamid Adom

Abstract: The dynamic characteristic of gas dispersal in uncontrolled environment always brings to inaccurate of gas source localization prediction through the gas map especially when using local maxima method. Gas map is a system that represents the gas distribution in an environment which help human to observe the concentration of harmful gases at a contaminated area. This paper proposes the utilization of Deep Neural Network (DNN) intelligence to localize the gas source in a gas map. DNN learns from the previous gas map data and patterns to generate a model that able to give the output in term of location of gas source. Results indicates that DNN able to predict the location of predicted gas source in the gas map within the range of 0.8 m to 2 m from the actual gas source. This finding shows that DNN has a high potential to utilize in gas source localization application.

PAPER ID: 120

TITLE: Design and Performance Enhancement of Triple Band Antenna using Metamaterial Superstrate for Wireless Communications

AUTHOR(S): Biplob Hossain

Abstract: A novel, compact, highly directive, efficient and metasurface structure-based superstrate configured triple band antenna has been developed in this article. The conventional patch antenna has been designed over FR4 dielectric with a rectangular slot on patch and the overall dimension of this proposed antenna was $40 \times 40 \times 1.6$ mm3. The superstrate is designed over FR4 dielectric and placed 6 mm away from conventional antenna. The proposed antenna operates at three different frequencies of 2.4 GHz, 5.8 GHz and 6.6 GHz. After the inclusion of superstrate, the bandwidth significantly improved by 9.62%, 28.13% and 16.39% respectively. Furthermore, as compared to the patch antenna alone, the gain of the proposed antenna was increased from 4.2 dB to 4.7 dB at 2.4 GHz, 3.26 dB to 5.02 dB at 5.8 GHz and 5.57 dB to 6.48 dB at 6.6 GHz. The overall antenna has been designed and the performance of different parameters have also been ob-served with CST software. As the proposed antenna has a maximum of 84% radiation efficiency, it can be promoted for Wi-Fi (2.4 GHz), WLAN (5.725-5.825 GHz) and Transport and mobile backhaul (6.425-7.125 GHz) applications.

PAPER ID: 121

TITLE: Undersampling and Oversampling Strategies for Convolutional Neural Networks Classifier

AUTHOR(S): Siti Raihanah Abdani, Mohd Asyraf Zulkifley and Nuraisyah Hani Zulkifley

Abstract: A deep learning network requires a large number of training data to optimize the complex feature representation. However, it is hard to gather a lot of samples in certain cases due to limited occurrence data or a costly sampling process. In medical applications, some of the patients refused to be part of the study, coupled with the limited occurrence of certain diseases has prevented a large-scale data collection. Besides that, data availability is also limited for a new disease such as COVID-19 x-ray images during the breakout of the pandemic in 2020. Thus, it is important to explore several sampling strategies, so that the network can be trained better with uniformly distributed samples among the classes. In this paper, EfficienNet-B1 is proposed to detect cancer cells for acute lymphoblast leukemia. It is a lightweight model with just 6,577,801 parameters even though it consists of 116 convolutional layers. Oversampling and undersampling strategies are explored to produce a balanced training dataset. Oversampling strategy is executed by duplicating samples in the class with a fewer total number of samples, while undersampling strategy is executed by deleting samples in the class with a more total number of samples. The results proved that oversampling improved the ac-curacy from 0.7754 to 0.7807. For future work, the effect of the data augmentation can be experimented together with various sampling strategies.

Abstract

PAPER ID: 123

TITLE: Selective Harmonic Minimization in Multilevel Inverter with Cascaded DC sources using Nature-Inspired Optimization Algorithm

AUTHOR(S): Yee Wei Sea, Wei Tik Chew, Siok Lan Ong, Wui Ven Yong, Noor Syafawati Ahmad and Jenn Hwai Leong

Abstract: This paper presents the performance of a nature-inspired optimization algorithm known as grasshopper optimization algorithm (GOA) implemented to low-frequency switching-angle calculation technique, selective harmonic minimization pulse width modulation (SHMPWM), to obtain the optimized switching angles and applied to cascaded multilevel inverter (CMLI). GOA-SHMPWM is used to eliminate the undesired low-order harmonics while maintaining the desired fundamental harmonic. The optimal switching angles of GOA-SHMPWM is computed using MATLAB. The output voltage waveform and THD of GOA-SHMPWM and sinusoidal pulse width modulation (SPWM) are simulated using PSIM and compared. The simulated line-to-line THD of GOA-SHMPWM is always lower than SPWM.

PAPER ID: 124

TITLE: Planning Of Dstributed Generation Using Mix-Integer Optimization By Genetic Algorithm (MIOGA)

AUTHOR(S): Che Muhamad Asad Safwan Che Aziz, Norhafidzah Mohd Saad, Mohammad Fadhil Abas and Abid Ali

Abstract: In this paper, the planning of distributed generation (DG) is investigated with the method of metaheuristic called mix-integer optimization by genetic algorithm (MIOGA). The solution of the distribution power flow is based on the backward/forward sweep method to compute the voltage at every node of the buses followed by the power loss determination. The main idea of the proposed method is to determine the size and location for the DG to be installed in the radial distribution network (RDN). The method is tested in 69 bus RDN in MATLAB. The total power loss reduction and improvement in bus voltage magnitudes are observed for the system with DG. By using MIOGA, the power loss can be reduced up to 63.03% for DG installation at bus 61 @ 1.8727 MW. Apart from optimizing losses, the installation of DG using MIOGA also helps to improve the voltage profile of the RDN. The critical bus voltage at bus 65 has successfully been improved from 0.9092 p.u. to 0.9806 p.u.

Abstract

PAPER ID: 125

TITLE: Planning Of Radial Distribution Network With Distributed Generation Using Particle Swarm Optimization

AUTHOR(S): Muhammad Al Amin Abdullah, Norhafidzah Mohd Saad, Mohammad Fadhil Abas and Abid Ali

Abstract: This article presents a combination of particle swarm optimization (PSO) al-gorithm and the backward/forward sweep power flow (BFSPF) approach to determine the optimal bus location and size of distributed generation (DG) in a radial distribution network (RDN). The analysis is performed using MATLAB and tested on the 33 – bus RDN for power loss minimization. The solutions accomplished through the experiments show a reduction in the system's total power loss and improvement in desired bus voltage profiles. With the installation of DG, the percentage of power loss reduction is 47.38% if compared to the system without DG. The DG size and location to be installed is determined at the bus no. 6 with the size of 2.59 MW.

PAPER ID: 126

TITLE: Pneumonia Identification from Chest X-rays (CXR) Using Ensemble Deep Learning Approach

AUTHOR(S): Mahmud Iwan Solihin, Ng Weng Mun and Chow Li Sze

Abstract: Chest x-ray screening has proven to be the most reliable method to diagnose pneumonia. However, it requires a professional radiologist to identify the symptom of pneumonia from each x-ray images. In the scarcity of professional radiologists, computer vision can assist in diagnosing x-ray images. This study aims to design a reliable image classifier for diagnosing pneumonia using an ensemble deep learning approach. Multiple experiments are conducted to evaluate transfer learning applications, data augmentations, and ensemble techniques. The pre-trained deep learning models are Xception, DenseNet201, ResNet152V2, InceptionResNetV2, NASNetLarge, and VGG16. The dataset used for training the models is obtained from Guangzhou Women and Children's Medical centre. Each of the chosen models is trained and fine-tuned with Nesterov Stochastic Gradient Descent optimizer with their respective learning rate. The majority voting ensemble approach is employed to archive an accuracy of 97.56% and 99.14% for train and test data, respectively. It yields an F1 score of 99.25% for the test data.

PAPER ID: 127

TITLE: Intermittent Measurement and Finite Escape Time Correlations Study in H8 Filter In Navigation

AUTHOR(S): Hamzah Ahmad, Mohd Syakirin Ramli, Mohd Mawardi Saari, Badaruddin Mohammad and Nur Aqilah Othm

Abstract: This paper introduces the analysis of finite escape time and intermittent measurement study in H8 Filter in mobile robot navigation. The study aims to analyze the H8 Filter performances for mobile robot navigation when finite escape time and measurements data are sometimes missing during observation. In our case, a mobile robot is arbitrarily placed in an unknown environment and then it must con-struct a map and concurrently localize itself in the built map by using H8 Filter. Both Finite escape time and missing measurement data issues are observed to see their correlations and effects to the estimation. This paper shows that, even if a measurement data is missing or there are some uncertainties exist during observations, information is still available for the robot to estimate its location and land-marks effectively. Through simulations, if both problems occurred frequently, then the mobile robot lost its estimation. Based on the experimental results, it was found that, even if finite escape time happens and measurements are sometimes missing during mobile robot observations, the filter is still capable of providing reliable information on the estimation.

PAPER ID: 128

TITLE: A novel blade fault diagnosis using deep learning model based on image and statistical analysis

AUTHOR(S): Mohd Syahril Ramadhan Mohd Saufi, Muhammad Firdaus Isham and Muhammad Danial Abu Hassan

Abstract: The artificial intelligence technology has the high potential for machinery fault detection and diagnosis. Blade failure is the main type of failure that occur in gas turbine and blade usually fail unexpectedly. Detection and diag-nosis of blade component is different with gear and bearing as both compo-nents have a standard vibration analysis and the fault can be examined using frequency domain analysis. Due to complex structure of the blade system, the informative feature from the vibration signal on the blade fault cannot be easily analysed. Thus, this paper proposed the fault diagnosis system using time-frequency image analysis and stacked sparse autoencoder (SSAE) mod-el. The experimental is carried out using multi-stage blade system and the re-sult showed that the proposed system is able to provide more than 90% diag-nosis performance

PAPER ID: 130

TITLE: Evaluating Performance enhancement of Surfactant-added Nano-enhanced Phase Change Material (SNPCM) on PV Module

AUTHOR(S): Nurul Humaira Muhd Zaimi, Amirjan Nawabjan, Shaharin Fadzli Abd Rahman, Siti Maherah Hussin and Hasimah Abdul Rahman

Abstract: To date, scarce studies have been reported on surfactant added NPCM (SNPCM) usage to enhance PV panel performance. Thus, this study aims to evaluate the impact of SNPCM on the performance of PV panels. SNPCM fabricated composed of Graphene nanoplatelet (GNP) with three different percentages (1wt%, 3wt%, and 5wt%), and Sodium Dodecylbenzene Sulfonate (SDBS) as surfactant. All the samples were attached to the back of the 10W PV panels. Measurement of Solar irradiance, ambient temperature, and PV modules temperature was performed, followed by an analysis of each module's performance using simulation. PV-PCM/5 wt. % GNP with SDBS (PV5) showed the lowest PV temperature reduction (as low as 37 °C reductions are reported), yielding the best performance enhancement with the highest output circuit voltage (20.3 V). This leads to an increase of maximum output power by 15.84%. This proves that fabricated SNPCM is reliable to be used to enhance the PV panel performance.

PAPER ID: 131

TITLE: A Novel Hybrid Extreme Learning Machine-Whale Optimization Algorithm for Bearing Fault Diagnosis

AUTHOR(S): Muhammad Firdaus Isham, Mohd Syahril Ramadhan Mohd Saufi and Amirulaminur Raheimi

Abstract: An accurate diagnosis method is important to ensure safe operation of bearing in rotating machinery application. Recently, single feed-forward neural network known as extreme learning machine (ELM) is rapidly used in many areas of study including fault diagnosis study. This is due to its rapid learning rate, better generalization performance and ease of implementation. However, the selection of neurons number and randomness of input weight and hidden layer bias may affect the performance of ELM. Meta-heuristic algorithm known as whale optimization algorithm (WOA) has been used to do the selection of these ELM parameters. Therefore, this paper proposed a novel hybrid fault diagnosis method known as ELM-WOA for bearing application. A bearing dataset consists of one healthy and three faulty data from Case Western Reserve University Bearing Data Center are used in this study. Statistical features are extracted from each data sample and being feed into ELM-WOA for fault diagnosis process. The proposed method accomplishes the best result in diagnosis performance as compared with conventional ELM.

Abstract

PAPER ID: 132

TITLE: Development of Remote Sensing System for Air Quality Monitoring Using Flying Wing UAV Platform

AUTHOR(S): Dhiya Syakir Zulkifli and Ahmad Anas Yusof

Abstract: Air pollution has been one of the biggest problems in South-East Asia for dec-ades, affecting primarily Malaysia and Indonesia due to the process of urbaniza-tion and rapid growth of the industrial sector, the rise in traffic volumes and the expansion of the petroleum. In Malaysia, air quality information is usually col-lected by ground stations that's been located nationwide by Department of Envi-ronment (DOE). Although ground station provides accurate and reliable data, it cannot track the changes of air quality in area that is not covered by the stations especially in remote areas and in emergency. This research will study the previ-ous scholar in order to help understand the development of remote sensing for air quality monitoring using UAV technologies. The development of such system can provide proper analysis for future research. There are 3 objectives of this study which is to design and develop an air quality monitoring module, to identi-fy and assembled the hardware and software for the flight controller systems of the flying wing UAV and to test and analyses the effects of airspeed on the read-ing of the air quality sensing. The validation and measuring of data is done by de-signing and carrying out experiments related to the objectives. For the experiment setup for achieving the last objective have been design and conducted which is to test the effects of airspeed on the reading of the air quality. All of the objectives of these project have been achieved.

PAPER ID: 133

TITLE: A High Accuracy Control of Dual Active Bridge DC-DC Converter using PSO Online Direct Tuning

AUTHOR(S): Suliana Ab-Ghani, Hamdan Daniyal, Nur Huda Ramlan, Norhafidzah Mohd Saad and Meng Chung Tiong

Abstract: The dual active bridge (DAB) is amongst the popular DC-DC converter in literature due to its attractive feature such as bidirectional power flow, gal-vanic isolation and high power density. The conventional proportional-integral (PI) controller is a controller that has been widely used in power electronics field including DAB converter due to its reliability. However, it¬ has less performance especially at the condition that far from the point of tuning¬. This paper proposes an online tuning of phase-shift angle using particle swarm optimization (PSO) al-gorithm for the 200 kW 20 kHz DAB system. The system is controlled directly by PSO without the existence of PI controller. Simulation has been carried out with the objective to minimize the steady-state error, e_{SS} of the DAB. The DAB performance with the proposed solution is evaluated in terms of e_{SS} by testing the system under various reference voltages at different loads. Comparative analysis between the proposed method and the PI controller performance are presented. In order to validate the simulation results, a hardware-in-the-loop (HIL) experi-mental circuit is built in Typhoon HIL-402 to verify the steady state performance of the system. The DAB system with proposed method produces higher accuracy by producing smaller e_{SS} as compared to the DAB system with PI controller.

PAPER ID: 134

TITLE: Rule-based-Iterative Energy Management System for Islanded Hybrid Microgrid System

AUTHOR(S): Ng Rong Wee and J.J. Jamian

Abstract: The microgrid is seen as an alternative that will replace the conventional generator in the future. However, Energy Management System (EMS) is required to enable efficient energy sources within a microgrid. While operating cost is essential in managing energies, another two important aspects that should be considered are the environmental aspect, specifically GHG emissions and technical aspects. However, the three aspects are always conflicting with one another, hence adding complexity to the EMS. In this paper, a Rule-based-Iterative EMS is proposed for an islanded microgrid which consists of photovoltaic (PV) array, tidal turbine (TT), diesel generator, and Li-ion battery storage. This study aims to obtain the optimal PV-TT-Battery size for minimum cost of energy, cost of GHG emission, and cost of power losses due to power electronic converters. The EMS model is verified through simulation. Results show that the optimal size for minimizing the cost of energy is two units of PV array, one unit of TT, and six battery units. As for minimizing the cost of GHG emission and cost of power loss, the optimal sizes are 2-2-5 and 1-1-1 for PV-TT-Battery combination. Thus, depending on the objective function, the power system planner can use this approach to find the best combination in the microgrid system.

Abstract

AUTHOR(S): Anuar Bin Mohamed Kassim

Abstract: Agricultural industry is a primer industry which applicable and acceptable to all countries that make it a source of income and food. The main challenges of the agricultural industries are crop protection. The pests such as insects, ants, snails, and maggots are the kind of pests which commonly found on the farm. The impact of these pests could produce less yields, and destroying the plants. The infected crops which harvested and stored together with the good quality products also will be affected and spread the disease if it not controlled wisely. As a result, the income of the farmers could be at risk. Therefore, this paper aims to evaluate the performance of the developed mobile robot for pesticide sprayers in the chili farm in terms of spraying coverage. The analysis of the spraying coverage done by using the SnapCard apps with the water sensitive paper (WSP) respectively. The comparison of the spraying coverage between under leaves and top leaves also done to show the effectiveness of the spraying mechanism. This study also involves the development of a pesticide sprayer mechanism that can be activated automatically when the ultrasonic sensors are detecting the existence of the chilies plant. The success of crop protection and pest management in the chili farm by using the mobile robot for pesticide application is analyzed respectively. The developed mobile robot for pest management also can be applied in any type of farm such as vegetables, pepper, pineapples, papaya, and, etc.

Abstract

PAPER ID: 137

TITLE: A BASIC Language Compiler for PLC Applications

AUTHOR(S): Zulfakar Aspar and Nurul Huda Abd Rahman

Abstract: Since PLC modeling has become more complex, an alternative method to write a program for a PLC must be developed. Based on IEC1131 require-ment, BASIC language compiler was chosen due to ease to learn and use. The BASIC language compiler can be used to write the whole PLC program or specifically used to write custom or complex libraries for existing program language known as Ladder Logic Diagram. This research is developing a BASIC language compiler for a specific microcontroller. The compiler will convert the BASIC language design entry into Mnemonic Code that can on-ly be understood by system developers. Then, the generated Mnemonic Code will be converted into Assembly Code of PIC 16F8XX. Next, the compiler will convert the generated Assembly Code into Machine Code using the as-sembler, MPASMWIN. Finally, the generated machine code is loaded into PIC 16F8XX chip using an integrated boot loader on a custom PLC board. For the moment, BASIC Compiler has seventeen formats of mnemonic code that can be adjusted for programmer's convenience and for enhancing the compiler in the future. The compiler was verified by comparing with C lan-guage compiler output and testing on the actual hardware PLC board. The BASIC language was also added with a few custom instructions specialized for PLC applications.

PAPER ID: 138

TITLE: Performance Analysis of Developed Multi Soil Sensor System with IoT Platform for Smart Farming System

AUTHOR(S): Anuar Mohamed Kassim

Abstract: This paper presents the use of Internet of Things or known (IoT) in smart farming is no stranger to today's world of automation which is known to fa-cilitate farmers as an example of precision agriculture. Despite of that, as known the multi-sensor accuracy is more effective than having this single function because proximal soil sensors respond to less than one soil property in a smart farming area. As referred to inaccurate analysis and waste of im-portant information in a single sensor system with this in order to overcome the problem this project uses the data fusion or integration of multi-sensor data integrated with Internet of Things technology in smart farming. In this paper, the purpose is to make it easier for farmers to get continuous or real-time agricultural data without hindrance. Readings of parameters such as soil EC known as electrical conductivity, soil moisture, temperature and light in-tensity are measured in agriculture. Meanwhile, the Internet of Things map-ping will display all the analyzes for the planting conditions in the user inter-face. Not only that, in order to evaluate the performance and efficiency of the system some experiments will also be conducted. Hence, in order to al-ways maintain needs and innovation in the market, this project is expected to contribute to farming innovation in this automation era.

PAPER ID: 139

TITLE: Power Consumption by using Various Type of Battery and Spectacle Design in Wearable Travel Aid Device for Visually Impaired Person

AUTHOR(S): Anuar Mohamed Kassim

Abstract: In this paper, the evaluation of the power consumption for the developed full direction electronic spectacles, two types of experiments are conducted in which the first is always in the ON mode and the second has a switching mode for four vibrators will be described. The charging system by using the energy harvesting method to be used in the wearable device for the visually impaired person. On the other hand, the measurement of simplified version of wearable travel aid device also is evaluated. An obstacle was placed in front of the device to evaluate the power consumption of the simplified design of electronic spectacles. Consequently, the improvement of the charging system and the power consumption could increase the life cycle of the wearable travel aid device which indirectly will increase the quality of life of the visually impaired person.

Abstract

PAPER ID: 140

TITLE: Robust Nonlinear Liquid Level Control of a Two-tank System using Backstepping Integral Sliding Mode Control

AUTHOR(S): Maziyah Mat Noh

Abstract: This paper presents the formulation of nonlinear robust control that integrates backstepping and integral sliding mode control strategies for controlling liquid level in a two-tank system. In the classical sliding mode control, a discontinuous control law is synthesized to drive the system state to the sliding surface in a fi-nite time and maintain it thereafter on that surface. The technique is naturally suit-ed for the tracking of controlled systems, such as liquid level control inside two-tank system. However, the effects of the discontinuous nature of the control, known as the chattering phenomenon is harmful because it leads to low control accuracy and high wear and tear of moving mechanical parts. The hybrid control preserves the main advantages as it is reduced the chattering effect and provide higher accuracy in realisation of the control system. The performance of the pro-posed controller is simulated using MATLAB/Simulink software which tested for nominal system, system with external disturbance and system with parameter variation. The performance of proposed controller is compared against the per-formance of backstepping sliding mode control and integral sliding mode control in terms of chattering reduction and steady state error. The simulation results have shown that the proposed controller has improved the output tracking performance better than the performance backstepping sliding mode control (BSMC) and inte-gral sliding mode (ISMC) with ISMC shows slowest respond. Undesired chat-tering in sliding surface has been reduced.

Abstract

PAPER ID: 141

TITLE: A Simulation Study of Wireless Power Transfer for Electric Vehicle

AUTHOR(S): Muhammad Izzul Mohd Mawardi, Mohd. Shafie Bakar and Mohd. Shawal Jadin

Abstract: This paper presents the simulation study of the wireless power transfer (WPT) for Electric Vehicle (EV) charging. This study investigates the best way to improve power transfer by using latest WPT system than using tradi-tional charging of internal combustion engine (ICE) vehicles and thus im-prove fuel sustainability. WPT provides users with a safer charging system. Using compensation circuits in a WPT system for EV applications plays an important role in increasing the capacity for WPT as well as the efficiency of the power transfer. There are four compensation topologies and each of to-pology have advantages and disadvantages. High-performance, convenient and cost-effective charging of electric vehicles has the ability to revolution-ize road transport. Thus, the proposed design in simulation are presented to show that the composition circuit can improve the power transfer efficiency.

PAPER ID: 142

TITLE: Spatio-temporal characteristics of energetic lightning in Southeast Asia: Preliminary statistical results

AUTHOR(S): Shunsuke Akama, Yasuhide Hobara, Mohamed Amir Izzani, Chandima Gomes, Kazuo Shiokawa, Shu Hirai, Hiroshi Kikuchi and Michael Stock

Abstract: The region of Southeast Asia is known as one of the lightning-prone areas in the world. However, spatial and temporal distributions of high-energy lightning discharges, which cause natural disasters e.g. significant damages to local power grid systems and forest fires, are still unknown. This paper reports initial results on the statistical characteristics of energetic lightning around Malay peninsula. Highly accurate timing and location as well as lightning peak current (Ip) of lightning strokes were obtained by ENTLN (EarthNetworks Total Lightning Network), while the vertical charge moment change Qds as a proxy of high-energy lightning was derived by using ground-based ELF magnetic field observations in Pahan, Malaysia with a small threshold of less than 10 C?km. The characteristics of energetic lightning for both rainy and dry seasons were successfully derived for the first time in this region. The results indicate that highly energetic lightning occur frequently throughout the rainy and dry seasons, mainly over the Malacca Strait. Long-term statistical analysis with an extended data analysis period is necessary to understand further the seasonal and yearly dependences of energetic lightning and their relations with local climate conditions.

PAPER ID: 143

TITLE: Power Production Optimization of Model-Free Wind Farm using Smoothed Functional Algorithm

AUTHOR(S): Renhao Mok and Mohd Ashraf Ahmad

Abstract: The current study reviewed the performance of Smoothed Functional Algorithm (SFA) based method towards the maximization of total power output by wind farms confronting the situations of diverging wind directions, non-static wind conditions and turbine failures. The proposed optimization method was specifically analyzed using the Horns Rev Offshore Wind Farm as the designing groundwork. Simulations were undertaken to appraise proficiencies of the SFA employed wind farm through the parameters of convergence interval, precision and maximized power generation. Obtained results have further revealed SFA based method as an efficacious optimization approach towards enhancing wind farm performance, in terms of a shorter convergence interval, greater precision and increased power maximization amidst the circumstances of dissimilar wind speeds, multiple wind directions and turbine failures.

PAPER ID: 144

TITLE: Spatio-temporal distributions of lightning stroke charge using ELF and Meteorological Data

AUTHOR(S): Yasuhide Hobara, Takuhiko Ohashi, Tomonori Shiraishi and Kazuo Shiokawa

Abstract: In this paper lightning stroke charges are estimated remotely by using com-binations of Extremely Low Frequency (ELF) radio waves, conventional Lightning Locating System (LLS) and local meteorological information for the first time. Each lightning stroke location from LLS and corresponding transient signature of ELF magnetic field observed at a long distance (~ 1000 km between lightning stroke and observation site) are utilized to es-timate the charge moment change (CMC) of the lightning stroke. The light-ning stroke charge Q is then derived by dividing the CMC by the altitude of the neutralized lightning charge. The corresponding altitude of the neutral-ized lightning charge for each stroke is determined by assuming local -20 °C altitude for a positive stroke (-10 °C altitude for a negative strokes) from MesoScale Model (MSM). Spatial and temporal frequency distributions of energetic lightning (large amount of stroke charge) and cumulative frequen-cy distributions of stroke charge in northwestern part of Japan in local summer and winter seasons for 4 years were derived. The spatial occurrence frequency distributions indicate that lightning strokes with a large amount of neutralized charge occur more frequently in inland areas during summer-time and in coastal areas in winter. The cumulative frequency distribution indicates that positive polarity lightning strokes in winter tend to have a large charge. Our statistical results are in good agreement with the lightning properties inferred from local observations, and are considered to be useful information not only to study electrical properties of thunderstorms but al-so for future maintenance planning of power grid systems in wide areas and mitigation of lightning damages.

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