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Thursday, October 12, 13:15 - 15:15

IT1: Information Technology 1

Room: Grand Ballroom B

Chairs: Yajima Kuniaki (General Engineering & National Institute of Technology Sendai College, Japan), Naras Kwanthong (Rajamangala University of Technology Srivijaya, Trang Campus, Thailand)

teaching from lecturer to students. Therefore, this way of learning limits students' solving problem skills and their abilities to learn by themselves. This will lead to difficulty situation when students have to manage and solve real problems. This method of learning also obstructs students to develop teamwork skills. Thus this research will explore teaching process by using the project-based management system to develop a team management program. Also, 'Collaborative Management' system will use for tracking student's learning behaviors and to support instructional learning by using 'Problem Based Learning (PBL)'. The results of this study show factors effecting teamwork efficiency and indicate skills that students need to study effectively based on the problem-based learning framework (PBL) as a guideline for developing effective skills in effective learning environment.

SIG1: Signal Processing & Machine Intelligence 1

Room: Madalena
Chair: Sirion Vittayakorn (King Mongkut's Institute of Technology Ladkrabang, Thailand)

POW1: Power Systems 1

Room: Marco Polo

Chair: Warongkidh Ganchanasopa (Assumption University of Thailand & Electrical and Electronics Engineering, Thailand)

Indicator-Based Multi-Objective Chemical Reaction Optimization for Combined Heat and Power Optimum Power Flow with Thermodynamic Model 65

Priambudi Pujihatma (Universitas Gadjah Mada, Indonesia); Sasongko Pramono Hadi (Gadjah Mada University, Indonesia); Sarjiya Sarjiya and Tri Agung Rohmat (Universitas Gadjah Mada, Indonesia)

Chemical reaction optimization is a recently developed heuristic optimization technique. This research aims to utilize Indicator-Based Chemical Reaction Optimization (IBCRO) to solve multi-objective combined heat & power (CHP) optimization, which considers cost, steam production and power system loss. CHP system will be modeled using thermodynamic equations of gas turbine and Heat Recovery Steam Generators (HRSG). The performance will be compared with other algorithms: goal attainment, NSGA II, MOPSO and PESA. The result shows that IB-CRO can compete with other popular algorithms, proven by high average satisfactory degree values and coverage metrics.

A Novel Approach for Electromechanical Mode Estimation Based on PMU 71

Sergei Dekhtiar (Ural Federal University, Russia); Pavel Chusovitin (Ural Federal University & System Operator of United Power System, Russia); Andrey Pazderin (Ural Federal University, Russia)

This paper describes a new electromechanical mode estimation algorithm based on phasor measurement units (PMU) data obtained under ringdown condition. The main feature of the algorithm is that oscillation parameters aren't directly estimated but equivalent dynamic power system model is identified as a whole. Furthermore, the model is based on physical concepts underlying electromechanical transient processes in power system. Proposed algorithm is more accurate compared to main algorithms which are used for solving this problem. Besides, the algorithm allows to identify not only frequency and damping of electromechanical modes but also mode shape: amplitude, phase. The proposed algorithm along with existing methods are tested using simulated data from simple three-nodes power system model.

Voltage Stability Analysis Using Quadratic Objective Function Taking into Account Inequality Constraints 77

Grigoriy Shabalin (Ural Federal University, Russia); Pavel Chusovitin (Ural Federal University & System Operator of United Power System, Russia); Pavel Bannykh (Ural Federal University, Russia); Eduard Balakh (Ural Federal University & Ural Institute of Electrical and Power Engineering, Russia); Andrey Pazderin (Ural Federal University, Russia)

The author group proposes algorithm based on the analysis of the objective function consisting of the squared residual sum of node voltage equations to evaluate the closest maximum loading condition. The paper presents the development of research connected with consideration of inequality constraints, namely generators reactive power ranges. These constraints are taken into account by the usage of modified objective function supplemented by penalty components. Test calculations were made on the basis the simplest models and of 7-node power system. The proposed objective function and algorithm of the closest maximum loading condition calculation allows to identify power system security margin with set accuracy.

The Usage of Parallel Calculations in State Estimation Algorithms 83

Olga Malozemova and Ilya Polyakov (Ural Federal University, Russia); Pavel Chusovitin (Ural Federal University & System Operator of United Power System, Russia); Andrey Pazderin (Ural Federal University, Russia)

An increasing calculation speed is one of the highest priorities in developing power system state estimation (SE) algorithms. Modern power systems are continuously growing and different types of new measurements are appearing in networks which impact on a practical implementation of SE. The expanding size and growing complexity of the SE task lead to increasing computation burden. The paper proposes parallel execution approaches of mathematical operations, which used in different stages of SE algorithms. Also, the new matrix storing format suited for parallel manipulations is suggested. The format allows adding new elements to the matrix in any sequence without reallocating memory and performing fast multiplication of two sparse matrices. Their implementation can significantly shorten computation time. Also, it allows to use resources of modern computers in a greater extent. Different approaches for SE are widely used today. Each of them has some features that must be taken into account in practical implementation. The application of parallel calculations to the SE problem in different statements is analyzed in this paper. The elapsed time for parallel executing of mathematical operations in comparison with their sequential realization is provided.

NET1: Communication & Network Technologies 1

Room: Santiago

Chairs: I Wayan Mustika (Universitas Gadjah Mada, Indonesia), Lapas Pradittasnee (King Mongkut's Institute of Technology Ladkrabang, Thailand)

representative network. This paper proposes the technique of RSU Cloud which has the ability of cloud computing to solve the limitation of the traditional RSU for the efficiency of distributed Infotainment message.

Two Dimensional Angle of Arrival Estimation Using Minimum Sparse Ruler Based Rectangular Array of Antennas 110

Hasbi Nur Prasetyo Wisudawan (Universitas Gadjah Mada, Indonesia); Risanuri Hidayat (Gadjah Mada University (UGM), Indonesia); Dyonisius Dony Ariananda (Universitas Gadjah Mada, Indonesia)

One important application in the field of adaptive antenna array processing used in recent wireless communications systems, such as cognitive radio applications, is the direction of arrival (DoA) estimation. The existing works suggest that the Nx × Ny two dimensional (2− D) antenna array is almost surely able to recover up to ⌈Nx/2⌉⌈Ny/2⌉ two dimensional (2−D) DoA. In this paper, a new 2 − D (azimuth and elevation) DoA estimation method using a minimum sparse ruler based rectangular array of antenna is evaluated. The minimal sparse ruler is used to determine which antennas that have to be deactivated and which antennas that should be remain active. Therefore, it is possible to deactivate some antennas in the uniform rectangular array (URA) leading to a sparse rectangular array (SpRA). While minimizing the reduction in the quality of the resulting DoA estimation with SpRA, the selection and averaging procedure are adopted to tackle these elements. This approach is possible for uncorrelated sources as the covariance matrix of the impinging signals on the URA contains redundant elements. The selection and averaging procedures are adopted to tackle these elements. These steps are followed by the execution of the MUSIC algorithm to compute the 2-D DoA estimates. The simulation study shows that it is possible to employ only 25-antennas in SpRA in order to estimate the azimuth (φ) and the elevation (θ) angles of up to 19 sources. The combinations of (φ) and (θ) is drawn from the range of 0^0≤ φ ≤ 180^0 and 0^0≤ θ ≤90^0. The separation in azimuth and elevation angles between sources is at least 10^0.

Cell and RBs Selection Scheme for Power Consumption Reduction in Femtocell Networks Using Discrete Bacterial Foraging Optimization 116

I Wayan Mustika (Universitas Gadjah Mada, Indonesia); Sahirul Alam (UGM, Indonesia); Selo Sulistyo (Gadjah Mada University, Indonesia)

Cell and resource blocks (RBs) selection scheme is deemed important especially in a dense deployed femtocell area. An appropriate scheme can select cell and RBs for the femtocell user equipment (FUE) to reduce the inflicted interference to achieve a higher throughput. In this paper, cell and RBs selection scheme to reduce the power consumption of femtocell networks is proposed using Discrete Bacterial Foraging Optimization (DBFO). The proposed scheme can select femtocell base station (FBS) and the combination of RBs, which use the lower power consumption but satisfy the minimum throughput required by the FUE.

Improving Performance of Route Maintenance Processes in RPL Protocol 122

Lapas Pradittasnee (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Currently, there is a rapid increase in the implementations of Internet of Thing (IoT) systems in many areas such as smart building, and smart cities. This type of network has different requirements than other types of networks. It needs to effectively work with unreliable wireless channel condition. IETF proposed IPv6 Routing Protocol for Low-Power and Lossy Networks (RPL) for addressing lossy environment problem. However, many important mechanisms of RPL protocol are underspecified. In this paper, we examine the performance of the route maintenance processes that are provided in RPL protocol (the combination of Neighbor Unreachability Detection Mechanism (NUD), Objective Function Zero (OF0) and The Minimum Rank with Hysteresis Objective Function (MRHOF)). Both practical and simulation experiments are conducted. The results from the practical experiments shows that the performance in term of Packet Reception Ratio (PRR) from the combination between NUD and MRHOF is better than the combination between NUD and OF0. Moreover, the simulation experiments are also conducted to explore the best approach to improve the route maintenance processes by modifying two input parameters (ReachableTime and MAX_LINK_METRIC). The results from the simulation experiments indicate that when the data rate is high enough, there is no need to modify the input parameters. However, when the data rate is low, modifying the value of MAX_LINK_METRIC can significantly improve the performance of the route maintenance processes but the careful consideration is required because it has high possibility to affect other mechanisms in RPL protocol.

CON1: Control Systems 1

Room: Vera Cruz

Chair: Altug Iftar (Anadolu University, Turkey)

Simulation of Standing Upright Control of an Inverted Pendulum Using Inertia Rotor and the Swing Type Inverted Pendulum for Engineering Education 128

Junichi Sugaya (National Institute of Technology Sendai College, Japan); Toshiyuki

extension of the original system. Stability and good performance are then considered. It is shown that, provided that the expanded system is an extension of the original system, the contracted controller achieves stability and good performance for the original system if the controller designed for the expanded system achieves stability and good performance for the expanded system.

A Study of Determining an Adaptive Control Input Without Using a Parallel Feedforward Compensator 153

Ryo Tanaka, Tetsunori Koga and Kazuki Ikeda (Kurume College, Japan)

This article describes an approach to determine a modified adaptive control input which realizes an almost strictly positive real (ASPR) plant without a parallel feedforward compensator (PFC). In a simple adaptive control (SAC) theory, several output feedback based control techniques can be applied to the plant satisfying ASPR characteristics. However, real plants do not often satisfy this characteristics. To solve this problem, several PFC design methods have been proposed so far. Most PFC design parameters are generally adjusted by acquiring an empirical knowledge of designers. This article focuses on this situation. If a relative degree of the plant is two, ASPR plants can be designed by modifying an adaptive control input. We perform the effectiveness of the proposed method by some numerical simulations.

Thursday, October 12, 15:30 - 16:50

IT2: Information Technology 2

Room: Grand Ballroom B

Chairs: Chalita Srinuan (Faculty of Business Administration and Management, KMITL, Thailand), Boonprasert Surakratanasakul (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Mobile Expert Systems for Bamboo Identification Using Rule Based Reasoning 159

Endina Putri Purwandari, Eldorado Arifin, Ariefa Yani, Endang Winarni and Feri Noperman (University of Bengkulu, Indonesia)

Indonesia is a rich country in the diversity of bamboo. The condition make difficult to identification process. The type of bamboo contained in Indonesia is estimated at about 159 species out of the total 1250 species of bamboo around the world. The bamboo identification method usually takes a long time, is relatively expensive, complicated, and requires information from a bamboo expert. By transferring the knowledge of bamboo experts in recognizing the characteristics of bamboo such as roots, shoots, stems, branches, and leaves, identification can be done without having to bring an expert directly. The data feature of the mobile expert system for the identification of the diversity of bamboo species is divided into 6 morphologies, 31 characteristics and 188 attributes characteristic as inputs. This system is built with a rule based reasoning method that is modified with greedy algorithm to compare the difference of bamboo species weight. The experiments were performed with 143 bamboo test cases have shown 100% high accuracy rate for the same system input 100%. Furthermore, the accuracy rate reaches 100% for 50% input data equal to the knowledge base and only 50% answer filled, so the user does not need to answer the whole question to get accurate identification result. This results shown that the mobile expert system for bamboo identification with rule based reasoning generated results more reliable than human expert

Development of an IoT Device for Monitoring Electrical Energy Consumption 165

Siriwat Wasoontarajaroen, Khanchai Pawasarn and Vitthaya Chamnanphai (Rajamangala University of Technology Isan, Khonkaen Campus, Thailand)

An energy monitoring device integrating with the concept of the Internet of Things allows their measurement data can be monitored and retrieved at any locations where internet is available. This paper presents an IoT device that was developed for monitoring electrical energy consumption in a building. It was a low-cost IoT device consisting of three available off-the-shelf modules including PZEM-004t electrical energy sensors, an Arduino Nano Mini microcontroller and an ESP8266 Serial-to-WiFi board. The IoT device was tested by conducting electrical energy measurement for a week. The results of the test confirmed that the device was functioning well which could be able to collect electrical energy data for supporting efficient energy management.

Shifting Thai Mobile User Behavior and Its Impact on Mobile Regulation 169

Chalita Srinuan (Faculty of Business Administration and Management, KMITL, Thailand)

This study investigated the determinants of mobile-only user subscribers in the Thai mobile communications market. The survey data in 2014 together with a probit model were employed for analysis. Results showed that subscriber characteristics, including gender, government officer, private officer, Internet application, area of living, and smart phone ownership, can explain a significant behavior

of becoming mobile-only user of Thai mobile subscribers. The subscribers in rural area are subjected to more rely on mobile service. Findings also showed that the subscribers who are heavily user on Internet application will not rely only on mobile service. They will use other services as a complimentary service. Hence, the telecom regulator should consider implementing a quality of service regulation. This regulation would provide an opportunity for subscriber in rural area could access to better mobile service. Importantly, the spectrum allocation policy is necessary due to the high demand of mobile only user. This will benefit for both users in urban and rural area.

Lightweight CommonKADS in Knowledge Intensive Organization 175

Boonprasert Surakratanasakul (King Mongkut's Institute of Technology Ladkrabang, Thailand)

One of challenges in knowledge engineering is analysis and organizes knowledge with appropriate methodology. CommonKADS is a de-facto technique in knowledge intensive methodology. It provides several models to explain organizational knowledge both in context and concept. Because of it offers for large scale of knowledge based system, so it complicates and confuses for naïve developer and knowledge engineer. For these reasons, this paper presents the lightweight of CommonKADS methodology. It aims to reduce process and improve method for easier learning by sense of organizational environment and with simplify user interface on web application. The experiment results from expert and beginner users show 85.7% can reduce processes in CommonKADS method and 57.1% satisfy and prefer this model for develop knowledge management system in an organization.

SIG2: Signal Processing & Machine Intelligence 2

Room: Madalena

Chairs: Hanung Adi Nugroho (Universitas Gadjah Mada, Indonesia), Kitsuchart Pasupa (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Vehicle Classification in Congested Traffic Based on 3D Point Cloud Using SVM and KNN 180

Porn-anan Raktrakulthum (King Mongkut's University of Technology North Bangkok, Thailand)

The vehicle classification in congested traffic is a big challenge due to the difficulty to segment packs of different vehicles that stand still next to each other or travel at a very low speed. In this work, a low-cost vision system was designed and built to acquire image and to generate 3D point cloud to be used as input for the classification process. The vehicle classification uses machine learning K-Nearest Neighbor and Support Vector Machine with radial basis function kernel to classify two types of vehicle which are car and motorcycle based on 3D point cloud. The processing of the training data and test data can be divided into filtering, segmentation, tracking, and feature extraction, respectively. The extracted feature vectors are then used for both KNN and SVM classifiers. The results show that the proposed preforms well even in high congested traffic with a mix of both vehicle's type. This can be seen from the TPR for car classification from both KNN and SVM which is relatively high (KNN=95.8%, and SVM=95.8%) compared to other existing systems. In case of motorcycle classification the SVM classifier performs better compared to KNN in all three different traffic conditions.

Neutrosophic and Fuzzy C-Means Clustering for Breast Ultrasound Image Segmentation 186

Hanung Adi Nugroho (Universitas Gadjah Mada, Indonesia); Made Rahmawaty (Universitas Gadjah Mada & Politeknik Caltex Riau, Indonesia); Yuli Triyani (Universitas Gadjah Mad & Politeknik Caltex Riau, Indonesia); Igi Ardiyanto (Universitas Gadjah Mada & Faculty of Engineering, Indonesia)

Breast ultrasound image segmentation is one of the most difficult tasks due to its speckle noise, poor quality and location of the breast nodule. In this research, we proposed normalization algorithm to enhance image contrast in order to be segmented using neutrosophic and fuzzy c-means clustering. At first, the input image is filtered using speckle reduction anisotropic diffusion (SRAD) to reduce speckle noise and normalized to increase the contrast. Secondly, the normalized image is transferred to neutrosophic domain with three membership subset T, I and F to define the nodule area. Finally, the fuzzy c-mean method is used to segment the nodule area from the background. To evaluate and compare the performance of the proposed method, this research uses several measurements, namely Area Error Metric and Boundary Error Metric. The result shows that the proposed method is able to segment the breast ultrasound images effectively and accurately.

Segmentation of Optic Disc and Optic Cup in Colour Fundus Images Based on Morphological Reconstruction 191

Hanung Adi Nugroho, KZ Widhia Oktoeberza, Astrid Erasari, Augustine Herin Hutami and Cerwyn Cahyono (Universitas Gadjah Mada, Indonesia)

Glaucoma disease is one of the retinal abnormalities caused by size changing of optic disc and optic cup. The disease commonly diagnosed by quantifying vertical cup-to-disc (CDR) ratio. Therefore, this study proposes two schemes for segmenting optic disc and cup based on morphological reconstruction. Retinal vessel removal is considered during the process. The proposed schemes are evaluated on 50 colour fundus images collected from Drishti-GS dataset. The final segmentation results are compared to the available ground truth image. Segmentation of optic disc achieves the level of accuracy, sensitivity and specificity at 96.3%, 83.12% and 99.37%, respectively. The evaluation for optic cup segmentation obtains the accuracy of 99.13%, sensitivity of 80.68% and specificity of 99.53%. These results denote that the proposed schemes have a potential to be implemented as part of developing computerised glaucoma diagnosis systems.

Comparison of Vowel Feature Extraction on Time and Frequency Domain 196

Risanuri Hidayat (Gadjah Mada University (UGM), Indonesia); Deni Yulian (Departement of Electrical Engineering and Information Technology, Indonesia); Agus Bejo and Sujoko Sumaryono (Universitas Gadjah Mada, Indonesia)

Vowel recognition is the most important part of the speech recognition process. Most spoken speeches must contain vowels to be sounded. It needs a method that can separate a vowel with another. The methods of the feature extraction on time domain, frequency, cepstrum, and fourier are several basic methods that can be used. This paper compares features of the strengths of the feature of zero crossing rate, energy, spectral centroid, spectral spread, spectral entropy, harmonic ratio, fundamental frequency, cepstrum, and fourier to separate and recognize vowels of a, i, u, e, and o. The results show that the spectral spread feature that is one of the features in the frequency domain has the most accurate ability to recognize vowels tested compared to other features.

POW2: Power Systems 2

Room: Marco Polo

Chair: Arit Thammano (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Maximum Utilization of DC Link Voltage in Grid Connected Hybrid Modular Multilevel Converter 200

Ambati Dinesh Kumar, Bikram Das, Prabir Ranjan Kasari and Abanishwar Chakraborti (NIT AGARTALA, India)

This paper presents a five level hybrid modular multilevel converter that consists of full-bridge sub modules & half-bridge sub modules with a ratio of 1:2. compared to conventional half bridge based modular multilevel converter. Hybrid modular multilevel converter can provide maximum utilization of available DC bus voltage, by which transformer less operation can be obtained. Phase-disposition pulse width modulation technique has been utilized for generating the pulses required for the converter. Finally, grid connection of the hybrid modular multilevel converter using vector control scheme has been implemented. Capacitor voltage balancing scheme has also been performed in this system. Simulation results have been presented here for validation of the complete system.

Optimal Allocation of Distributed Generation with FACTS Controller for Electrical Power Loss Reduction Using Genetic Algorithm 205

Sattawat Burana, Panida Thararak, Peerapol Jirapong and Kannathat Mansuwan (Chiangmai University, Thailand)

Distributed generation (DG) and flexible alternating current transmission systems (FACTS) can be used to enhance power generation and increase the efficiency of distribution systems. However, the installation of DG units with FACTS controllers at inappropriate allocations can result in negative impacts. In this paper, a new DG with FACTS allocation planning tool is developed for determining the optimal location and sizing of DG with FACTS to reduce power losses. The optimal power flow (OPF) with DG and FACTS is formulated as a minimization problem of system power losses subjected to system constraints such as voltage limits, line loading limits, generation limits, and the Provincial Electricity Authority (PEA) grid code. DG and FACTS used in this experiment are synchronous generator and static var compensator (SVC), respectively. Genetic algorithm (GA) implemented by a m-file script in MATLAB is used for the optimization technique. Consequently, evaluation of load flow solutions and objective functions in each generation of GA are determined using DIgSILENT Programing Language (DPL) script in DIgSILENT software. In this approach, MATLAB and DIgSILENT are employed and linked together in a genuine automatic data exchange procedure. An existing 22 kV distribution system from PEA of Thailand is used as a case study. The practical system data from a geographic information system (GIS) database are imported for the planning tool using DIgSILENT-GIS-SCADA (DGS) file format. The obtained simulation results show that the optimal location and sizing of DG with FACTS using the proposed tool results in system power loss reduction and voltage profile and line loading improvement, both of which lead to a higher level of system efficiency.

Defining the Damping Properties of Synchronous Generator Using Disturbance Measurements 211

Dmitry Bliznyuk and Aleksander Berdin (Ural Federal University, Russia); Pavel Kovalenko (Ural Federal University named after the first President of Russia B. N. Yeltsin, Russia); Andrey Gerasimov (JSC «STC UPS», Russia); Sergei Dekhtiar (Ural Federal University, Russia)

At present time complex generating unit models with a great number of parameters are implemented for the emergency control in power systems. Identification of these parameters is a challenging problem. State-of-the-industry measurement devices allow calculating electrical parameters during electromechanical disturbances. That is why one can use simplified generating unit models, parameters of which can be calculated using field measurements. In particular, generating units damping properties might be estimated. The proposed method involves the synchronous machine damping power estimation by means of the measurements approximation during dynamic disturbances. This value allows determining the generating unit capability to damp power system oscillations. The method was examined in MATLAB Simulink and by means of JSC "STC UPS" physical electrodynamic simulator. One can apply obtained results in the power system emergency control and in a wide variety of problems related to dynamic transients calculation and analysis.

Optimal Location and Sizing for PV System and Battery Energy Storage System Using ABC Algorithm Considering Voltage Deviation and Time of Use Rate 216

Arnuphap Meechaka (King Mongkut's University of Technology Thonburi, Thailand); Anawach Sangswang (King Mongkut's University of Tech. Thonburi, Thailand); Krissanapong Kirtikara (CSSC KMUTT, Thailand); Dhirayut Chenvidhya (King Mongkut's University of Technology Thonburi (KMUTT), Thailand)

This paper presents the optimal location and sizing for photovoltaic (PV) and battery energy storage (BESS) with PV 220 kWp on King Mongkut's University of Technology Thonburi, Bangkhunthian Campus (KMUTT BKT) 13 bus system. By using Artificial Bee Colony Algorithm (ABC) to find the optimal PV and battery size considering Time of use Rate (TOU) and using Time Sweep Mode in DlgSILENT Power factory to get the optimal location focus on voltage deviation of the system by defining scenario that may happen to the system in the future. The PV installation on the limited rooftop area of the building and Net Present Value NPV are considered for optimal sizing. The results show that the system with optimal location and sizing of PV and battery energy storage lead to system voltage difference from 85.64% to 4.13%, efficient energy usage, save energy cost 23.74% per year and reduce power transmission line loss from utility grid to KMUTT BKT.

IT3: Information Technology 3

Room: Santiago

Chairs: Lukito Edi Nugroho (Universitas Gadjah Mada, Indonesia), Bundit Thanasopon (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Enabling Fine Granularity of Difficulty Ranking Measure for Automatic Quiz Generation 222

Sasitorn Nuthong (Prince of Songkla University, Thailand)

This Automatic Quiz Generation system is utterly handy for reducing teachers' workloads in quiz creation. Nevertheless, by exploiting a coarse-granular concern inside difficulty ranking mechanism, only a few number of automatic-generated quizzes can be obtained. In order to increase the number of usable quizzes, we suggest how a 5-level difficulty ranking score using a hybrid similarity measurement approach together with property filtering of the key data can be potential for serving this propose. Based on experiment results, our proposed similarity measure outperforms three other candidates. Enabling users with finer options of making sensible quiz generation. Hence, this mechanism can be regarded as a synergistic technology for improving teachers' quality of life for the future.

Knowledge Management System for Supporting Organizational Management and Sustainable Development: A Case Study of a Research Group in a University 228

Soontarin Nupap (Mae Fah Luang University, Thailand)

Knowledge management system (KMS) plays a crucial role as a knowledge repository to support organizational management and sustainable development. Based on the previous study which demonstrated the success of balanced scorecard (BSC) implementation for quality assurance in educational management, this paper aims to propose a framework for the same case study which is a research group within a department in a university by implementing KMS based on BSC notion in order to improve the knowledge sharing and learning environment for sustainable development. It reveals the proposed methodology in which the KMS initially implemented for improvement in the corporation sector

accelerates educational management and supports knowledge sharing and learning environment for long-term improvement.

Extraction and Evaluation of Popular Online Trends: A Case of Pantip.com 233

Bundit Thanasopon, Nattawut Sumret and Jirawin Buranapanitkij (King Mongkut's Institute of Technology Ladkrabang, Thailand); Ponrudee Netisopakul (King Mongkut's Institute of Technology Ladkrabang & Faculty of Information Technology, Thailand)

Popular online trends detection from crowd becomes more and more essential for both trend followers and online sellers. However, huge amount of online posts, both text and images, has prevented trends detection to be manually processed. This article, focusing on text mining, aims to automatically extract popular online trends. A case study is performed on one of the most popular discussion forum websites in Thailand - i.e., Pantip.com. The approach involves employing several unsupervised text mining techniques, namely, TF-IDF and HTML scores, and supervised learning sentiment classification, to extract key topics and assess sentiment results, respectively. Also, we conducted an experiment on the performance of sentiment classification and found that support vector machine (SVM) outperformed other learning techniques. In addition, the authors developed a web-application incorporating the proposed approach. The application collects data from Pantip.com, identifies key concepts of posts and calculates the popularity of each key concept based on statistics and sentiment results.

Development of Monitoring System for Smart Farming Using Progressive Web App 238

Lukito Edi Nugroho, I Wayan Mustika and Ridi Ferdiana (Universitas Gadjah Mada, Indonesia)

Indonesia is one of countries well-known as the biggest palm oil producers in the world. In 2015, this country succeeded to produce 32.5 million tons of palm oil, and used 26.4 million of it to export to other countries. The quality of Indonesia's palm oil production has become the reason why Indonesia becomes the famous exporter in a global market. For this reason, many Indonesian palm oil companies are trying to improve their quality through smart farming. One of the ways to improve is by using technology such as Internet of Things (IoT). In order to have the actual and real-time condition of the land, using the IoT concept by connecting some sensors. A previous research has accomplished to create some Application Programming Interfaces (API), which can be used to support the use of technology. However, these APIs have not been integrated to a User Interface (UI), as it can only be used by developers or programmers. These APIs have not been able to be used as a monitoring information system for palm oil plantation, which can be understood by the employees. Based on those problems, this research attempts to develop a monitoring information system, which will be integrated with the APIs from the previous research by using the Progressive Web App (PWA) approach. So, this monitoring information system can be accessed by the employees, either by using smartphone or by using desktop. Even, it can work similar with a native application.

CON2: Control Systems 2

Room: Vera Cruz

Chairs: Cyril Joseph (Manipal University & Manipal University, India), Pastraporn Thipayasothorn (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Automated Fertigation System for Efficient Utilization of Fertilizer and Water 243

Cyril Joseph (Manipal University & Manipal University, India); Indiran Thirunavuakkarasu, Aadesh Bhaskar and Anish Penujuru (Manipal University, India)

Fertigation is the process of delivering plants nutrients along with water to produce a quality crop with higher yields. Employing an automated fertigation system can help farmers by significantly improving water and nutrient usage. The objective is to automatically maintain the moisture level in the soil and to mix different nutrients to obtain the required NPK ratio and give it to plants along with irrigation. The project is carried out in two parts. One is maintaining the optimum level of moisture in the soil. We use a soil moisture sensor which senses the moisture content in the soil. The sensor output is given to the controller, which decides if more water needs to be pumped or not. Then we move on to control the fertilizer mixing and delivery part. The user will input the amount of N, P and K needed in Kg. The user will also input the concentrations of NPK fertilizer solutions used. Taking all these parameters into account, the system will prepare a fertilizer mixture that contains the required amount of nutrients needed by the plant. It will then deliver the mixture along with irrigation water. The preparation of fertilizer mixture will be done with specific intervals of time which will be decided by the user. The system is connected to internet by using Wi-Fi and the user can enter the parameters in a mobile application which will transmit the data to the system over internet.

The Control Speed of DC Motor with Adaptive Compensator Add Integrate 249

Napassadol Singhata (Valaya Alongkorn Rajabhat University under the Royal Patronage, Thailand)

This paper presents the control of DC motor speed with adaptive compensator by using a gradient method. It controls power from disturbance to maintain the DC motor speed. The error of steady state system can be reduced by increasing integrated gain. This method was used to compare with the PI method. Experimental results are studied to verify the validity of the two methods. According to the results of using gradient method, it was found that the adaptive compensator responding to the disturbance resulted in efficiently keeping the continuity in DC motor speed. The results also indicate that the gradient method caused the temporary delay in DC motor speed when compared to PI method. In this study, gradient method in controlling DC motor more effective than using PI method.

Control System Technology of Higher Educational Community Traffic 255

Pastraporn Thipayasothorn and Amornchai Chaichana (King Mongkut's Institute of Technology Ladkrabang, Thailand)

The traffic network designed for the communities plan around higher education service areas in Bangkok and vicinity aimed to 1) study the traffic flow in the communities plan around the higher education service areas in Bangkok and vicinity, 2) study the appropriate information used to plan the traffic routes for the particular community's plan, and 3) provide control system of guideline for information needed for the traffic routes planning for the certain community's plan. The data was collected from 400 samples who were regular commuters in the certain area around the higher education service areas in Bangkok and vicinity through sets of questionnaires. Then, the data was analyzed based on the research methodology. According to the result, the researcher found that the city commuting network affecting the accessibility of each area should provide sufficient convenience for the commuting demand and it should be able to connect to other networks as well. Moreover, the traffic of the communities around the higher education service areas in Bangkok and vicinity must be easily understood, accessible, and each route must be used equally.

Design of LQR Controller for Ballbot and Hardware Implementation 259

Edwin Mocherla, Winston Netto and Sherine Jesna VA (Manipal Institute of Technology, Manipal University, India)

A Ballbot is a single spherical wheeled robot with single point of contact with ground. This makes the system statically unstable. It attains stability only with the help of a sophisticated controller. The controller is a computer algorithm that reads/senses various physical parameters of the robot and generates a computed control signal. LQR controllers for each plane of instability are designed and then tuned from simulation results and was implemented on hardware and validated. Ballbot structure is designed using Solidworks software and the hardware model is fabricated.

Friday, October 13, 11:15 - 12:15

IT4: Information Technology 4

Room: Grand Ballroom B

Chairs: Munesh Chandra Trivedi (ABES Engineering College Ghaziabad, India), Olarn Wongwirat (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Industrial Wireless Sensor Selection Method by Using Decision Tree 265

Saksiri Meesawad (KMITL, Thailand); Olarn Wongwirat (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Abstract—Recently, an industrial wireless sensor (IWS) is widely used by many industries. There are various industries trying to apply qualified IWS products in competitive market for gaining advantage. The method in selection IWS includes not only the cost, but also several factors, e.g., data rate, output power, operating voltage, current transmitting, current receiving, operate temperature, brand and so on. These factors is difficult to decision making by engineers or project managers. In this paper, we propose the method for selection IWS by using data mining techniques of decision tree. The proposed method is suitable for the problems that involve selection simultaneously, as in the IWS selection problem. The IWS factors used for decision attribute are defined in this work, as well as the model of training set preferences. The classification definition and algorithms of decision tree technique are also derived in the process to acquire the result, including the cross validation check for the result obtained. The result

SIG3: Signal Processing & Machine Intelligence 3

Room: Madalena

Chair: Ukrit Watchareeruetai (International College, King Mongkut's Institute of Technology Ladkrabang, Thailand)

recognition was used as a personal identification with a limited scope, now this technology has grown in the field of security, in terms of preventing fraudsters, criminals, and terrorists. In addition, face recognition is also used in detecting how tired a driver is, reducing the occurrence of road accidents, as well as in marketing, advertising, health, and others. Many method are developed to give the best accuracy in face recognition. Deep learning approach become trend in this field because of stunning results, and fast computation. However, the problem about accuracy, complexity, and scalability become a challenges in face recognition. This paper focus on recognizing the importance of this technology, how to achieve high accuracy with low complexity. Deep learning and non-deep learning methods are discussed and compared to analyze their advantages and disadvantages. From critical analysis using experiment with YALE dataset, non-deep learning algorithm can reach up to 90.6% for low-high complexity and 94.67% in deep learning method for low-high complexity. Optimization deep learning,SVM and Genetic Algorithm is proposed to overcome the problem about low accuracy and scalability.

Detection of Fibrosis in Liver Biopsy Images Using Multi-Objective Genetic Programming 294

Purit Thong-on (King Mongkut's Institute of Technology Ladkrabang, Thailand); Ukrit Watchareeruetai (International College, King Mongkut's Institute of Technology Ladkrabang, Thailand)

This paper proposes an automatic construction of feature extractor for liver fibrosis detection using a multi-objective genetic programming approach in which a constructed feature extractor was measured in different aspects in which becomes the objectives of the evolutionary run. The result of the evolutionary run is a set of solutions with different strengths and weaknesses. A solution from each experiment is selected and compared with a benchmark handcraft method in by each experiment and top-five manners. One of the best result obtained has 2.09 fibrosis estimation error which is less than the benchmark method with 2.63 fibrosis estimation error.

ELEC1: Electronics, Circuits, and Systems 1

Room: Marco Polo

Chairs: Saowalak Saengkae (Rajamangala University of Technology Krungthep, Thailand), Ruslee Sutthaweekul (Newcastle University, United Kingdom (Great Britain))

Implementation of Wireless Instrument for Solar Energy System 300

Saowalak Saengkae, Putthiphong Kirdpipat and Saichol Chudjuarjeen (Rajamangala University of Technology Krungthep, Thailand)

Solar cells are an alternative energy that is easily accessible to many households. The enhancement of solar cell research is widespread, but energy monitoring is time consuming. In order to reduce the workload and increase the ability of researchers, solar cell system measuring based on the microcontroller application. Applying 2.4 GHz wireless module to transmit and receive data to a computer. Implementing Graphic User Interface (GUI) using Delphi program for recording the data in database and display them on the graphs. As the results, we measure DC voltage, DC current and AC voltage by comparing our instrument with digital multimeter. We observe that there are some errors in term of percentage such as 0.25 percent of DC voltage, 0.34 percent of DC current and 1.8 percent of AC voltage respectively. Our instrument can also send all voltages via wireless communication at transmission range are 7 meters. The average of light intensity which provides the maximum voltage (20V) of solar energy is 15000-45000 lux in the morning and afternoon respectively. This application may apply to the other applications in the solar energy systems.

Three-Input Single-Output Current-Mode Universal Filter Using Single CCCTA 304

Jakrawat Budboonchu (King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand); Worapong Tangsrirat (King Mongkut's Institute of Technology Ladkrabang (KMITL) & Faculty of Engineering, Thailand)

The circuit topology for the realization of a low-component count current-mode universal biquadratic filter with three inputs and single outputs (TISO) is described. The described structure employs a single current-controlled conveyor transconductance amplifier (CCCTA), and only two grounded capacitors, without needing any external passive resisotrs. By properly selecting the relevant input signal, the circuit is capable of generating the five standard biquadratic filtering functions, i.e. lowpass, bandpass, highpass, bandstop and allpass current responses. The proposed filter can also be tuned electronically by external bias currents of the CCCTA. The circuit is analyzed for the non-idealities of the used CCCTA and possesses attractive low sensitivity performance. Simulation results are found to be in good agreement with the theoretical analysis.

Study of Microwave Responses on Layered Woven CFRP Composites 308

Ruslee Sutthaweekul (Newcastle University, United Kingdom (Great Britain)); Adi Mahmud Jaya Marindra (Newcastle University, United Kingdom (Great Britain) &

Kalimantan Institute of Technology, Indonesia); Guiyun Tian (Newcastle University, United Kingdom (Great Britain))

Woven carbon fibre reinforced polymer (CFRP) have been widely used in airline industry. The main challenge of microwave inspection on woven CFRPs is the complex electromagnetic responses related to their layered-woven structures and associated defect (e.g., impact damage). This work focuses on simulation study of microwave responses for woven CFRPs based on microwave open-ended waveguide (OEW) system in K-band. Simulation studies of woven composites with different weaving structures are carried out through structural parameters including width, gap between fibres, ply thickness and number of plies. The simulation results suggest that gap and ply thickness significantly affect frequency shift in the response, whereas woven texture and number of plies are related to occurrences of multiple resonances/ ripples. In experiment, we examine microwave responses of a 12-layers, 5HS woven composite in areas of with and without impact damage. The initial experimental results show good agreement with the simulation. The understanding of microwave responses related to woven CFRP structures is the foundation for future development of defect characterisation technique and inverse problem solving on woven composites.

SIG4: Signal Processing & Machine Intelligence 4

Room: Santiago

Chairs: Peter Drotar (Technical University of Kosice, Slovakia), Duangjai Jitkongchuen (Dhurakij Pundit University, Thailand)

NET2: Communication & Network Technologies 2

Room: Vera Cruz

Chair: Lapas Pradittasnee (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Design of Textile Capsule-Shaped Patch Antenna for WBAN Applications 326

Charinsak Saetiaw (Rajamangala University of Technology Isan, Khonkaen Campus, Thailand)

This paper presents the design of the Capsule-shaped patch antenna on fabric substrate for WBAN applications at 2.45GHz ISM band. The antenna uses Pure Copper Polyester Taffeta Fabric as a conductive substrate for ground and radiator layers, and denim as dielectric substrate. Normally, a basic rectangular antenna has a narrow bandwidth. This paper proposes the new design combining a rectangular shape with a half circular shape at both end, called the Capsule-shaped antenna was proposed. The other purpose of this research is to design the antenna that can be directly installed on cloth for a WBAN small sensor. The parameters used for the analysis rely on resonance frequency. The operation frequency can be analyzed based on the reflection coefficients; it is obtained from simulation results. The antenna prototypes have been built and measured. The impedance bandwidth of prototype antenna at 10 dB with a value of 11.95% compared with 7.34% of the simulation, centered at 2.45GHz. It was found that the antenna gain from simulation and measurement was 5.63dB and 3.53dB, respectively. Finally, the radiation pattern of Capsule-shaped antenna was verified by the measurement results.

Proposal of Channel Estimation Scheme for Practical V-BLAST MIMO-OFDM System 330

Tanairat Mata (Rajamangala University of Technology Krungthep, Thailand); Nakarin Inkamchua (King Moungkut's Institute of Technology Ladkrabang, Thailand); Anan Sopin (Rajamangala University of Technology Krungthep, Thailand); Pisit Boonsrimuang (King Moungkut's Institute of Technology Ladkrabang, Thailand)

In wireless communication, multiple input and multiple output technique is often applied with orthogonal frequency division multiplexing (MIMO-OFDM) because of its many advantages such as spectral efficiency, link reliability, diversity gain and so on. In the practical MIMO-OFDM system, it has a signal aliasing problem due to the mismatch of sampling from adding zero padding at both front and rear of data transmission in each OFDM symbol. To solve this problem, the channel estimation by using the new comb-type pilot symbol arrangement scheme is proposed for the practical MIMO-OFDM system. From the computer results, it can be shown that the proposed channel estimation scheme can perform higher system performances than the conventional scheme in the practical V-BLAST MIMO-OFDM system.

Elephant Flow Detection and Delay-Aware Flow Rerouting in Software-Defined Network 335

Hnin Thiri Zaw (University of Computer Studies, Yangon); Aung Htein Maw (University of Information Technology, Myanmar)

Long-lived large flows (or) elephant flows (such as VM migration and backup data transfer) carry a large amount of data and consume a lot of network resources. Normal flows (or) mice flows (such as web searching) carry a small amount of data and consume a few network resources. The long existence of elephant flow makes the network throughput degradation and delays to other traffic flow in the network by utilizing more bandwidth and buffers. Therefore, differentiating elephant and mice flows play as an important function to optimize network performance. This paper presents a traffic rerouting solution with the combination of elephant flow detection and multipath routing in software-defined networking (SDN). This solution provides network performance improvement and efficient resource utilization by rerouting the elephant flow to the least delay path among available paths. The proposed method is implemented by using ONOS controller and Mininet emulator. The experimental results show that 44.11%-58.76% throughput improvement and 36.46%-47.44% flow completion time (FCT) reduction for elephant flows as compared with the reactive forwarding application of ONOS controller.

Friday, October 13, 13:15 - 15:15

IT5: Information Technology 5

Room: Grand Ballroom B

Chairs: Adhitya Bhawiyuga (University of Brawijaya, Indonesia), Marissa Chantamas (Assumption University, Thailand)

acceptance. This study, therefore, propose a conceptual framework based on the UTAUT theory of website acceptance. In addition to the main variables in the original theory which are applicable only to general users, two more main variables were included in this framework: perceived convenience and perceived reliability. Two new moderators were added to it as well: web accessibility and vision impairment level. These extra variables and moderators were added in order to incorporate users' intention to use a website and their usage behavior in this framework. This framework would be of value to developers and associated personnel to help them understand the valid website design requirements for university students with visual impairment.

Friday, October 13, 13:15 - 15:35

SIG5: Signal Processing & Machine Intelligence 5

Room: Madalena

Chairs: Kousuke Matsushima (National Institute of Technology, Kurume College, Japan), Ajchara Phu-ang (Chandrakasem Rajabhat University, Thailand)

Segmentation of Coring Images Using Fully Convolutional Neural Networks 361

Szilard Fazekas, Stephen Obrochta, Tatsuhiko Sato and Akihiro Yamamura (Akita University, Japan)

As a first step in building a toolkit for the computer analysis of images of sea floor sediment cores, we introduce a technique to automate a time consuming manual phase of said analysis. The retrieved cores contain artifacts, e.g., induced by the extraction itself, the removal of which improves the efficiency of environmental reconstruction. From a computer vision perspective, the task of identifying those artifacts is an image segmentation problem. The method we describe as a solution uses the recently introduced fully convolutional neural networks (FCN), which have been shown to be very efficient in segmenting images.

Road Deformation Detection Based Sensor Fusion 366

Katsuto Yamaki and Kousuke Matsushima (National Institute of Technology, Kurume College, Japan); Osamu Takahashi (Nagaoka University of Technology, Japan)

The state of asphalt pavement gradually becomes worse because of daily traffic, weather, and temperature. Then it emerges as pavement deformations. For preventing human damages by them, we need to detect existing underground cavity. Consequently, location estimation of the efficiency is an important factor for maintaining the road safety. The purpose of the present study is to develop Asphalt Pavement Deformation Monitoring System (APDMS). The APDMS automatically detects the deformation of asphalt pavement using computer vision, laser range finder, and inertial measurement sensor. Laser range finder is used to collect height data of pavement surface more accurately. Then vision sensor is used to acquire a state of asphalt pavement. Experimental results show that pavement deformations can be detected correctly with the sensor fusion method.

Image-based Pavement Crack Detection by Percolation Theory 372

Yasuhiro Kawasaki and Kousuke Matsushima (National Institute of Technology, Kurume College, Japan); Tadashi Sho (Toyohashi University of Technology, Japan)

Asphalt pavement performance may deteriorate so rapidly because the desired service level of local governments is reduced. Thus, there are a lot of road damages like cracks, potholes, and ruts on some pavements. If they remain in the condition of being inconvenient, road-traffic accidents such as vehicle crash and fall of motorcycle would be occurred. Moreover, if they get worse further, there are possibilities that the pavement safety performance cannot be maintained and the structures may collapse. Hence, it is necessary to diagnose the pavements for safety and to carry out proper maintenance on a regular basis. In the present study we present the approach for highly accurate crack detection based percolation theory. The shadow reduction approach is used to detect cracks more accurately. Experimental results show that many kinds of cracks can be detected correctly and fast with the adaptive search window method.

The Flower Pollination Algorithm with Disparity Count Process for Scheduling Problem 378

Ajchara Phu-ang (Chandrakasem Rajabhat University, Thailand)

The flexible job shop scheduling is the problem that found in the manufacturing industry and challenge for many researchers interested in this field. This paper proposed new algorithm for solving the flexible job shop scheduling problem (FJSP). The proposed algorithm is based on the flower pollination algorithm with a new concept called disparity count process. The performance of the proposed algorithm is compared

with the other state-of-the-art metaheuristic algorithm. The results are evaluated in terms of the average percentage deviation from the lower bound. The experimental shown that the proposed algorithm found the number of best answer more than others algorithm.

Multiple Steps Time Series Prediction by A Novel Recurrent Kernel Extreme Learning Machine Approach 383

Zongying Liu, Chu Kiong Loo and Naoki Masuyama (University of Malaya, Malaysia); Kitsuchart Pasupa (King Mongkut's Institute of Technology Ladkrabang, Thailand)

This paper proposes a novel recurrent multi-steps-prediction model called Recurrent Kernel Extreme Learning Machine (RKELM). This model combines the strengths of recurrent multi-steps-prediction and Extreme Learning Machine (ELM) to unleash the limitation of prediction horizon. The kernel matrix is applied to replace the hidden layer mapping of ELM in order to solve the lack of predicting deterministic and parameter dependency. In the experiment, we apply two synthetic benchmark data sets and two real-world time series data sets including Malaysia palm oil price, ozone concentration of Toronto to evaluate RKELM and compare its performance against Recurrent Support Vector Regression (RSVR) and Recurrent Extreme Learning Machine (RELM). The experimental results show that RKELM has superior abilities in the different predicting horizons and stronger predicting deterministic than others.

A Framework for Origin-Destination Estimation Using License Plate Recognition for Thai Rural Traffic 387

Kitipong Praphananurak (Ministry of Transport, Thailand); Winai Sanghitkul (MAA Consultants Co., Ltd, Thailand); Voraniti Chovichien (Asian Engineering Consultants Corp. Ltd., Thailand); Pakorn Watanachaturaporn (King Mongkut's Institute of Technology Ladkrabang & Faculty of Engineering, Thailand)

Origin-Destination (OD) estimation is a crucial parameter for planning city transportation network. Classical methods for collecting the OD information including individual interviewing or using pressurized tube counting equipment; such example methods are limited by the number of people involved during observation and interview, traffic delay, budget, and short observation period. Accuracy from human observation and short observation period are doubtfully accurate. Using image processing technology, the OD estimation can be performed for longer period by analyzing vehicle movement from recorded or online closed-circuit television recordings. Moreover, an individual average speed for each vehicle or type of vehicle are obtainable from identify the license plate number. This paper proposes of a methodology for applying a license plate recognition technology for OD estimation for Thai rural traffic. The proposed methodology obtains trustable estimation for each individual vehicle. The results can be verified later by human or other methods from recorded video. Therefore, higher accurate and trustable estimation is obtained and make available for later usage.

Intravascular Ultrasound Image Recovery and Segmentation Based on Circular Analysis 392

Anusorn Wong-od (Burapha University & Informatics, Thailand); Annupan Rodtook (Ramkhamheang University, Thailand); Suwanna Rasmequan and Krisana Chinnasarn (Burapha University, Thailand)

This paper presents an novel approach to segment Lumen and Media-Adventitia boundaries and repair corrupted pixels of incomplete Intravascular Ultrasound Image. The proposed algorithm based on circle analysis is employed to estimate Lumen and Media-Adventitia boundaries and the algorithm based on diffusion is implemented to recover corrupted pixel. The proposed method has been tested on the standard dataset provided by expertise of Computer Vision Center, Universitat de Barcelona, Barcelona, ESP. The experiment demonstrates that the proposed method provides good accuracy results for a set of incomplete Intravascular Ultrasound Image.

Friday, October 13, 13:15 - 15:15

POW3: Power Systems 3

Room: Santiago

Chair: Sarjiya Sarjiya (Gadjah Mada University, Indonesia)

The Development of Wind Energy Resources as Wind Turbine Grid Tied Using SCIG in Bantul South Java Island 398

Danang Wijaya (UGM, Indonesia)

The development of wind energy resources as grid tied wind turbine in Indonesia is presented. There are

Iterative decremented step-size scanning-based maximum power point tracking (MPPT) algorithms are presented in this paper. The change of partial shading conditions is a main problem in photovoltaic systems. Power curves of the systems will contain some local maximum power points, beside a global one, and also change depending on environmental climates, which affect the partial shading conditions. Three iterative scanning-based MPPT algorithms are proposed to solve the problem, i.e. decremented window scanning, peak bracketing (PB) method and PB with initial scanning. A photovoltaic system coupled with a DC/DC converter is modeled in SPICE for verification and simulation purposes. The simulation results have presented that, for some cases, those MPPT algorithms can find out the global maximum power points of the considered photovoltaic system. They also required relatively small number perturb-and-observe steps to reach global maximum power points.