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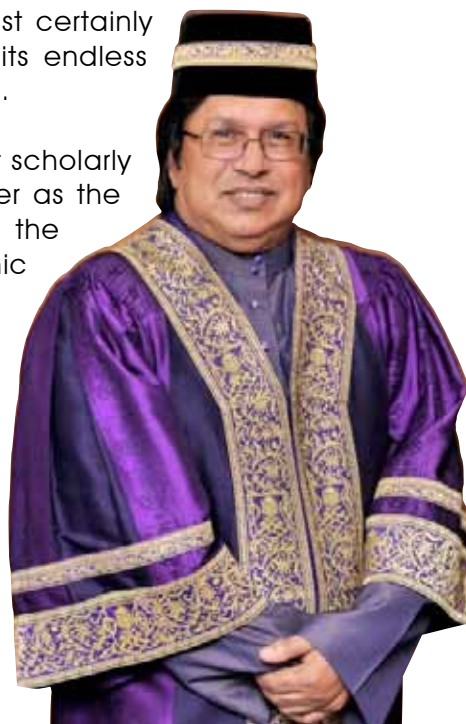
FOREWORD

The Seventh Issue of The Doctoral Research Abstracts captures the novelty of 65 doctorates receiving their scrolls in UiTM's 82nd Convocation in the field of Science and Technology, Business and Administration, and Social Science and Humanities. To the recipients I would like to say that you have most certainly done UiTM proud by journeying through the scholastic path with its endless challenges and impediments, and persevering right till the very end.

This convocation should not be regarded as the end of your highest scholarly achievement and contribution to the body of knowledge but rather as the beginning of embarking into high impact innovative research for the community and country from knowledge gained during this academic journey.

As alumni of UiTM, we will always hold you dear to our hearts. A new 'handshake' is about to take place between you and UiTM as joint collaborators in future research undertakings. I envisioned a strong research pact between you as our alumni and UiTM in breaking the frontier of knowledge through research.

I wish you all the best in your endeavour and may I offer my congratulations to all the graduands. 'UiTM sentiasa dihati ku'



Tan Sri Dato' Sri Prof Ir Dr Sahol Hamid Abu Bakar , *FASc, PEng*
Vice Chancellor
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This newsletter was created to disseminate information on the research carried out by the doctoral graduates of UiTM by sharing the abstract of their thesis.

For more information do not hesitate to contact us at <http://ipsis.uitm.edu.my>

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Name :

Kay Dora Abd Ghani

Title :

Seismic Performance of Full-Scale Precast Non-Seismic Beam-Column Joints with Corbels Under In-Plane Lateral Cyclic Loading

Supervisor :

Associate Prof. Dr. Nor Hayati Abdul Hamid @ Zulkurnail (MS)

Prof. Ir. Dr. Siti Hawa Hamzah (CS)

2

Name :

Noorsuhada Md Nor

Title :

Fatigue Damage Assessment of Reinforced Concrete Beam using Acoustic Emission Technique

Supervisor :

Prof. Dr. Azmi Ibrahim (MS)

Associate Prof. Dr. Hamidah Mohd Saman @ Hj Mohamed (CS)

Dr Norazura Muhammad Bunnori (CS)

Precast concrete building had been widely used in Malaysia for the public amenities such as residential housings, shopping complexes, hospitals, and school buildings. Moreover, most of the precast concrete buildings in Malaysia were designed in accordance to British Standard (BS8110) which has no specific detailing design of joint for precast elements under seismic loading. Thus, this study aims to evaluate the behavior of non-seismic designed precast buildings when subjected to long-distant earthquakes from Sumatera and near-field earthquakes. Three sub-assemblages of the specimens consisting of corner, interior and exterior of precast beam-column joints, were designed, constructed and tested under reversible in-plane lateral cyclic loading. These sub-assemblages were representing the main joints in the prototype precast two-storey school building. Direct Displacement-Based Design (DDBD) approach was utilized in developing load versus displacement curve (hysteresis loops) for all three sub-assemblages studied. Subsequently, the exterior beam-column joint was retrofitted using Carbon Fiber Reinforced Polymer (CFRP) wrapping and steel plate bonding. Ruaumoko Programming was utilized in modeling the inelastic behavior of the joints and overall structural deformation of the school building. The hysteresis loops of the precast beam-column joints were modeled using Hysteres program. The behavior of prototype school building was analyzed using Ruaumoko 2D and the mode shapes of the structural failure were illustrated by using Dynaplot program. In addition, a seismic assessment under Performance Based Earthquake Engineering (PBEE) was carried out using the fragility curve based on the Design Basis Earthquake (DBE), Maximum Considered Earthquake (MCE) and four past earthquake records. Finally, the capacity-demand response spectrum of the prototype two-storey precast school building was developed. Experimental results have demonstrated that the corner joint with corbel suffered severe damage when tested up to $\pm 1.35\%$ drift. Large gap opening between precast beam and column were also observed during experimental work. Nonetheless, the interior beam-column joints were tested up to $\pm 1.15\%$ drift and exterior precast beam-column joints were tested up to $\pm 1.0\%$ drift and suffered moderate damage called as captive column, due to strong beam-weak column design. Major crack at the cast-in-place (monolithic) area near the beam-column joint were also observed for all specimens. The retrofitted precast beam-column exterior specimen was tested up to $\pm 1.75\%$ drift and exhibited approximately 9.7% increment in lateral loading capacity as compared to the specimen before retrofitting work. Finally, a guideline of repair and strengthening of beam-column joints has been proposed for the damage structures so that it is easier for designer to apply the retrofitting procedures to the damaged elements after earthquake. From the capacity-demand response spectrum analysis, it can be concluded that the precast beam-column joints would not survive when subjected to earthquake excitation with surface-wave magnitude, M_w , more than 5.5 Scale Richter (Type 1 of spectra) which means that the beam-column joint which is designed by using BS8110 would severely damage when subjected to strong earthquake excitation. Therefore, this study help in enhancing the understanding of the behavior of non-seismically designed beam-column joints under earthquake loadings.

Damage due to fatigue loading in a reinforced concrete (RC) beam is a crucial phenomenon that requires assessment. Acoustic emission (AE) technique can be used to identify the fatigue damage progression in the RC beam. Third point loading fatigue test was carried out in the laboratory of heavy structure on a small size RC beam of 150 mm x 150 mm x 750 mm and the actual size of RC beam of 300 mm x 600 mm x 4050 mm. The fatigue test was carried out based on various ranges of maximum fatigue loading, based on the first crack load, P_{cr} and ultimate static load, P_{ult} . Four objectives were outlined; to investigate the fatigue crack progression of RC beam specimens corresponding to the AE characteristic, to correlate damage classification of the RC beam specimens with respect to intensity analysis, to evaluate the fatigue crack characterization of RC beam specimens based on average frequency and RA value and to develop a new approach in fatigue damage assessment of RC beam specimens based on AE characteristics. RA value is the rise time divided by peak amplitude ($\mu s/v$ or ms/v). In the review, it was found that the analysis based on AE signal collected from channel basis is generally used. Channel basis is an analysis of AE data at a particular channel. Hence, a new approach in fatigue damage assessment of RC beam specimens based on AE signal collected from located event was developed. The located event is the analysis of AE data at a particular location which considers the AE signals captured from more than two (2) channels in a data set. It is also based on the time of arrival (TOA) of AE source to a particular channel. The analysis based on AE signal collected from the located event was compared with the AE signal collected from channel basis. It is found that the AE characteristics are dependent on the load application. Good agreements between AE characteristics, intensity zone, crack pattern and load application were found on the RC beams. The relationship between average frequency and RA value indicated clear trend with respect to crack classifications namely tensile crack and shear crack. It is found that the intensity of AE signal from located event shows reasonable plots to classify the damage corresponding to actual crack appearance than those from channel basis.

* (MS) = Main Supervisor (CS) = Co Supervisor

Name :

Nor Amani Filzah Mohd Kamil

Title :

Bioremediation of Polycyclic Aromatic Hydrocarbon in Artificially Contaminated Soil

Supervisor :

Prof. Ir. Dr. Suhaimi Abdul Talib (MS)**Prof. Ir. Dr. Ruslan Hassan (CS)****Associate Prof. Dr. Noor Hana Hussain (CS)**

Land used for industrial facilities or for waste disposal can be contaminated. Redevelopment of contaminated land often requires unacceptable risks are assessed and managed so that the site becomes suitable for its new use. One of the major criteria to be satisfied before such land can be reused is to ensure that remediation is carried out to remove all health hazards. One of the treatment methods that can be adopted involves bioremediation processes. Bioremediation process is considered to be environmentally sound and economically feasible. Other process, namely, physical and chemical processes require high energy, high costs and produce secondary contaminants that are more toxic if not completely degraded. This study is carried out to provide a better understanding on application of potential bacteria under non-indigenous condition, i.e., isolate from sludge and inoculate into contaminated soil. Many studies were conducted under indigenous and semi-indigenous condition. However, there are limited reports on studies under non-indigenous condition, particularly under aerobic condition. This study is also conducted to evaluate the effectiveness of potential bacteria and to established a mathematical model for PAHs biodegradation. The organic contaminants focus in this study is Polycyclic Aromatic Hydrocarbons (PAHs) and sand was selected as the soil media. PAHs are one of the most widespread organic contaminants and known to be highly toxic, mutagenic and carcinogenic. The objectives of this study are (i) a) establishment study parameters through characterization, (ii) biodegradation of PAHs, (iii) evaluation on effectiveness of PAHs biodegradation and (iv) model development. The methodology of this study consisted of four stages. The first stage involves determining the type of micropollutant that are present in the soil through characterization of soil taken from the Kubang Badak landfill. The second stage involves three phases of experimental works, namely, growth curve based on turbidity, biodegradation and survival of the strains in contaminated sand. The third stage involves five experimental works based on different factors, i.e., pH, temperature, phenanthrene concentration, bacteria number and heavy metals concentration. The final stage is to establish the kinetic parameter and the mathematical model for the biodegradation process. Results from stage 1 showed that phenanthrene is the most abundant PAHs in the soil samples, followed by anthracene. For heavy metals, zinc showed the highest mean concentration in the soil samples. Based on results in stage 2, a bacterial strain, namely, *Corynebacterium uroalyticum* isolated from municipal sludge shows the most potential as PAHs degrader. The evaluation of most potential strain is based on four factors, namely, day of inoculation, degradation rate, bacteria survival and degradation rate per colony. Results in stage 3 showed that the optimum condition occurred at pH 7, temperature of 30°C, initial phenanthrene concentration of 500 mg/kg, bacteria number of 10^9 cfu/g soil and samples without the addition of heavy metals. The final stage involve development of a mathematical model based on Monod kinetic. Kinetic parameters, q_{max} , X and K_s . q_{max} and K_s were observed to increase when the initial phenanthrene concentration increases. The Monod equation modified by Lawrence and McCarty (1970) was further enhanced in this study. As conclusion, understanding on application of potential PAHs degrading bacteria under non-indigenous condition has been evaluated in this study.

Name :

Mahfuzah Mustafa

Title :

EEG Sub-Band Frequency Analysis of Spectrogram Image For Balanced Brainwave and IQ Applications

Supervisor :

Prof. Dr. Hj. Mohd Nasir Taib (MS)

This thesis introduces new methods in analyzing Electroencephalogram (EEG) signal by utilizing EEG spectrogram image and image processing texture analysis called Gray-level Co-occurrence Matrices (GLCM). The methods attempt to apply in balanced brain and Intelligence Quotient (IQ) applications. The relationship between balanced brain and IQ application also proposed in this thesis. Collection of EEG signals were recorded from 101 volunteers. EEG signals recorded for the balanced brain application contain closed eyes state meanwhile for the IQ application contains closed eyes and opened eyes state. Before processing the information from the EEG signals, signal preprocessing is done to remove artefacts and unwanted signal frequencies. A time-frequency based technique called EEG spectrogram image was used to generate an image from EEG signal. The spectrogram image was produced for each EEG signals sub-band frequency Delta, Theta, Alpha and Beta. The GLCM texture analysis derives features from EEG spectrogram image. Then, Principal Component Analysis (PCA) was applied to reduce the results and selected principal components features were used as inputs to the classifier. Two classifiers involved in this experiment are K-Nearest Neighbor (KNN) and Artificial Neural Network (ANN). The number of training and testing ratio is assessed at 70 to 30 and 80 to 20 to find the best model based on percentage of accuracy, sensitivity, specificity as well as Mean Squared Error (MSE). The relationship pattern of balanced brain and IQ application were observed via histogram and then Scatterplot. The strength and significant of the relationship was evaluated by using Pearson correlation test. The percentage of correctness classification for balanced brain application is 90% and MSE 0.1. The sensitivity and specificity of this application is ranging from 66.67% to 100%. The accuracy for IQ application is 94.44% and MSE 0.0752. Meanwhile, the sensitivity and specificity of this application is ranging from 0% to 100%. The relationship between balanced brain and IQ achieved with positive and strong correlation with r ranging between 0.860 to 1.000 and $p < 0.05$ for some cases. The experiments reported in this thesis showed that the proposed technique were highly successful in indexing the balanced brain level and IQ.

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Name :

Mohamed Faidz Mohamed Said

Title :

The Programming Primitives Effects of the Overlapping Message-Passing and Computation in Beowulf Cluster Computing

Supervisor :

Prof. Dr. Hj. Mohd Nasir Taib (MS)
Prof. Dr. Saadiah Yahya (CS)

Beowulf cluster computing is one of the parallel architectures that has been extensively utilized by exploiting the commodity aspect of its hardware and also the open codes of its software. It offers many advantages, but in order to support parallel and distributed applications, many factors of the cluster system have contributed to the performance bottleneck. One of these factors is due to the explicit primitives of its message-passing implementation. Basically, these primitives are divided into two types; blocking and non-blocking communications. For optimization purposes, the primitives can be applied to allow the overlap of the message-passing and computation to create an application with optimal completion time. However, the effects on the low-level issues concerning data overhead by using different primitives have not been explored in details. This research project empirically looks into the effect of the overlapping message-passing and computation in the proposed Beowulf cluster. It also develops new analytical tool to analyze the overlapping effect, particularly on the programming primitives characterizations. The scope of this research is based on the use of the Message Passing Interface (MPI) point-to-point communication on a collection of four computers that are connected to a switch via a network. Each computer is installed with Linux operating system and connected by UTP cables using Ethernet. The results demonstrate that increasing the message size for an overlap message transfer with computation will intensify the peak processing consumption. By adding more processors, the computing cluster provides higher packet transfer among the nodes. Nevertheless, the results demonstrate that as the message transfer is increasingly overlapped with computation, the TCP/IP overhead of the packet decreases. This outcome provides significant findings on the characterization of the primitives overhead in the Beowulf cluster system. The understanding of these primitive characterizations and their efficiency will provide programmers to use them selectively as they will eventually contribute to the improved performance of parallel applications.

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Name :

Mohammad Shukri Hapeez

Title :

Novel Algorithms of Identifying Types of Partial Discharges using Electrical and Non-Contact Methods

Supervisor :

Associate Prof. Dr. Hj. Ngah Ramzi Hamzah (MS)
Associate Prof. Dr. Habibah Hashim (CS)
Dr. Ahmad Farid Abidin @ Bharun (CS)
Mr. Mustafar Kamal Hamzah (CS)

- Identifying types of Partial Discharge (PD) is very crucial
- in order to prepare and provide solutions before complete
- breakdown occurs. Before PD can be identified, detection of
- the PD is initially required and it can be made by ultrasonic and
- electrical methods. By using ultrasonic methods, the obtained
- PD data is conventionally identified using Neural Network (NN)
- models where it has several disadvantages. It can be said that
- NN suffer from several drawbacks such as black-box behaviour,
- inconsistencies in producing results, initialization issues
- and complex parameter setup. Similarly, electrical method,
- where PD is identified using PD circuit detectors, sensors
- and amplification circuits also presents drawbacks such as
- inconvenient system configuration as well as complex set up.
- Two novel algorithms are presented in this work namely 'Simple
- Partial Discharge Identifier (SPDI) and Fundamental Partial
- Discharge Identifier (FPDI) were developed to overcome the PD
- identification shortcoming. Experimental work was conducted
- to obtain PD data on both ultrasonic and electrical methods.
- The validated PD data acquired from ultrasonic method was
- used to test SPDI and compared with several models of NN. The
- obtained results on both SPDI and NN models were compared
- for consistency and lower in error. The PD data acquired from
- electrical method was used to test the FPDI. The comparison
- was made based on the less hardware used for detection
- while sustain the identification accuracy. FPDI uses simple
- probe and oscilloscope for detection while the competitors
- are using the PD circuit detector. Both algorithms of SPDI and
- FPDI demonstrate remarkable results against its competitor.
- The SPDI successfully produced 86.7% overall in average
- in detecting the PD type better than NN models. The FPDI
- successfully produced 99% overall in average in detecting the
- PD types without using any additional PD circuit or detector.
- The proposed novel algorithms have been proven to be reliable
- and trustworthy in identifying PD type better compared to
- other techniques.

Name :
Mohd Hanapiah Abdullah

Title :
Fabrication and Characterisation of Graded Index Nanostructured TiO₂ Compact Layers for Dye-Sensitized Solar Cell

Supervisor :
Prof. Engr. Dr. Mohamad Rusop Mahmood (MS)

A novel graded index nanostructured TiO₂ compact layer (arc-TiO₂) had been successfully deposited on Indium tin oxide (ITO) substrate by long-throw radiofrequency (RF) magnetron sputtering. The main aims of the arc-TiO₂ compact layer were to serve as an antireflective compact layer that could reduce reflection losses, improve the photo-response of dye molecules, and prevent electron recombination in a dye-sensitized solar cell (DSSC) application. The employment of the TiO₂ compact layer in the DSSC was carefully optimised in term of RF power and thickness of the arc-TiO₂ film. Meanwhile, the desired characteristics were systematically investigated by means of UV-absorption spectra, incident photon to current efficiency (IPCE), open-circuit voltage decay (OCVD) and electrochemical impedance spectroscopy (EIS). The average transmittance of the ITO/arc-TiO₂ conducting substrate in the region from 400 nm to 1000 nm was approximately 85%. Corresponding average reflectance difference that was recorded in comparison to the bare ITO was 2.5 %. The red-shift behaviour of the transmittance peak was actually due to the formation of a new hybrid band energy structure of 3.1 eV resulting from the tin (Sn) diffusion in the ITO film that shifted the absorption edge of the substrate. This had favoured the absorption characteristics and photo-response of N719 dye. Hence, the consistency of peaks between the transmittance spectra of the substrate with the corresponding IPCE spectra of the DSSC cell was improved. Additionally, the arc-TiO₂ compact layer preserved the higher conductivity of the ITO films from oxygen-related defects during the annealing process. The resistivity of the ITO/arc-TiO₂ substrate was conserved at $2.05 \times 10^{-4} \Omega \text{ cm}$ even at this high temperature. The preserved conductivity had consequently decreased the charge interfacial resistance (R₁) in the EIS measurement and facilitated the charge transport from the nanocrystalline-TiO₂ to the ITO. In later investigations, it was revealed that the 100 nm thickness of arc-TiO₂ compact layer prepared using 100W RF power become the optimal deposition parameters for preparing the compact layer. At this stage, the reduced interfacial resistance R₁ observed under EIS measurement was 2.36 Ω and the highest IPCE peak of 58% was achieved at 550 nm wavelengths. The higher IPCE had contributed to 8.93 mA/cm₂ of the cell's short-circuit photocurrent, J_{sc} and 0.67 V to the associated open circuit voltage, Voc. The photo-generated electron lifetime, τ_{eff} of 1.1 orders of magnitude higher than bare ITO was achieved. As a result, the overall conversion efficiency of 3.45% was recorded for the optimized DSSC device. This record was actually 50% improved compared to that of bare ITO cell. Therefore, the combined effects (i.e., reduced reflection losses and interfacial resistance with better photo-response) owed to the arc-TiO₂ compact layer prepared at their optimal condition was found to be important as it had originated the remarkable improvement in this arc-TiO₂ based DSSC.

Name :
Nor Diyana Md Sin

Title :
Fabrication and Performance of Nanostructured ZnO/SnO₂ Based Humidity Sensor

Supervisor :
Prof. Engr. Dr. Mohamad Rusop Mahmood (MS)

- Humidity sensors were fabricated using zinc oxide/tin oxide (ZnO/SnO₂) composite nanorods and novel structures of ZnO/SnO₂ nanoblock arrays and ZnO/SnO₂ composite nanocubes. The ZnO/SnO₂ composite nanorods and ZnO/SnO₂ nanoblock arrays were successfully synthesised using thermal chemical vapour deposition (CVD). The ZnO/SnO₂ composite nanocubes were prepared using a novel sol-gel immersion method. First, ZnO thin films were synthesised to prepare the ZnO/SnO₂ composite nanorods and the ZnO/SnO₂ composite nanocubes. These ZnO thin films acted as template layers, which were deposited using a radio frequency (RF) magnetron sputtering system. To obtain a conductive template layer, parametric studies were conducted by varying the RF power and the temperature of the substrate. This template was optimised using a RF power of 200 watts and a substrate temperature of 500°C to obtain the ZnO template with the highest conductivity of 73.1 S cm⁻¹. The ZnO/SnO₂ composite nanorods were studied by varying different parameters including the ZnO/SnO₂ composition, the type of tin precursor (i.e., dibutyltin diacetate, tin powder and tin chloride pentahydrate), the substrate temperature (between 200 and 600°C) and the oxygen flow rate (5, 10 and 15 sccm). The sensitivity of the humidity sensor and the response and recovery times were studied in each experiment. The experimental results were used to relate the sensor performance to the surface conditions in terms of the dimension of the active layer. The humidity sensor was fabricated using a novel sensor configuration consisting of ZnO/SnO₂ composite nanorods, ZnO/SnO₂ nanoblock arrays and ZnO/SnO₂ composite nanocubes. The humidity sensor made of ZnO/SnO₂ composite nanorods had a sensitivity of 265. Remarkably, the highest sensitivity of 371 was obtained for a humidity sensor based on a ZnO/SnO₂ nanoblock array for which the porous surface structure was enhanced using a tin chloride pentahydrate precursor at a substrate temperature of 500°C and an oxygen flow rate of 10 sccm. The humidity sensor based on ZnO/SnO₂ composite nanocubes was successfully grown on a ZnO template by controlling two parameters: the Zn:Sn molar ratio (1 to 10:10) and the immersion time (0.5 to 6 h). Notably, the highest sensitivity of 101 was found for the humidity sensor based on ZnO/SnO₂ composite nanocubes, which were deposited using a Zn:Sn molar ratio of 5:10 and an immersion time of 2 h. In this study, high sensitivities were observed for the fabricated humidity sensor based on ZnO/SnO₂ composite nanorods, the humidity sensor based on ZnO/SnO₂ nanoblock arrays and the humidity sensor based on ZnO/SnO₂ composites.

Name :

Norfishah Ab Wahab

Title :

Single Mode Ring Resonator for Bandpass Filter Applications

Supervisor :

Dr. Mohd Khairul Mohd Salleh (MS)**Prof. Dr. Zaiki Awang (CS)**

Technology advancements in microwave systems demand for high performance electronic devices. This leads to the creation and development of new microwave filter topologies to achieve better selection and control of response. Ring based filter topologies become immediately attractive options as they offer dual resonance in their response which will ensure high selectivity and physical compactness of the filter. However, in some cases, the ring filters do not come with complete mathematical synthesis, making them difficult to design and to be generalized at higher order. This thesis introduces a single mode ring resonator, fed via one of the resonator's quarter-wavelength coupled-line for simplification, with less control parameters. A global synthesis is developed to fix the transmission zeros and experiments are conducted to prove the validity of the synthesis and subsequently can be generalized for higher-order filters. To prove this concept, higher-order filters were realized by cascading the single mode ring to form multiple cells and additional coupled-lines were introduced in the structure to create additional poles. The global synthesis of the single mode ring was applied to demonstrate the flexibility of the single mode ring topology and its synthesis. Higher-order filters of up to 5th-order were implemented in the range of 1 GHz to 2 GHz to give a different range of fractional bandwidth between 10% - 26%. Further advancement on the application of single mode ring topology is presented in this thesis for reconfigurable filter application. By manipulating the electrical length of the ring lines using external tunable elements, the electrical length of the ring was varied, hence, shifting the frequency response to a desired position. The reconfigurable filter with its tunable scheme synthesis was developed to control the frequency response at arbitrary center frequency. Based on this reconfigurable concept and its synthesis, two reconfigurable designs were achieved using two different techniques. The first technique made use of lumped capacitors and was successfully reconfigured from 2 GHz to 984.4 MHz; while miniaturisation achieved up to 71% as compared to the conventional filter designed directly at 1 GHz. The second design made use of varactor-diodes and shifted the resonance frequency from 1.10 GHz to 1.38 GHz, spreading over 280 MHz frequency range to give 25% tuning range with fractional bandwidth below 9%. All the filters were realized using microstrip technology. The simulated and measured results are then presented and compared to demonstrate the excellent performance of the proposed filters.

Name :

Nur Amalina Muhamad

Title :

Fabrication of TiO₂/DYE/CuI Solid-State Solar Cell Using Mist-Atomized CuI Nanostructures

Supervisor :

Prof. Engr. Dr. Mohamad Rusop Mahmood (MS)

- This study is carried out to investigate the properties of copper
- (I) iodide (CuI) thin films deposited by using a novel-mist
- atomization method. The properties of CuI thin films studied
- in this research are structural, morphological, electrical
- and optical properties. The new deposition method of CuI
- thin films which is by using mist-atomization technique is
- carried out in order to find the suitability of CuI thin films
- as a p-type hole conductor for the fabrication of solid-state
- dye sensitized solar cells (ss-DSSCs). The CuI solution was
- prepared by dissolving the CuI powder in acetonitrile and
- deposited onto the conducting glass substrate. Several
- parameters investigated which are deposition flow rate and
- frequency, spraying method, substrate temperature, molar
- concentration and doping concentration to get an optimized
- film. All of the investigated parameters were carried out by
- using mist-atomization technique. The nanostructured CuI
- exhibit a 2-dimensional and quantum confinement effects
- that lead to improved properties. Further investigations reveal
- that the 0.05 M of CuI concentration sample was the most
- conductive sample of 3.93 S cm⁻¹ with the highest crystallinity,
- which then becomes the set of parameters to be applied in the
- fabrication of solid-state dye sensitized solar cells (ss-DSSCs).
- Then, the two set of parameters of molar concentration and
- doping concentrations were carried out to the next part of the
- research which is the fabrication of ss-DSSCs (TiO₂/dye/CuI).
- In this part, the CuI thin films were fabricated on top of dye-
- anchored TiO₂ layer using a novel mist-atomization method.
- Therefore, in order to understand the photovoltage behavior,
- four different parametric studies are conducted. The solar cells
- efficiencies show same relations with the results obtained in
- the thin film properties section. It is observed that 0.05M of
- CuI solution concentration gives the best device efficiency of
- 1.05% as compared to other parameters. While low device
- efficiency for cells fabricated with doped CuI thin films was
- observed when compared to the undoped CuI thin films. From
- the results, it can be concluded that the nano sized of CuI
- particles which matched to the porous structures of TiO₂ layer
- and electrical conductivity are the main properties contributed
- to the ss-DSSCs device efficiency.

Name :

Nur Ashida Salim

Title :

Determination of Transfer Capability Considering Risk and Reliability Cost/Worth Assessment in Dynamic and Static System Cascading Collapses

Supervisor :

Associate Prof. Dr. Muhammad Murtadha Othman (MS)**Prof. Dr. Ismail Musirin (CS)****Mr. Mohd Salleh Serwan (CS)**

In a restructured power system, it is important to determine realistic value of Available Transfer Capability (ATC) since this information will be used as a reference by the Independent System Operator (ISO) towards the finest decision making in congestion management especially pertaining to system security and effective electricity market. ATC is the additional amount of power that can be transferred between two areas without jeopardizing the system security and reliability. The determination of ATC must accommodate a certain amount of Transmission Reliability Margin (TRM) vital for resolving between uncertain system securities and maximizing the power transfer. In this thesis, a stochastic framework has been established for ATC and TRM determination by considering uncertainties in hourly peak loads, transmission failures and system cascading collapse. The events of worldwide major blackouts that occurred recently have emphasized on the importance of cascading collapse consideration in determining power transfer capability. The proposed research methodology involved developing an algorithm commenced with a fault occurrence and then followed by the propagation of power system component tripping events which is defined as the system cascading collapse. In this thesis, both static and dynamic operating conditions in a power system are considered in the analysis of system cascading collapse. The assessment of static system cascading collapse is performed wherein its cascaded violation depends on the violation of transmission line limit. On the other hand, the dynamic system cascading collapse is performed by inspecting the violation of generator rotor angle limit and frequency limit starting from the dynamic response of critical clearing time until the final transient stability simulation time. In particular, bootstrap technique is used to generate uncertainties of system parameters comprising with the chronological hourly peak loads, transmission line failures and system cascading collapse. The bootstrap technique is done by replicating the inherent information in order to produce new information considering various levels of system uncertainties. This thesis also introduces on the assessments of risk and reliability cost/worth based Customer Interruption Cost in relation to each case of system cascading collapse. The performance and effectiveness of the proposed techniques were evaluated through the comparison of TRM, ATC, RC and CICC results associated with the static and dynamic system cascading collapses. The results have proven that a large value of TRM is obtained based on the combined uncertainty of chronological hourly peak loads, transmission line outages and system cascading collapse. This signifies that the uncertain tripping events of exposed generator together with exposed transmission lines occurred in the system cascading collapse ultimately will cause to a considerable impact to the TRM and ATC determinations. On top of that, the results of customer interruption cost also have proven that the uncertainty of system cascading collapse should not be ignored from the TRM determination. Therefore, the proposed techniques are reliable and confer promising results in the determination of transfer capabilities, risk and reliability cost/worth of the system.

Name :

Nurlaila Ismail

Title :

ANN Modelling of Agarwood Oil Significant Chemical Compounds for Quality Discrimination

Supervisor :

Prof. Dr. Hj. Mohd Nasir Taib (MS)**Dr Nor Azah Mohd Ali (CS)****Associate Prof. Dr. Saiful Nizam Tajuddin (CS)****Associate Prof. Dr. Mohd Hezri Fazalul Rahiman (CS)**

- This thesis presents a new ANN modelling in discriminating
- agarwood oil quality using selected significant chemical
- compounds of the oil. In order to accomplish the work,
- the analyses have been carried out in two categories.
- The first category is the abundances pattern of odor
- chemical compounds observation and investigation.
- The extraction of odor chemical compounds is done
- by solid phase micro-extraction (SPME). In this work
- two types of SPME fibers were used; divinylbenzene-
- carboxen-polydimethylsiloxane (DVB-CAR-PDMS)
- and polydimethylsiloxane (PDMS) to analyze the odor
- compounds under three different sampling temperature
- conditions; 40°C, 60°C and 80°C. A consistent abundances
- pattern of five significant odor chemical compounds as
- highlighted by Z-score were revealed. The compounds
- are 10-epi- γ -eudesmol, aromadendrane, β -agarofuran,
- α -agarofuran and γ -eudesmol. These odor chemical
- compounds are important as they contributed to the odor
- of high quality agarwood oils. Then the second category
- was performed by the extraction of the agarwood oil
- chemical compounds using gas chromatography-mass
- spectrometry (GC-MS). The identified compounds from
- SPME were used as marker compounds for agarwood
- oil quality discrimination using GC-MS data. In this
- category, Z-score highlighted seven significant chemical
- compounds; β -agarofuran, α -agarofuran, 10-epi- γ -
- eudesmol, γ -eudesmol, longifolol, hexadecanol and
- eudesmol. Their abundances has been used as input to
- k-nearest neighbor (k-NN) and artificial neural network
- (ANN) applications. In this study, all the agarwood oil
- samples were obtained from two institution; Forest
- Research Institute Malaysia (FRIM) and Universiti
- Malaysia Pahang (UMP). The experiments were carried
- out using k-NN and ANN modeling. The study showed
- that the k-NN classification accuracy is within 81-86% for
- k=1 to k=5 and 100% accuracy for the classification of
- ANN modeling.

Name :

Sameh Kh. M Khanfar

Title :

Microwave Planar Filter Topologies Based on Ring Resonators with Coupled-Lines Combination

Supervisor :

Dr. Mohd Khairul Mohd Salleh (MS)**Prof. Dr. Zaiki Awang (CS)**

This research is divided into two topics, where ring resonator and coupled line will be, either, integrated or cascaded. In the first topic, quarter-wavelength coupled line ring resonator integration will be developed, which will result in a single mode resonator with two transmission zeros on both sides of the passband. The new filter will be presented by its equivalent circuits in order to derive the mathematical modeling and extract the controlling parameters which determine the position of the transmission zeros. Several filters are designed using the new synthesis to show its advantages and new applications. The synthesis of the new topology could be generalized to design higher order filters, which facilitates the design of such filter. Moreover, the filter will be cascaded to offer higher orders and more selective filters. 2nd, 3rd, 4th and 5th order filters will be designed and simulated to show the feasibility of the new topology. In the second part, the concept of the ring resonator and coupled lines will be further explored, where the quarter-wavelength coupled line will be cascaded with the ring resonator. Such a topology will offer high selective and wideband filter compared to conventional coupled line filter. Furthermore, the new topology reduces the number of controlling parameters, thereby, achieving ease of designing and fabrication. Several techniques are proposed to miniaturize the filter size by using curved coupled line cascaded with curvy ring resonator or by adding a square patch to the inner corner of the ring resonator. Moreover, the same concept is used where the quarter-wavelength coupled lines are cascaded with multiple ring resonators to achieve high selective, wideband and shorter circuitry filters, when compared with conventional coupled line filter. Eleven filters will be designed and fabricated using planar circuitry technology, where measurements using vector network analyzer show the agreement of measured and simulated results.

Name :

Siti Amely Jumaat

Title :

Multi-Facts Devices Installation for Loss Minimization and Techno-Economic Impact Assessment Based on Computational Intelligence Technique

Supervisor :

Prof. Dr. Ismail Musirin (MS)**Prof. Dr. Hj. Mohd Nasir Taib (CS)**

- This thesis presents a new meta-heuristic approach technique
- for optimal location and sizing of multi-unit Flexible Alternating
- Currents System (FACTS) device installation using single- and
- multi-objective problems. It also considers techno-economic
- impact in the system. In this research, the first objective is to
- develop heuristic technique Single- Objective Particle Swarm
- Optimization (SOPSO) for optimal location and sizing of single-
- unit FACTS device installation with loss minimization, voltage
- monitoring and taking into account the cost of installation
- in the system. The verification was conducted through
- comparative studies with Single-Objective Evolutionary
- Programming (SOEP) and Single-Objective Artificial Immune
- System (SOAIS) techniques. The effect of weight coefficient, c1
- and c2 and the effect of population size of loss minimization
- are also investigated. The second objective is to determine the
- location and sizing of multi-unit and multi-type FACTS device
- installation using SOPSO and SOEP. Consequently, the third
- objective of this research is to develop a new meta-heuristic
- technique termed as Evolutionary Particle Swarm Optimization
- (EPSO) for optimal placement and sizing of multi-unit FACTS
- device with single-objective problem. Comparative studies
- with respect to traditional PSO and classical EP techniques
- indicated that EPSO has its merit in terms of loss minimization.
- In addition, the cluster formation of FACTS device installation
- is also derived from the obtained results. The cluster formation
- of FACTS device installation was derived by looking at how
- many times (frequency) the load buses are selected for FACTS
- device installation identified by EPSO, PSO and EP techniques.
- The fourth objective in this research is to develop a new
- optimization technique termed as sigma-Multi-Objective EPSO
- (_MOEPSO) technique for optimal location and sizing of FACTS
- devices installation for multi-objective problem to minimize
- the transmission loss and cost of installation in power system.
- Finally, the fifth objective is to assess the techno-economic
- impact of FACTS device installation in power system. This
- assessment is performed by using a hybrid Evolutionary
- Particle Swarm Optimization - Net Present Value (EPSO-NPV)
- for assessing the impact of FACTS devices installation in
- duration up to 20 years. Comparative study has been done
- with Evolutionary Programming - Net Present Value (EP-NPV)
- technique. It was found that the proposed technique has been
- able to produce better performance as compared to other
- techniques and could be beneficial to power system planner
- in order to perform FACTS devices installation scheme for the
- minimization of loss and cost in their systems.

Name :
Siti Zura A. Jalil @ Zainuddin

Title :
Human Body Radiation Wave Analysis and Classification for Gender and Body Segments Recognition

Supervisor :
Prof. Dr. Hj. Mohd Nasir Taib (MS)

This thesis presents a novel analysis and classification of human radiation wave for gender and body segments recognition. The human body has been shown to emit radiation into space surrounding their body. The research study frequency radiations at 23 points of the human body segregated into body segments of Chakra, Left, Right, Upper body, Torso, Arm and Lower body. Initially, the characteristics of frequency radiation are examined using statistical tools to find the correlations between variables. Multivariate analysis of variance (MANOVA) is employed to compare the differences of frequency radiation characteristics between genders. Then, the classification algorithm of k -nearest neighbor (KNN) is employed to discriminate between genders, and between body segments. The classifiers are evaluated through analysis of the performance indicators applied in medical research of accuracy, precision, sensitivity and specificity in receiver operating characteristics (ROC) analysis. The findings obtained from this research show that the wave radiation characteristics of a male and a female human body are different. The proposed technique is able to distinguish gender and classify body segments, and it is justified using MANOVA statistical tests. The individual features of gender differences using analysis of variance forms a significant outcome on 13 points that are located close to the forehead, left and right side of abdomen, palms, arms, shoulders and head. In KNN classification, the outcomes for the classifiers are consistent with the MANOVA. For gender recognition, the classifiers have successfully differentiated male from female human body, and achieving a performance of 100% for accuracy, sensitivity and specificity. For body segment recognition, the classifiers are also able to distinguish between the body segments producing 100% accuracy in classifying of Chakra, Left and Right, whilst 93.75% accuracy is obtained in classifying of Upper body, Torso, Arm and Lower body. The sensitivity and specificity computed for body segment recognition are found to be more than 80% indicating a good classification performance. The outcomes of this study demonstrate that a male and a female human body, and also the different body segments, have different frequency radiation characteristics. The finding offers new opportunities in research and application based on human body radiation such as biometrics and surveillance systems.

Name :
Zuraida Muhammad

Title :
Modelling and Control of Induction Based Steam Distillation Essential Oil Extraction System using Self-Tuning Fuzzy Pid Control

Supervisor :
Associate Prof. Dr. Mohd Hezri Fazalul Rahiman (MS)
Prof. Dr. Hj. Mohd Nasir Taib (CS)

- Steam distillation is the most popular technique used in the
- industry for extraction of essential oil. The main contributing
- factors are the system cost, cleanliness, productivity,
- operational cost and the maintenance cost. In extracting the
- essential oils, several factors have been identified to have great
- influence on the extraction yields and quality. The extraction
- temperature is regarded as the most significant parameter
- that contributes to the amount of output yield and quality of
- oil. In conventional steam distillation system, electric heater
- or gas was commonly used as the heating source. However,
- some drawback was observed during application of electrical
- heater or gas and it's also lacks of temperature control in order
- to satisfy the essential oil extraction process requirement.
- Based on the literature reviews, this research proposed an
- application of self-tuning fuzzy PID (STFPID) integrated to the
- induction based steam distillation system to regulate steam
- temperature for the essential oil extraction process. A new
- method for steam distillation system had been developed by
- replacing induction heating system as their heating source.
- The modeling works have been carried out to understand the
- plant characteristic and behavior. The ARX structure with first
- order model was chosen to represent the system dynamic
- for simulation studies. The STFPID controller was designed
- for the obtained plant model. Real-time implementation of
- the simulated STFPID controller has been carried out and
- the performance of the proposed controller was evaluated.
- Proposed controller has been benchmarking their performance
- with HFPPID and PID controllers. Results shows that STFPID
- controller has the ability to improved process rise time, settling
- time and reduced process overshoot compared to HFPPID and
- PID controllers.

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Name :
Norasiah Muhammad

Title :
Model Development of Resistance Spot Welding on Low Carbon Steel and Advanced High Strength Steel using Multiresponse DOE and FEM

Supervisor :
Associate Prof. Dr. Ing Yupiter Harangan Prasada Manurung (MS)
Associate Prof. Dr. Esa Haruman (CS)

This project investigated the development of the weld zone in resistance spot welding (RSW) on similar and dissimilar material using various statistical methods and numerical simulation approach. Demands placed on dissimilar material joints have increased from various viewpoint such as lightweight vehicle structure, energy saving, high performance and cost saving. Due to steadily increasing price of material, a combination between DP 600 and low carbon steel can be seen as an alternative especially for the section which is not fully exposed to external load. Therefore, the RSW process on dissimilar material of DP 600 and low carbon steel is necessarily to be observed for mass production. For comparison purpose, this research was conducted for plate thickness of 1.2 mm of low carbon steel and 1.0 mm of DP600. In order to reduce the trial and error experiments, statistical methods were used throughout the investigation. An experimental design was started using a general 24 factorial design to determine which of the various parameters were important in response surface study. The significance of the welding parameters was obtained using Analysis of Variance (ANOVA) to evaluate the relations existing between the important parameters and the response (radius of weld nugget and radius of HAZ). Optimization of the welding parameters (weld current, weld time and electrode force) to normalize weld nugget and to minimize HAZ size was then conducted using Central Composite Design (CCD) in Response Surface Methodology (RSM) and the optimum parameters were determined. Experiments were conducted according to the selected experimental design, followed by data analysis which included regression analysis and model adequacy checking. A quadratic model for radius of weld nugget and radius of HAZ as a function of the significant parameters were developed for all the combined metal sheets. A second order models were found fitted and can be effectively used to predict the size of weld zone within the factors domain study. Further, the optimization of multi-response (nominal-the-best for radius of weld nugget and smaller-the-better for radius of HAZ) were obtained simultaneously using desirability approach. The confirmation tests validated the use of multi-response optimization for enhancing the welding performance and optimizing the welding parameters in RSW process. The experimental obtained under the optimum operating conditions and the predicted one was found to agree satisfactorily with each other. The optimum parameters obtained from multi-response optimization was applied in the simulation process. A two dimensional axis-symmetric finite element model using customized electrode meshing was chosen to develop the thermal-mechanical-electrical characteristic of the RSW based on the actual electrode dimension. The development of the weld zone was investigated using finite element method (FEM) of SYSWELD and the results were compared with experimental measurement. It was found that the result of FEM presents a theoretically accurate correlation with that of experiments in terms of radius weld nugget as well as HAZ developed.

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Name :
Rusmi Alias

Title :
Pyrolysis Of Shredded Oil Palm Empty Fruit Bunches Impregnated with Cobalt Catalyst

Supervisor :
Prof. Dr. Hj. Ku Halim Ku Hamid (MS)
Dr. Kamariah Noor Ismail (CS)

- The world community is concerned with the depletion of fossil fuel and looking at alternative energy resources such as biomass, solar, hydro and wind. With the growth of palm oil production in Malaysia, the amount of biomass residues generated also shows a corresponding increase. Currently, there are several routes being studied to convert the biomass to liquid bio oil, bio char and gases depending on the pyrolysis condition. Catalytic pyrolysis is proposed to be a viable technology to convert this biomass by having a catalyst introduced during the pyrolysis process and in contact physically with the biomass, in the formation of higher quality bio oil. The first goal of this thesis is to analyse the possibility of shredded oil palm empty fruit bunches (SOPEFB) as a catalyst support/carrier by direct impregnation method using cobalt as the catalyst. The concentration of the cobalt aqueous solution were prepared for 5,10,15 and 20 wt% and the SOPEFB samples were soaked in these solutions with the different soaking time. The functional groups that are involve in the reaction such as ion exchange and adsorption, leading to metal uptake by the SOPEFB. Results show that the sorption equilibrium is achieved approximately after 24 hours. The adsorption capacity was 8.12, 9.27, 11.16 and 12.06 mg/g of SOPEFB for the 5, 10, 15 and 20 wt% of cobalt aqueous solutions respectively. The adsorption follows both Langmuir and Freundlich isotherm, however, the correlation coefficient showed that Freundlich equilibrium data fitted well than Langmuir model indicated the surface heterogeneity of the SOPEFB. The second goal is to study the thermal decomposition and kinetic reaction of the pyrolysis of the impregnated SOPEFB with cobalt catalyst. Thermogravimetric analysis (TGA) was carried out to elucidate chemical kinetics of the pyrolysis of the non impregnated SOPEFB and impregnated SOPEFB with cobalt catalyst. The kinetic parameters were calculated using least square with minimizing sum of error technique. The results show that the activation energy (E_a) of SOPEFB is in the range of 80 to 100kJ/mol and the order of reaction (n) was discovered in the range of 2.0 to 3.0. The model used to predict the rate equations agree with the experimental data with the coefficient of determination (R^2) in the range of 0.70 to 0.97. Fixed bed pyrolysis was performed to evaluate the pyrolysis and catalytic pyrolysis of SOPEFB in a simple batch system. The effects of pyrolysis temperature and the cobalt catalyst content on the yield of products were investigated. Results showed that the maximum oil yield is obtained at 500°C of pyrolysis temperature. The use of cobalt catalyst has a positive impact on the yields of small molecular weight compounds. It is believed that the hydrocarbon vapour from the thermal decomposition of SOPEFB immediately came into contact with cobalt on the SOPEFB surface. The cracking of the hydrocarbon may involve reactions on the cobalt surface as well as subsequent reactions in the vapour phase. Overall, this study confirms the possibility of SOPEFB to become a cobalt catalyst support/carrier and at the same time the product of catalytic pyrolysis of the SOPEFB can be cracked to smaller molecular weight and subsequently upgraded the quality of the bio oil.

Co-utilisation of coal and biomass deem to be one of the alternatives to reduce climate changes due to global warming. Despite rapid development in this area, no work has been reported on co-firing of coal-biomass char blend derived from oil palm waste. Nevertheless, much research has shown that, lack of synergistic effect was observed during the combustion of the two fuels, resulting in little improvement in combustion efficiency/emission. Co-firing of coal with biomass char produced from microwave irradiation pyrolysis is undoubtedly a new area and will therefore contribute to new knowledge and novelty in this field. An investigation of co-utilisation empty fruit bunch (EFB), palm mesocarp fibre (PMF) and palm kernel shell (PKS) with sub-bituminous Mukah Balingian coal and six different blends were carried out via thermogravimetric analyser during pyrolysis and combustion at dynamic conditions in four heating rates. The behaviour of pyrolysis of oil palm biomass using microwave irradiation technique was carried out by exposing the samples at different parameter i.e. power level, exposure time and mass of samples where the best operating conditions was established using Response Surface Method (RSM). Resulting char produced from the optimum conditions were used for the co-combustion characteristics of coal: biomass char blends. Thermal profiles of the coal/oil palm biomass blends appear to correlate with percentage of biomass added in the blends, thus, suggesting lack of interaction between them during pyrolysis and combustion. In the microwave assisted pyrolysis experiment, the power level has least important influence to the solid char yield of EFB and PMF. No significant impact on the solid char yield of PMF beyond 10 minutes of exposure. Maximum mass input for EFB, PMF and PKS is 40 g, 50 g and 25 g, respectively. Calorific values of the solid char produced were comparable to a low rank coal (>22 MJ/kg). From the RSM analysis, the best conditions for obtaining high char yield and high calorific values have been determined with power of 300W, exposure time in the range of 16.7 – 32 min., and initial sample mass in the range of 20 – 40.4 g. Upon combustion of biomass char from microwave and tube furnace pyrolysis depicts one evolution profile that was similar to that of MB coal. When blending MB coal with the biomass chars produced from both pyrolysis techniques, synergistic effect was observed in all blends except 80 wt% of EFBMW:MB coal blend ; PMFMW:MB coal blend (40 – 60 wt%); and PKSMW:MB coal blend (20, 50 and 60 wt%). In comparison to char produced from tube furnace and coal blends, PMF char has not shown any synergistic effect, while 20, 40 and 60 wt% of PKS blends and all blends except 20 wt% EFB showed synergistic effect. Overall, the current study had shown for the first time that the pyrolytic char derived from oil palm biomass materials using microwave pyrolysis technique could be sustainably utilised as fuel to be co-firing with MB coal.

- This thesis presents an integrated investigation of various aspects of hydrodynamic lubrication in a journal bearing. Hydrodynamic journal bearings are critical power transmission components used to carry high loads in different machines applications. In machine design, it is essential to know the true or expected operating conditions of the bearings. These operating conditions can be explored in laboratory using a specific test rig. In the present study, the hydrodynamics lubrication behaviour in a journal bearing has been investigated. The work described is based on the direct measurement of temperature, pressure, frictional force and ultrasonic reflection coefficients from a fluid interface using longitudinal and shear transducers. Measurement of temperature profile in hydrodynamic lubrication journal bearing has been investigated for different conditions later compared to predicted values from effective temperatures. In this study effective temperatures were calculated by two different methods using (1) Raimondi and Boyd charts and (2) inlet and outlet temperature values. From the results obtained, it was found that speed, load, oil inlet supply pressure and oil groove locations have affected the temperature profiles to some extent. In other investigation, measurements of pressure profiles in hydrodynamic lubrication in journal bearing were plotted. Predicted maximum pressure from Raimondi and Boyd charts were obtained for comparison purposes. Theoretical pressure profiles by short-bearing and long-bearing approximations were computed. It was found that the experimental maximum pressure is higher compared to the predicted value. In another investigation, an ultrasonic method was deployed to map thickness profile around the journal bearing. A purpose built transducer using a longitudinal wave was used to obtain the reflection coefficient from the lubricant layer. The thickness profile obtained in converging section agrees well with classical hydrodynamic predictions. In the diverging section, transformation from reflection coefficient values to oil film thickness is no longer valid due to the presence of a second phase, air. This caused the reflection coefficient values tend to 1. In measurement of viscosity around bearing circumferential, a shear wave was deployed to obtained reflection coefficient from the lubricant layer. A different plug was used for the purpose built transducer. Viscosity values were calculated using Spring Model for thin layer and Bulk Model in thick layer. It was observed that viscosity in operating journal bearing differ from the values obtained by effective temperatures.

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Name :

Muhammad Izzat Nor Ma'arof

Title :

Information Architecture & Mathematical Modelling to Optimally 'Fit' Human Operator on Motorcycle

Supervisor :

Prof. Ir. Dr. Hj. Abdul Rahman Omar (MS)**Dr. Sukarnur Che Abdullah (CS)**

Code (2010) noted that motorcycles road accidents are always due to human error. Based on Stedmon (2010), it is strongly suggested that when the human operator's working posture does not 'fit' the motorcycle, the human operator is prone to human error and possibly accident. Therefore, there is an existing link between motorcycle road accidents and motorcycle ergonomics. This study aimed to establish new motorcycle ergonomics information architecture from existing ergonomics knowledge for the establishment of new mathematical model to optimally 'fit' human operator on motorcycle. The motorcycle information architectures established were the Motorcycle Risk Information Architecture (MORIA) and Riding Posture Analysis Components (RIPAC) (consisting of RIPEC, HUMIS and RIPOC). Based on the MORIA, RIPAC, biomechanical analysis, and in referring to the guidelines provided by literature on physical loading and physiological stress, new mathematical model that proposed an optimally 'fit' riding posture for a human operator on motorcycle were established. The mathematical model is named the Bologna Triangle. In validating that the optimal 'fit' riding posture proposed by the Bologna Triangle is more advantageous; comparison were performed between the proposed riding posture, RIPOC riding postures and neutral sitting. The methods used in validating the Bologna Triangle were working posture ergonomics assessment, biomechanical analysis and experimental research design. The experimental research design was a surface electromyography (sEMG) bilateral measurement of 4 muscle groups (extensor carpi radialis longus (forearm muscle), upper trapezius (shoulder/neck), triceps (upper arms), and deltoid (shoulder)). 8 subjects participated voluntarily for the experiment. The triangulation between the three validation methods showed that the proposed optimal 'fit' riding posture (specific for a particular subject) showed the lowest physical static loading distribution, working posture hazard score and total body muscular activation. Hence, this validates that the riding posture proposed by the mathematical model is a more advantageous riding posture in comparison to the currently available riding posture. Both motorcycle manufacturers and consumers could benefit from the Bologna Triangle. Conclusively, this study closes the research gap by introducing the MORIA and the RIPAC and the Bologna Triangle. From the Bologna Triangle, motorcycle could be specifically designed, built and even modified to optimally 'fit' the human operator. By having an optimal 'fit' on the motorcycle, human operator could perform their motorcycling duties more effectively, efficiently and safely; thus, minimizing the occurrence possibility of human error. Ultimately, this would reduce motorcycles road accidents.

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Name :

Ramzyzan Ramly

Title :

Delamination Monitoring of Honeycomb Composite for Aircraft Structure Using Fiber Bragg Gratings

Supervisor :

Prof. Dr. Ir. Wahyu Kuntjoro (MS)**Prof. Dr. Hj. Mohd Kamil Abd Rahman (CS)**

Since two decades ago, non-metallic composites especially honeycomb core sandwich panel were widely used in the secondary non-controlling surfaces such as the horizontal and vertical stabilizer main boxes. One of the problems in honeycomb sandwich structure is detection of delamination between the core and the skin. In order to overcome this problem, most aircraft manufacturers equipped their aircrafts with Health Monitoring System (HMS) in place to monitor the status of the aircraft structural integrity. There are many types of HMS being adopted by the aircraft manufacturers. The type of HMS being studied in this research is the one using Fiber Bragg Grating (FBG) system, which utilize optical strain sensor using light wave as the means of signal detection. The objectives of this research are to detect the location of delamination in sandwich panel and to determine the extents or the relative size of the delamination using FBG. In this study, an FBG sensor array was embedded in the honeycomb core carbon fiber skin sandwich panel. The sandwich panel was fabricated in accordance to the aviation industry standards process as well as the materials used in fabrication. The FBG's used in the research had two sensors with grating wavelengths of 1550 nm and 1555 nm spaced approximately 100 mm between the two. The grating had a length of 15 mm. The sandwich panel had a dimension of 300 mm by 200 mm by 20 mm. The core was made from Nomex® honeycomb while the skin was made from plain weave carbon fiber supplied by Hexcel®. There were five cases being studied with different sizes of delamination were pre-introduced at different locations, using a non-stick plastic used in the vacuum bagging process, laid between the carbon fiber skin and the honeycomb core. Finite Element Analysis simulation was conducted to monitor the axial displacement at the location of the FBG's in the specimen. The simulation was validated by experiment. The specimens underwent a 3-point bending test. The loads were applied in the increment of 0.2 kN up to 2.2 kN. The whole panel failed at the load of 2.6 kN. The data was recorded using FBG Scanner. From the simulation and experiment, there was an agreement and similarities in terms of the patterns of the result. From the research, the use of FBG was a proven method where the relative location of delamination could be detected and relative size of the delamination could be determined. The findings could be used to help monitoring the aircraft structural integrity in the area of honeycomb sandwich panel.

Name :
Zuraidah Salleh

Title :
A Study on The Post Impact and Open Hole Tensile Strength of Kenaf and Kenaf/Fibreglass Hybrid Reinforced Composite

Supervisor :
Prof. Ir. Dr. Mohamad Nor Berhan (MS)
Dr. David Howell Isaac (CS)
Dr. Koay Mei Hyie (CS)

Natural fibres have emerged as the potential reinforcement material for composite structures and have gained interest by many researchers. Due to their light weight and low costs when compared with synthetic fibre. Kenaf fibres recently have been considered as a substitute material in many weight-critical applications such as marine, automotive and other industries. Attempts to hybrid the kenaf fibre with the synthetic fibre such as fibreglass were carried out in this study to investigate the tensile properties of fibreglass reinforced kenaf composite. In this study, polyester natural fibre kenaf composites and kenaf/fibreglass hybrid composites were fabricated by using combination of hand lay-up and cold-press methods. The effect of different fibre types (powder, short fibres and unidirectional long fibres) on the tensile properties of the composites was investigated. The effect of volume fraction on the tensile strength of kenaf composites was also studied. The post impact tensile tests and open hole tensile tests of long kenaf fibre composites with and without the addition of fibreglass were carried out. The optimum tensile strength of kenaf composites was obtained at 25% volume fraction of long kenaf. Significant improvements in tensile strength and modulus were observed by the introduction of long kenaf/woven fibreglass hybrid composite. The composites with long kenaf/woven fibreglass hybrid had the highest strain to failure. Long kenaf and woven fibreglass improved the interfacial bonding between the fibres and matrix if compared with kenaf powders, kenaf short fibres and chopped strand mat (CSM) fibreglass. The effect of moisture content on tensile strength of kenaf and kenaf hybrid composites was investigated. Studies on the tensile and low velocity impact of kenaf composites and kenaf/fibreglass reinforced polyester resin composites revealed that the composites were seriously impaired when low energy impact load was applied. The tensile strength of open hole long kenaf composites was more sensitive to notch than long kenaf/woven glass hybrid composite. It was noticed that the long kenaf/woven glass hybrid composites had greater residual strength and modulus than long kenaf composites. The hybrid composites were more resistance to crack growth. Fibre matrix debonding followed by fibre fibre ruptures or pull-outs finally caused the composites to fail. The woven fibreglass structure created a strong interlamina bond with kenaf and matrix and hence improved the tensile strength and modulus of the final hybrid product. The severity of matrix failure was therefore lesser as compared with the matrix damage in long kenaf composite. The damage areas measured from impacted specimens and open hole tensile specimens showed similar trend in the strength degradation rate. The correlation between impact and open hole tensile thus can be used as a tool to predict the strength degradation rate based on the fracture mechanic concepts. The possible approach on this correlation will be proposed for prediction of composite damage in future work.

Name :
Mohamad Fariz Mohamad Taib

Title :
First Principles Studies on Properties of Pb(II), Sn(II) and Ge(II) Ferroelectric Materials Using Density Functional Theory

Supervisor :
Dr. Ing Oskar Hasdinor Hassan (MS)
Prof. Dr. Muhd Zu Azhan Yahya (CS)
Prof. Dr. Abdul Kariem Arof (CS)
Dr. Amreesh Chandra (CS)

- Quantum calculations via the first-principles study using the density functional theory (DFT) have offered great opportunities to describe the origin and most fundamental properties of new materials. In addition, detailed properties of the materials can be visualized by providing an accurate view at the atomic level. In this study, works are focused on investigating new lead-free ferroelectric materials that have a similar special ns^2 lone pair electrons with Pb (II) such as Sn (II) and Ge (II) via first principles calculation. Modification of Pb-based materials (PTO and PZT) by substituting or doping at the A-site are numerically anticipated to enhance the ferroelectric properties as well as to eventually reduce the consumption of Pb (II) in electroactive devices. Properties of lead-based materials $PbTiO_3$ (PTO), $PbZrO_3$ (PZO) and $PbZrTiO_3$ (PZT) as reference materials were compared with new lead-free ferroelectric materials such as $SnTiO_3$ (SnTO), $GeTiO_3$ (GTO) and $SnZrO_3$ (SnZO). All calculations were performed using first principles study based on Density Functional Theory (DFT) that has been implemented in CASTEP computer code. Functional GGA-PBEsol exhibits the most accurate values for lattice parameter with 0.6 % relative to experimental values for both cubic $PbTiO_3$ and $PbZrO_3$ (reference materials). Meanwhile, LDA-CAPZ functional is accurate for tetragonal PTO. The elastic properties values confirm that cubic PTO, SnTO, GTO, SnZO and PZO as well as tetragonal PTO, SnTO and GTO are mechanically stable. The electronic band structure, density of states (DOS) and electron density variation indicate the existence of hybridizations between anion O 2p and cation Pb 6s/ Sn 5s/ Ge 4s (special lone pair) in tetragonal PTO, SnTO, GTO and SnZO phase. Optical results show that anion O 2p, cation Pb 6p, Sn 5p, Ge 4p and Ti 3d, Zr 4d states respectively correspond to the transition electrons from valence states to the bottom of conduction state of the $ATiO_3$ (A=Pb, Sn, Ge) and $AZrO_3$ (A=Pb, Sn). The phonon calculation and cohesive energy revealed that the PTO and SnTO are stable in the tetragonal $P4mm$ phase compared to the non polar ilmenite structure. However, $GeTiO_3$ apparently shows non-polar ilmenite structure is more stable compared to the ferroelectric perovskite structure. The phonon dispersion analyses for PZO and SnZO proves that both compounds have ground state structure with antiferroelectric orthorhombic (Pbam, no: 55 space group) and in approximation with the polar ferroelectric phase rhombohedral ($R3c$, no: 161 space group). In this work, calculations on novel compounds consist of Sn (II) and Ge (II) in PTO and Sn (II) in PZT provide new insights on geometrical and electronic structure of materials. Thus, these findings will be able to gear up efforts in reducing lead consumption by substituting or doping Sn and Ge in Pb-based system, and hence will substantially contribute to greener environment.

Nanostructured porous silicon template (NPSiT) was successfully prepared from [100] orientation p-doped silicon (Si) substrate by photo-electrochemically anodization method with optimization parameters of etching time and annealing temperature while the rest of parameters were fixed. Uniform porous structures, optimum surface roughness and high intensity of photoluminescence (PL) of NPSiT as an optimized samples. The optimized NPSiT was used as template to synthesis vertically aligned carbon nanotubes (VACNT). VACNT were synthesized on NPSiT using double thermal chemical vapour deposition (DTCVD) method with camphor oil as carbon source and ferrocene (Fe) as a catalyst. The synthesis was carried out by the in-situ catalyst with floated method in a DTCVD reactor without any pre-treatment of catalyst. The process was called in-situ catalyst due to same vaporization point, 180°C of camphor and ferrocene. High percentage of vertically aligned, smallest diameter, uniform length, high graphite crystallinity and high growth rate of VACNT on NPSiT has been successfully synthesized with short synthesis time at 15 min. Single-Walled Carbon Nanotubes (SWCNT) was found at 15 min synthesis time gave lowest I_D/I_G ratio. Parametric studies were done such as ratio of catalyst to carbon source, synthesis temperature and synthesis time to determine optimum parameter in obtain VACNT on NPSiT. Field emission scanning microscopy (FESEM), High Resolution Transmission Electron Microscopy (HRTEM), atomic force microscopy (AFM), Energy Dispersive X-Ray Spectrometer (EDX), Raman spectroscopy, PL emission, Fourier transforms infrared spectroscopy (FTIR), Field Electron Emission Measurements (FEE) were selected for characterization. The measurements were used to analyse the structural, morphological, bonding, optical and electrical properties of the nanomaterials. Growth mechanism of VACNT on NPSiT based on experimental observation was discussed. The CNT was growth at pores and pillar with a mixed top and bottom growth model has been proposed. The tip growth model was proposed grow inside the pore while valley growth model was proposed grow on pillar of NPSiT. An excellent potential application of camphor oil based VACNT on NPSiT as electron field emitter was demonstrated. Lower turn-on field of $2.80 \text{ V}\mu\text{m}^{-1}$ at 0.1 mAcm^{-2} and threshold fields of $3.30 \text{ V}\mu\text{m}^{-1}$ at 1.0 mAcm^{-2} while maximum current of 1.20 mAcm^{-2} at low applied field of $4.40 \text{ V}\mu\text{m}^{-1}$ with good emission stability. It can be concluded that the VACNT from the bio-hydrocarbon precursor camphor oil synthesize on optimum NPSiT was stable for applications in field emission devices such as flat panel displays and LED.

- In this study, four manganites series with starting compositions
- $\text{La}_{0.85-x}\text{Sm}_x\text{Ag}_{0.15}\text{MnO}_3$ ($x=0-0.2$), $\text{La}_{0.8-x}\text{M}_x\text{Ag}_{0.2}\text{MnO}_3$ ($\text{M}=\text{Dy}^{3+}$, Sm^{3+} , $x=0-0.15$), $(1-y)\text{La}_{0.8}\text{Ag}_{0.2}\text{MnO}_3/y\text{BiFeO}_3$ ($y=0\text{wt}\%-3.5\text{wt}\%$) and $\text{Pr}_{0.6}\text{Ca}_{0.4-x}\text{Ba}_x\text{MnO}_3$ ($x=0-0.3$) were prepared by solid-state reaction method in order to elucidate their physical properties.
- For $\text{La}_{0.85-x}\text{Sm}_x\text{Ag}_{0.15}\text{MnO}_3$ ($x=0-0.2$) and $\text{La}_{0.8-x}\text{M}_x\text{Ag}_{0.2}\text{MnO}_3$ ($\text{M}=\text{Sm}^{3+}$, Dy^{3+} , $x=0-0.15$) series, the resistivity and magnetic measurements showed all samples exhibit transition from
- insulating to metallic behavior accompanying a paramagnetic
- to ferromagnetic transition as the temperatures was decreased.
- For $x=0$, two metal-insulator, MI transition peaks were observed
- at T_{P1} and T_{P2} in the resistivity curves. Both peaks and Curie
- temperature, T_c shifted to lower temperatures with increasing
- Dy^{3+} and Sm^{3+} , indicating that the substitution weakened the
- double exchange process and enhanced the Jahn-Teller effect.
- The magnetoresistance peak was observed around T_{P1} for all
- samples. The observed double peak behavior in the $\rho(T)$ curve
- is suggested to be due magnetic inhomogeneity of the samples.
- Our result also showed that the inhomogeneity was strongly
- influenced by the lattice effect. For $(1-y)\text{La}_{0.8}\text{Ag}_{0.2}\text{MnO}_3/y\text{BiFeO}_3$ ($y=0\text{wt}\%-3.5\text{wt}\%$) composite series, the resistivity
- and susceptibility measurements showed both metal-insulator
- transition temperatures, T_{MI} and paramagnetic-ferromagnetic
- transition temperature, T_c decreased with increasing BFO content
- indicating weakening of the double exchange, DE mechanism.
- The MR peak was observed around T_{MI} for all samples which
- is ascribed to the intrinsic MR effect. Below the peak, the MR
- increased almost linearly with decreasing temperature for all
- samples and this ascribed to the phenomena of extrinsic MR.
- The highest MR% (at 40 K) was observed for the $x=1.5\%$ sample
- which showed a MR of more than twice that of the undoped
- ($x=0\%$) sample. This extrinsic effect is suggested to be related
- to improved spin polarize tunneling of conduction electrons
- between grains under external field as a result of improved
- spin alignment. It is suggested that BFO induced some kind
- of magnetoelectric coupling between BFO and LAMO leading
- to the enhancement of the process. For $\text{Pr}_{0.6}\text{Ca}_{0.4-x}\text{Ba}_x\text{MnO}_3$ ($x=0-0.3$) series, the electrical and magnetic measurements
- showed that the $x=0$ sample exhibit insulating behavior and
- an antiferromagnetic to paramagnetic transition behavior.
- On the other hand, Ba-doped samples exhibit transition from
- insulating to metallic behavior accompanying a paramagnetic to
- ferromagnetic transition as the temperatures were decreased.
- Both T_c and T_{MI} of samples increase with increasing Ba
- concentration. Magnetoresistance, MR behavior indicates
- intrinsic MR mechanism for $x=0.1$ which changed to extrinsic MR
- for $x>0.2$ as a result of Ba substitution. The weakening of charge
- ordering and inducement of ferromagnetic-metallic (FMM) state
- as well as increased in both T_c and T_{MI} indicating enhancement
- of double exchange mechanism which is suggested to be related
- to the increase of tolerance factor, τ and increase of e_g -electron
- bandwidth as $\langle r_A \rangle$ increase with Ba substitution.

Name :
Norshidah Baharuddin

Title :
Artificial Neural Network (ANN) Approach in Predicting Arsenic and Mercury Species in Kinta River

Supervisor :
Associate Prof. Dr. Hj. Nor'ashikin Saim (MS)
Associate Prof. Dr. Sharifuddin Mohd Zin (CS)

Surface water is most exposed to pollution from chemical, physical and biological contaminants by anthropogenic activities. Identifying the variables contributing to the deterioration of water quality is crucial and predicting the future status is vital in managing the ecosystem. As Kinta River is an ex-mining area, heavy metals contamination is expected to be the major pollution contributor particularly arsenic and mercury. Confirmation on the significant contribution of arsenic and mercury species was done by applying selected chemometrics techniques namely cluster analysis (CA) and principal component analysis (PCA) on the physicochemical variables monitored by the Department of Environment (DOE), Malaysia during the period from 1997 – 2006. Thirty physicochemical variables were selected as input variables for CA and PCA in an attempt to identify the significant variables by the factor loadings obtained from PCA. From CA, the physicochemical variables were classified into four main clusters based on the similarities and dissimilarities. PCA applied to the dataset resulted in ten varifactors with a total variance of 78.06%. Arsenic and mercury were classified as moderately significant variables that affect the Kinta River water with a factor loadings of 0.561 and 0.643, respectively. The pollution of the river due to these metals could be contributed by industrial discharge, agricultural activities and residential waste. Since the toxicity of arsenic and mercury depended on the specific species of the metals, speciation analysis is therefore important to study the toxicity of these metals species due to their significant risks to human health and to the environment. LC-ICP-MS offers several advantages for speciation analysis as it allows multi-element and multi-isotope detection, high sensitivity and a wide linear dynamic range of detection. Analytical validation carried out showed that the detection limits for As were 1.0 and 0.5 ppb for As (III) and As (V) respectively with recoveries of As (III) and As (V) in the range of 90 – 115%. The detection limits for Hg₂₊ and CH₃Hg⁺ were found to be 1.0 ng L⁻¹ and 1.5 µg L⁻¹, respectively with recoveries of Hg₂₊ and MeHg⁺ in the range of 95 – 111%. Water samples taken from six sampling points selected from the DOE monitoring stations were analysed for arsenic and mercury species. This speciation analytical data was used in validating the artificial neural network (ANN) developed for predicting the concentration of these species in Kinta River. In developing the ANN model, two approaches were considered. The first approach, prediction was performed based on the original principal components (PCs) with thirty PCs as the input and the second approach, rotated principle components (RPCs) with eigenvalues greater than 1 with ten RPCs as inputs. It was observed that the predicted output of the first approach obtained a higher coefficient of determination (R₂) value of 1.0 for both As(V) and Hg₂₊ as compared to the second approach with R₂ of 0.915 and 0.984 for As (V) and Hg₂₊, respectively. The sensitivity analysis with leave-one-out technique showed that both arsenic and mercury were found to have significant input-output relationship with contribution of 31.6% and 86%, respectively. The ANN model developed obtained a good agreement for As(V) with R₂ of 1, whilst relatively low correlation for Hg₂₊ with R₂ of 0.6528.

Name :
Ruzaina Ishak

Title :
Effects of Palm-Based Edible Coating on The Postharvest Life of Guava (*Psidium Guajava* L.) and Palm-Based Chitosan Film on Cherry Tomato (*Solanum Lycopersicum* C.)

Supervisor :
Associate Prof. Dr. Norizzah Abd Rashid (MS)
Associate Prof. Dr. Halimahton Zahrah Mohamed Som (CS)

This study was conducted to determine the potential of palm stearin (PS) as edible coating materials for fruits. The palm stearin was blended with 20-80% palm kernel olein (PKOo) and the properties of the blends were evaluated in terms of the slip melting point (SMP), solid fat content (SFC), fatty acid and triacylglycerol compositions (TAG), and polymorphism. Blending of PS with PKOo reduced the SMP, SFC, altered the FAC and TAG composition and changed the crystal polymorphism from β to mixture of β and β'. The changes in the physicochemical properties of PS were due to the replacement of the high melting TAG in PS with medium chain TAG in PKOo. From the analysis, 1:1 and 3:2 were the better PSPKOo blend formulations in slowing down the weight loss, respiration gases and gave better appearance when compared to other PSPKOo blends formulations. These two different coating formulations, 1:1 and 3:2 PSPKOo blends were applied onto guava by hand-wiping techniques, stored at 10°C and 20°C and were compared to beeswax (commercial coating) in terms of respiration gases, cohesiveness, weight loss, glossiness, colour and appearance. Guavas coated with 1:1 PSPKOo blend showed the lowest weight loss, while coating with 3:2 PSPKOo showed the best guava appearance at 20°C. Both the PSPKOo coating blends significantly reduced (p<0.05) the weight loss, loss of O₂ and CO₂, glossiness, lightness, greenness and yellowness of guava stored at 20°C for 21 days when compared to beeswax. No significant difference (p>0.05) was observed between the two coating formulations in terms of weight loss, ethylene gas concentrations, lightness, greenness and yellowness of guava for both storage temperatures. However, both coating resulted in better guava appearance than beeswax at both storage temperatures. The PSPKOo blend (at 31%) was incorporated into chitosan of different degree of deacetylation (DD) (85% and 95%) and molecular weight (MW) (100.000 and 300.000 Da) to form films and the films were evaluated in terms of particle size, diameter and stability of emulsion and also thickness and tensile strength. The chitosan with 85% DD (MW 300.000 Da) + 31% PSPKOo blend resulted in the strongest film and thus this chitosan was added with 15.5% and 31% PSPKOo blends for comparison of physical properties of film. Emulsion blend containing 85% DD (MW 300.000 Da) and 31% PSPKOo blend of chitosan gave the biggest particle size, highest viscosity and the most stable emulsion, resulting in the thickest film with the highest TS and EM. The film was applied on cherry tomato and stored at 20°C for 9 days. The chitosan film with 85% DD (MW 300.000 Da) + 31% PSPKOo blend was the most effective in reducing weight loss, maintaining firmness and redness of cherry tomato compared to the other two films. Hence, PS showed potential to be used as a moisture barrier in fruit coating.

Searching a new material for the development of proton conducting polymer electrolytes that can be used in protonic electrochemical cells is the focus of this research study. In this study, the proton conducting polymer electrolytes were prepared by solution cast technique. Poly (vinyl chloride) PVC is used as the polymer host, ammonium triflate ($\text{NH}_4\text{CF}_3\text{SO}_3$) as the doping salt and ethylene carbonate (EC) and butyltrimethyl ammonium bis trifluoromethyl sulfonyl imide ($\text{Bu}_3\text{MeNTf}_2\text{N}$) is used as the plasticizers. Characterization techniques of EIS, XRD, FTIR, FESEM, DSC, TGA, transference number and linear sweep voltammetry measurements were used to study the properties of the PVC based proton conducting polymer electrolytes. Pure PVC exhibits room temperature ionic conductivity of $1.55 \times 10^{-10} \text{ S cm}^{-1}$. Various combinations of PVC and $\text{NH}_4\text{CF}_3\text{SO}_3$ compositions were attempted and the highest conductivity achieved was $2.50 \times 10^{-7} \text{ S cm}^{-1}$ when 30 wt. % $\text{NH}_4\text{CF}_3\text{SO}_3$ (A4) was incorporated into PVC which is an increase of about three orders of magnitude. The increase in conductivity with addition of $\text{NH}_4\text{CF}_3\text{SO}_3$ is attributed to increase in number of mobile ions and decrease in crystallinity of the films as shown by XRD, FESEM and DSC results. A further increase in ionic conductivity is observed when the polymer-salt electrolyte with the highest conductivity (A4) was added with plasticizers EC and $\text{Bu}_3\text{MeNTf}_2\text{N}$. The highest ionic conductivity achieved was $3.06 \times 10^{-5} \text{ S cm}^{-1}$ when 5 wt. % of EC (B1) was incorporated to the A4 polymer electrolyte. When 15 wt. % $\text{Bu}_3\text{MeNTf}_2\text{N}$ (C3) was added to the A4 polymer electrolyte, the highest ionic conductivity achieved was $1.56 \times 10^{-4} \text{ S cm}^{-1}$. Temperature dependence of conductivity study showed that conductivity increased with temperature and is found to obey the Arrhenius relationship. XRD studies showed that amorphous PVC becomes largely amorphous in nature upon addition of $\text{NH}_4\text{CF}_3\text{SO}_3$. Largely amorphous in nature is also obtained upon addition of EC and $\text{Bu}_3\text{MeNTf}_2\text{N}$ to PVC- $\text{NH}_4\text{CF}_3\text{SO}_3$. The degree of crystallinity, X_c is obtained by DSC and showed that the plasticized system has lower fraction of crystallinity compared to the salted systems with $\text{Bu}_3\text{MeNTf}_2\text{N}$ plasticized system having concentration of 15 wt. % (C3) having the least crystallinity. The transference number of this electrolyte is found to be 0.82 while its electrochemical window stability is 1.8 V. Electrochemical cells were fabricated using C3 electrolytes. The cells were discharged at different loads of 1.5 k Ω , 62 k Ω and 95 k Ω . The OCV of a cell based on the highest conducting electrolyte with configuration: $\text{Zn}+\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}+\text{PTFE} \mid 85 \text{ wt. \% (PVC-NH}_4\text{CF}_3\text{SO}_3) +15 \text{ wt. \% Bu}_3\text{MeNTf}_2\text{N (C3)} \mid \text{MnO}_2+\text{PTFE}$ is $\sim 1.52 \text{ V}$ while its discharge capacity is 0.55 mA h. The discharge performance of the cells showed that the protonic polymer electrolyte film proposed in this work has potential for application in protonic electrochemical cells for proton battery.

During canning and juice processing of pineapple, pineapple peel usually discharged. Discharged of pineapple peel during these productions will produce waste and lead to serious environmental pollution. In industrial practices, pineapple waste is either used as animal feed or disposed to the soil as waste. Pineapple peel contain valuable natural enzyme which is bromelain. Bromelain is enzyme which believed to have many benefits and very promising to the development of food and pharmaceutical industries. The purpose of this study is to isolate leucine from beef by using purified bromelain from pineapple peel extract. Purified bromelain powder from pineapple peel was produced through purification process. These include extraction from pineapple peel using purified water as a medium extraction, purification by cation exchange chromatography, desalting using continuous diafiltrator and followed by freeze drying. Each step was found to produce different effect on bromelain activity, protein content, specific enzyme activity and purification level. It was found that bromelain extracted from 100g of pineapple peel could yield 1.0g of bromelain powder. The amino acid composition in 14 beef cuts was also determined in this study. The flank cut was found to contain significantly higher amount of leucine amongst the beef cuts. The enzymatic hydrolysis was done with bromelain enzyme as a substrate to produce beef protein hydrolysate with higher content of leucine. The optimisation condition for the isolation of leucine was found with bromelain concentration of 1.38%, hydrolysis temperature of 42.5°C and hydrolysis time of 31.59 hours. The isolation of leucine was done by cation exchange chromatography and followed by freeze drying to obtain leucine powder. The leucine produce are as crystalline solid form, clean and white deposit. This leucine powder was used to determine the secretion of insulin in plasma of male Sprague-Dawley rats. It was found that the mean plasma insulin concentration value was achieved maximum at 90 minutes and 180 minutes for intramuscular injection and oral, respectively after leucine administered. The percentage of insulin increment for both intramuscular injection and oral administration of leucine are 80.40% and 79.02%, respectively.

Three series of charge-ordered compounds $\text{Nd}_{0.5}\text{Ca}_{0.5}\text{Mn}_{1-x}\text{Cr}_x\text{O}_3$ (NCMCO) ($0 \leq x \leq 0.05$), $\text{Nd}_{0.3}\text{La}_{0.2}\text{Ca}_{0.5-y}\text{Sr}_y\text{MnO}_3$ (NLCSMO) ($0 \leq y \leq 0.05$) and $\text{Dy}_{0.5-z}\text{Er}_z\text{Ba}_{0.5}\text{CoO}_3$ (DEBCO) ($0 \leq z \leq 0.05$) ceramics were prepared using the solid-state reaction method. For NCMCO series, resistivity and susceptibility measurements for the $x=0$ sample showed an insulating behavior and an anti-ferromagnetic (AFM) transition at 230 K as well as a charge-ordering (CO) transition at 280 K. The substitution of Cr induces a ferromagnetic-paramagnetic (FM-PM) and metal-insulator (MI) transition as well as gradually suppressing the CO state due to weakening of the Jahn-Teller (JT) effect. Quenching to reduce the oxygen content of the $x=0.05$ sample caused the MI transition temperature to shift to lower temperatures most likely due to oxygen reduction. On the other hand, both longitudinal and shear velocities at 100 K increased significantly with Cr substitution indicating improvement in elastic properties. However, quenching of the $x=0.05$ sample slightly decreased both velocities and related elastic moduli. A step-like longitudinal velocity anomaly characterized by a slope change suggests the existence of CO state for $x=0$, 0.02 and 0.05 samples. The step-like anomaly shifts to lower temperatures from 266 K ($x=0$) to 222 K ($x=0.05$) with Cr substitution indicating the weakening of the CO state. Absence of the step-like anomaly for the quenched $x=0.05$ sample suggests suppression of the CO state due to oxygen reduction. For the NLCSMO series, resistivity and susceptibility measurements showed all samples exhibit MI behavior accompanied by FM-PM transition where the MI transition temperature, T_{MI} and FM-PM transition temperature, T_C increased with Sr content indicating the enhancement of double-exchange mechanism. Analysis of the resistivity change with respect to temperature, $\ln \rho / dT^{-1}$ versus T indicates onset of CO state where its CO transition temperature, T_{CO} decreased with Sr content indicating weakening of the CO state. On the other hand, both absolute longitudinal and shear velocities as well as elastic moduli measured at 80 K increased significantly with Sr doping indicating improvement in elastic properties. A longitudinal velocity anomaly characterized by a slope change around the vicinity of T_{CO} was observed for all samples. The longitudinal elastic anomaly is attributed to the JT effect of Mn^{3+} ions. For the DEBCO series, resistivity and susceptibility measurements for the $z=0$ sample exhibited an insulating behavior and an AFM transition, T_N at 198 K as well as FM transition, T_C at 260 K. Increasing of Er content suppressed the FM and AFM state may be due to the increase in size disorder arising from the size mismatch between A-site cations. On the other hand, both absolute velocities and related elastic moduli measured at 210 K decreased with Er content in conjunction with the declining in the FM domain indicating a weakening in elastic properties. A longitudinal velocity anomaly characterized by a drop in velocity upon cooling before hardening with further cooling was observed for all samples. This abnormal elastic anomaly can be attributed due to JT distortion of intermediate-spin Co^{3+} ions. Analysis of the elastic anomaly using the mean-field theory in the NCMCO, NLCSMO and DEBCO series suggests involvement of the JT effect which transforms from dynamic to static type with decreasing temperature. The elastic anomaly shifted to lower temperature from 266 K ($x=0$) to 222 K ($x=0.05$) for NCMCO, 222 K ($y=0$) to 205 K ($y=0.05$) for NLCSMO and 129 K ($z=0$) to 124 K ($z=0.05$) for DEBCO, indicating a weakening of the static JT effect.

- The purpose of this study was (1) to compare temporal-spatial gait parameters and axial segmental coordination across attentional loading conditions during Timed Up and Go test (TUG), and (2) to determine the correlation between gait parameters across attentional loading conditions during TUG and, level of sensorimotor impairment, and functional balance in stroke survivors. Thirty stroke survivors participated in this study. Temporal-spatial gait parameters (gait speed, stride time, stride length, turn time and number of steps) and axial segmental coordination across single, dual-motor and dual-cognitive task were measured during the Timed Up and Go (TUG) test. Researcher further divided the TUG test into turning and straight walking phases to gain information about whether attentional loading had a differential effect on each phase. A repeated measure ANOVA and the Spearman's rank correlation coefficient were used to analyse the data. The temporal-spatial gait parameters taken during TUG test was increased significantly from single- to dual-task conditions (dual-motor and dual- cognitive). Attentional loading had a differential effect on gait speed measured during the straight walking phase of the TUG for both groups ($p = 0.001$). Dual-motor and dual-cognitive task conditions led to a slower gait speed compared with the single task condition in stroke survivors (Both, $p = 0.02$). However, in healthy controls, only the dual-cognitive condition led to a significantly reduced gait speed compared with single task condition ($p = 0.001$) and dual-motor condition ($p = 0.01$). Furthermore, dual-cognitive task condition led to a significant increase in the time taken to complete the 180° turn in both groups. In addition, attentional loading had a significant effect on axial segment reorientation onset time ($p = 0.03$), and the effect was similar between stroke survivors and healthy controls ($p = 0.54$). However, only dual-cognitive task led to an earlier axial segment reorientation onset time than single task condition ($p = 0.006$) in both groups. Stroke survivors showed

The assessment of post-operative spine using computed tomography (CT) imaging is so challenging in the presence of metal artifacts induced by spinal implants. Metal artifacts can severely affect the quality of CT images, and mislead the diagnosis interpretation. The artifacts are due to the beam hardening, photon starvation effect, and inappropriate correction algorithm during image reconstruction. Knowledge on factors affecting the artifacts is crucially important to minimize these artifacts. The main aim of this study is to develop a novel technique for suppression of metal artifacts and this study generally consists three main parts. The first part is the development of a simple phantom useful for metal streaking analysis performed in the second part of this work. A customized phantom was constructed with tissue-equivalent materials and various metal inserts to simulate the streaking artifacts similar to the clinical findings in post-operative spine imaging. In this work, a thorough study on factors influencing the magnitude of metal streak artifacts is presented. There are 3 different variables studied which were metal insert characteristics, exposure factors, and reconstruction parameters. The phantom was scanned using Siemens Definition AS+ CT scanner in Radiology Department, HUSM. All phantom images were acquired using standard field of view (FOV) of 230mm with various acquisition and reconstruction protocols depending on the parameters studied. Standardized regions of interest (ROIs) were defined within the streaking region to obtain 1625 attenuation measurements in Hounsfield units (HU). All data are displayed as mean \pm standard deviation (SD). The severity of metal streak in each image was determined by CT fluctuation, and noise at each ROI. Results show similar degrees of streaking artifacts noted in phantom images compared with the clinical CT outcomes. From artifacts analysis, it is found that smaller size and low density metal implants produce less severe artifacts. The result shows increased kVp and mAs has reduced streak artifacts with reduction in image noise and enhanced signal-to-noise ratio (SNR) values. A sharper kernel reduces metal streaks, but produces significantly higher noise ($P < 0.05$) in the images as compared to smooth kernel. Thicker slice also reduced metal artifacts and noise in image. The last part is the development of a metal artifact correction (MAC) algorithm and evaluation of the proposed algorithm in artifacts reduction in CT images. The MAC algorithm was developed in MATLAB environment and was applied on virtual sinogram which directly computed through forward projection of CT images. The missing projection data due to metal region is detected and extracted using an improved technique of dual-step adaptive thresholding. Then, the missing data are replaced by interpolated values by using the spline cubic interpolation. The interpolated and metal-only images were reconstructed and fused together to obtain the final corrected images. The corrected and non-corrected phantom images were compared to evaluate the performance of the proposed MAC. It is shown that the streaking region close to metal inserts was reduced after applying the MAC algorithm. The result also shows significant reduction in image noise, and SNR is enhanced in corrected images. As a conclusion, the fabricated phantom is useful for metal streak analysis with a broad range of parameters can be studied and cost effective. It is concluded that the proposed algorithm allows significant reduction of the streaking artifacts in both phantom and clinical CT images.

Motif Discovery (MD) is the process of identifying meaningful patterns in DNA, RNA, or protein sequences. In the field of bioinformatics, a pattern is also known as a motif. Numerous algorithms had been developed for MD, but most of these were not designed to discover species specific motifs used in identifying a specifically selected species where the exact location of these motifs also needs to be identified. Evaluation of these algorithms showed that the results are unsatisfactory due to the lower validity and accuracy of these algorithms. At present, DNA sequencing analysis is the most utilised technique for species identification where patterns of DNA sequences are determined by comparing the sequence to comprehensive databases. However, several false and gap sequences had been identified to be present in these databases which lead to false identification. Therefore, this study addresses these problems by introducing a hybrid algorithm for MD. In this study, the MD is a process to discover all possible motifs that existed in DNA sequences whereas Motif Identification (MI) is a process to identify the correct motif that can represent a selected species. Particle Swarm Optimisation (PSO) was selected as the base algorithm that needs improvement and integration with other techniques. The Linear-PSO algorithm was the first version of improvement. However due to the longer time required for complete execution of this algorithm, the Binary Search technique was integrated and a new version of the algorithm was developed, namely the Linear-PSO with Binary Search (LPBS) algorithm. A total of 11 experiments were conducted in this research, where the aim of the first four experiments was algorithm improvement; the next four experiments were for identifying suitable input data, while the final three experiments were for algorithm validation. Several DNA sequences from different species were collected from the GenBank and TRAnsCompel databases and used as input for the algorithm. The collected DNA sequences were from the Mitochondrial Cytochrome C Oxidase Subunit I (COX1) gene. Due to the limitation of available data, only four species were collected for Motif Discovery, namely pig, cow, yak, and chicken. Another five species were used for Motif Identification, which were human, sheep, dog, frog, and rat. The algorithm was run on an Intel(R) Core(TM) Duo CPU 1.73 GHz notebook with 3 GB RAM. The results showed that the LPBS algorithm was able to discover possible correct motifs that can represent a species with higher validity and accuracy as compared to previous algorithms. The motifs discovered were consistent for each execution with higher calculated fitness values.

Name :
Mohd Faizal Bin Mubarak

Title :
A New Technical Framework for Security, Trust and Privacy (STP) Of RFID System

Supervisor :
Prof. Dr. Saadiah Yahya (MS)
Dr. Jamalul-lail Ab Manan (CS)

Future trend of RFID system is moving towards integration with other devices, and hence making it more pervasive. Even though RFID technology brings numerous benefits, it also comes with potential security and privacy threats. In this thesis, we investigate how the integration and interconnection of RFID system with other devices introduce security vulnerabilities which could be exploited by attackers and adversary systems equipped with advanced techniques and attacking tools to achieve their evil objectives. We examined past works on RFID with privacy-preserving solutions dealing with issues on system integrity and availability. We found out that these unprotected RFID system without integrity verification could also be subjected to malicious code attacks and impersonation attacks. We found a solution that could exactly protect the RFID system in three main protection areas, namely security, trust, and privacy (STP). We believe that we have used a unique approach in our research study because we have taken into account all potential issues and we tackle them in a unified and integrated way. Our main contribution is that we proposed a unified STP protection in RFID framework which protected against unauthorized access and adversary attacks. We call this framework as MF-JaSa2 RFID framework. The framework offers enhanced unified STP features in RFID system advanced techniques such as encrypted-based attestation, integrity verification techniques with respect to protect user privacy, utilization of Trusted Platform Module (TPM), a tamper proof hardware to provide integrity verification for RFID system and utilization of MJS-Watcher as runtime integrity-checker, elliptic curve cryptography (ECC) for security protection and anonymizer for privacy-preserving protection. Based on formal method analysis, we proved that MF-JaSa2 RFID protocol always maintains its platforms in trusted and secured mode and keeps tags anonymous. Based on experiments, we proved MF-JaSa2 framework is able to protect RFID system against any attack especially the runtime-based attack and impersonation attack. Finally, MF-JaSa2 RFID framework is considered as trusted, secured and privacy-preserved RFID system.

Name :
Nuru'I - 'Izzah Othman

Title :
Computational Model of Stepwise Quantitative Assessment of Equations Correctness

Supervisor :
Prof. Dr. Arsmah Ibrahim (MS)
Prof. Dr. Zainab Abu Bakar (CS)

- Existing computational solutions for stepwise correctness checking of free-response solution schemes consisting of equations only consider providing qualitative feedbacks. Hence, this research intends to propose a computational model of a typical stepwise correctness checking of a scheme of student-constructed responses normally (usually) performed by a human examiner with the provision of quantitative feedbacks. The responses are worked solutions on solving linear algebraic equations in one variable. The proposed computational model comprises of computational techniques of key marking processes, and has enabled a marking engine prototype, which has been developed based on the model, to perform stepwise correctness checking and scoring of the response of each step in a working scheme and of the working scheme as well. The assigned numeric score of each step, or analytical score, serves as a quantitative feedback to inform students on the degree of correctness of the response of a particular step. The numeric score of the working scheme, or overall score, indicates the degree of correctness of the whole working scheme. Existing computational solutions that are currently available determine response correctness based on mathematical equivalence of expressions. In this research, the degree of correctness of an equation is based on the structural identicalness of the constituting mathtokens, which is evaluated using a correctness measure formulated in this research. The experimental verification shows that the evaluation of correctness by the correctness measure is comparable to human judgment on correctness. The computational model is formalized mathematically by basic concepts from Multiset Theory, while the process framework is supported by basic techniques and processes from the field of textual information retrieval that have been adapted to suit the problem of this research. The data used are existing worked solutions on solving linear algebraic equations in one variable from a previous pilot study as well as new sets of responses that were collected using the marking engine prototype. The experimental test of correctness shows that the computational model is able to generate the expected output. Hence, the underlying computational techniques of the model can be regarded as correct. The agreement between the automated and the manual marking methods were analysed in terms of the agreement between the correctness scores. The method agreement analyses were conducted in two phases. The analysis in Phase I involved a total of 561 working schemes which comprised of 2021 responses and in Phase II a total of 350 working schemes comprising of 1385 responses were used. The analyses involved determining the percent agreement, degree of correlation and degree of agreement between the automated and manual scores. The accuracy of the scores was determined by calculating the average absolute errors present in the automated scores, which are calibrated by the average mixed errors. The results show that both the automated analytical scores and the automated overall scores exhibited high percent agreement, high correlation, high degree of agreement and small average absolute and mixed errors. It can be inferred that the automated scores are comparable with manual scores and that the stepwise correctness checking and scoring technique of this research agrees with the human marking technique. Therefore, the computational model of stepwise quantitative assessment is a valid and reliable model to be used in place of a human examiner to check and score responses to similar questions used in this research for both formative and summative assessment settings..

Name :
Shafaf Ibrahim

Title :
A New Hybrid Technique for Nosologic Segmentation of Primary Brain Tumors

Supervisor :
Associate Prof. Dr. Mazani Manaf (MS)
Dr. Noor Elaiza Abd Khalid (CS)
Dr. Mohd Ezane Aziz (CS)

The main purpose of this research is to design a comprehensive algorithm which aims to aid the medical practitioners mainly the radiographers, radiologists and neurologists in primary brain tumors diagnosis. Detection of primary brain tumors is inspired by the necessity of high accuracy as it deals with human life. Presently, various imaging modalities techniques have incarnated as a tool for the doctors and radiologists to help them in diagnosis and treatment domain. While these are highly accurate and fast, they still require experienced and competent medical practitioners for the proper interpretation. Thus, the involvement of information technology is highly demanded in introducing reliable, simple and accurate computer systems. This study presents an algorithm for nosologic segmentation of primary brain tumors on Magnetic Resonance Imaging (MRI) brain images. The MRI technique has been chosen as the digital imaging modality since it provides clearer image for the tissue area as compared to the other techniques that focusing more on bone study such as Computed Tomography (CT) Scan and X-ray. The purpose of segmentation is to highlight the tumor areas, whereas classification is used to identify the type of the primary brain tumors. For this purpose, an algorithm which hybridized the Intensity Based Analysis (IBA), Grey Level Co-occurrence Matrices (GLCM), Adaptive Network-based Fuzzy Inference System (ANFIS) and Particle Swarm Optimization (PSO) Clustering Algorithm (CAPSOCA) is proposed. The combination of several computer vision techniques was presented which aims to deliver reproducible nosologic segmentation of primary brain tumors which are gliomas and meningiomas. A Rule Based Expert System (RBES) is used to preliminarily classify the various types of primary brain tumors. It is designed to incorporate with the CAPSOCA algorithm which intended to strengthen the classification outcomes. The performance of the proposed CAPSOCA algorithm is compared with the PSO and ANFIS algorithms separately. The performance of the algorithms is quantified by two measurements which are segmentation accuracy and classification accuracy. The segmentation accuracy is evaluated using two approaches which are tumor template matching and comparison with ground truth. On the other hand, the classification accuracy is quantified using truth table by comparing the classification outcomes with histopathology diagnosis collected from the patient's record. The study revealed that very high pixel detection is noticeable in PSO algorithm which leads to over-segmentation in the tumor areas, and indirectly affected the segmentation accuracy. On the other hand, the ANFIS is found to have limited pixel detection in nosologic segmentation of primary brain tumors. The CAPSOCA was proven to be the best algorithm for nosologic segmentation of primary brain tumors from the MRI images data. It appeared to return the highest percentages of accuracy as compared to the PSO and ANFIS for both segmentation and classification at 78.79% of accuracy for gliomas segmentation, 76.68% of accuracy for meningiomas segmentation and 76.30% of accuracy for classification accuracy.

Name :
Wael Mohamed Shafer Yafooz

Title :
Application of Clustering in Managing Unstructured Textual Data in Relational Database

Supervisor :
Associate Prof. Dr. Siti Zaleha Zainal Abidin (MS)
Dr. Nasiroh Omar (CS)

- Huge reliance on computer usage in everyday life, leads to a continuous increase of large data applications in textual forms.
- The data are repositied to a secondary storage for future usage.
- Therefore, a *relational database* (RDB) is most commonly used as a backbone in most application software for organising such data into structured form. The RDB has robust and powerful structures for managing, organising, and retrieving the data. However, the database structure can still contain large amounts of unstructured textual data. Dealing with unstructured textual data leads to three basic issues; users encounter difficulties to find useful information, inaccurate information retrieval and insufficient performance of query processing. Attempts have been made to resolve all of these issues by using several methods such as: full text searching, text indexing, a database schema management, database data model, and query-based techniques. However, the front-end approach, in the form of software applications, are still needed to organise the unstructured textual information in the RDB. This study proposes a *Textual Virtual Schema Model* (TVSM) as the back-end approach to reorganising textual data inside relational databases, while performing automatic semantic linking and clustering assignments. Upon storing any new unstructured textual data into a database, all words are extracted to uncover the underlying meaning of such data. Their name entities and top most frequent terms are selected for the factors used in a cluster assignment. The model is tested and evaluated by embedding it in a component-based package of a relational database's internal structure. Three experiments have been conducted on textual Reuters corpus, Classic and WAP dataset. The clustering results have been validated using the *F-measure*, *Entropy* and *Purity* methods of measurement and compared with two common methods, which are information extraction and textual document clustering, for example, *K-means*, *Frequent Item-Set*, *Hierarchical Clustering Algorithms* and *Oracle Text*. The results show that there are linkages between structured textual data and unstructured information, high performance of query processing and time improvement in document clustering with accurate clusters. Thus, the proposed technique can increase retrieval performance and produce high accuracy textual data clusters. This model envisages a beneficial and useful approach for various domains that involve big textual data such as document clustering, topic detecting and tracking, information integration, personal data management and information retrieval.
- This research work published in eight international proceeding indexed by ISI and Scopus and two book chapters indexed by ISI and Scopus and one international journal.
- This research work has patent pending under serial number PI2013002636 from MYIPO Malaysia.

Name :

Wan Fairos Wan Yaacob

Title :

Construction and Evaluation of Panel Count Model for Road Accident Data

Supervisor :

Associate Prof. Dr. Mohd Alias Lazim (MS)

Prof. Dr. Yap Bee Wah (CS)

This thesis presents the work on modelling road accident count in Malaysia through the development panel count model. This research is motivated by several factors. The first is the alarming phenomenon pertaining to the high rates of road accidents which has generated interest among researchers and policy makers to find ways and means to overcome this global issue. Secondly, the effect of adverse weather condition is known to affect road safety and although various intervention measures have been implemented, significant results have yet to be achieved. Hence, a better understanding of such phenomenon is essential to allow necessary measures to be taken to improve road safety. An extensive literature review was made to gain a better understanding on road accidents phenomenon and evolution of statistical model for count data. Through an extensive literature review, the gap was identified in the development of road accident models in Malaysian which overlooked the panel count models. Additionally, there is also the issue of potential bias in the panel count model estimator particularly with the issues of fixed effects estimator. Thus, the first research objective is to develop panel count model for road accidents data in Malaysia. The second objective is to evaluate the effect of panel size and time dimension on the estimator of panel count model using Monte Carlo simulation. This research involved two phases which are statistical modelling and simulation study. In the first phase of the research, the panel data models based on the fixed and random effects Poisson and Negative Binomial models were developed. Several estimation methods such as conditional and unconditional approaches were used to model road accident data for 12 states in Malaysia. The results revealed that precipitation in the form of rainfall, dry spell and number of rainy days has significant effect on road accidents in Malaysia. The risk of road accident occurrence significantly increases during the rainy months with shorter dry spell period of gap between rain and no-rain. On the other hand the risk is lessening with the rainfall in the months of longer spell period. In the second phase, the Monte Carlo simulation method using SAS programming was used to evaluate the effect of the changes of sample (panel) size as well as number of time periods on the alternative conditional fixed-effects Negative Binomial (FENB) and the Projected Score Method (PSM) estimators. For small sample size and when the number of panel wave/time periods is fixed, the results of the estimation of the unconditional FENB (with correction for standard error) are less satisfactory. This is evidence from the large sampling variability, large SE and RMSE generated. Additionally, the unconditional fixed effects perform better than the PSM method at different level of individual size. The main contribution of this study in the field of road accidents is the fundamental knowledge of new evidence-based research finding of road accident occurrence relating to weather condition. As one of the tropical countries, the considerable amount of precipitation in a form of rainfall and dry spell in Malaysia are found to be a significant contributor to road accidents in the country. This study also provides a framework for Monte-Carlo simulation methodology in evaluating the alternative fixed effects panel model estimator. For future research, the advantage of bootstrapping technique for panel count data involving small sample size and time period can be investigated.

Name :

Ali Ibrahim Ali Dawo

Title :

Relationship Between Participation in In-Service Training Program and Academic Competencies Among Sports Science University Lecturers

Supervisor :

Dr. Rozita Abdul Latif (MS)

Dr. Tan Chee Hian

- In-service training programs have emerged as an ideal training platform for lecturers in various universities to enhance their professional competencies. This becomes a necessity owing to the rapid advances that prompt the acquisition of knowledge to improve the lecturers' competencies especially in sports science. The purpose of this study lies in investigating the relationship between participation in in-service training programs and academic competencies among Sport Science Lecturers in Libya and Malaysia. The need for in-service training among lecturers based on their participation in in-service activities was based on participation in planning (PPL), participation in implementation (PIM) and participation in evaluation (PEV). The competencies of Lecturers place focus on the competencies in planning instruction (CPI), competencies in conducting instruction (CCI), competencies evaluating instruction (CEI) and competencies in facilitating student's growth (CFS). Previous studies were reviewed to support the arguments presented in this study using prominent theories such as the Perceptual Psychology Theory, Innovation Theory of planned behaviour (ITPB) and Contingency Theory. To achieve the objectives of this study, a quantitative study based on the survey questionnaire was used to collect primary data from 320 sports science lecturers within 11 Universities in Libya and Malaysia. Non-probability (purposive sampling) was used in this study for sampling selection. The results and findings were analysed using the Statistical Package Social Sciences (SPSS) and Analysis of Moment Structure (AMOS) Software. The final model goodness fit satisfactory explained the value of $\chi^2 = 498.637$. The NFI, TLI and GFI were above 0.90. The eleven (11) major hypothetical statements have some direct effects on selected variables such as CPI, CCI, CEI and CFS tested and they were significant at 0.00 level. Theoretically, this study inferred two mediating variables. Firstly, CCI fully mediated the relationship between CPI and CEI. Secondly, CEI partially mediated the relationship between CCI and CFS. The current study has indicated that the integration of in-service training programs among the sports science lecturers improved the levels of competency to facilitate student's growth. The results obtained in this study depict the increasing need that relates to planning, implementation and evaluation of in-service training programs as an ideal improvement pathway of lecturers' competency at various universities. This suggests that the sports science lecturers should pay more attention towards the participation in in-service training programs that aim at upgrading their respective professional competencies. The implementation of the results of this study in universities in Libya and Malaysia is set to enhance competencies of lecturers as well as student growth which are at the forefront of government educational policies.

Name :

Haryanti Mohd Affandi

Title :

A Generic Competency Framework for Entry Level Construction Managers in Malaysia

Supervisor :

Associate Prof. Dr. Padzil@Fadzil Hassan (MS)**Dr. Zulhabri Ismail (CS)**

The changes in industry needs have further highlighted the problems of incompetence entry level construction managers and brought significant changes in construction management education. Moreover, culmination from the issues faced in the entry level construction management, it suggests that there is problem relating to the mismatch of generic competency in entry level construction management. The mismatch of generic competency appears when there are changes in industry requirements added with education provision in developing construction management students' generic competency. Furthermore, there's an absence of strategic framework for Malaysian entry level construction managers. The aim of this research is to address part of the problem in construction management generic competency education and construction industry by suggesting an improved generic competency framework of entry level construction managers in Malaysia. This study adopts a mixed method approaches and results from questionnaire survey and interviews which highlight the major issues. Sequential explanatory model are chosen in determining the mismatch. In developing the generic competency framework, this study adapts and improves Spencer & Spencer (1993) competency development model. Responses for questionnaire surveys were collected from contactors and undergraduate construction management students and have been analyzed by inferential statistical analyses using Winsteps. Qualitative analysis was done by validating the framework and explaining the existence of mismatch. Results from this study, manage to develop a generic competency framework for entry level construction managers based on their roles and tasks. This framework consists of 12 generic competencies which are communication, behavioral characteristics, negotiation, teamwork, leadership, problem solving, entrepreneurship, ethics, analytical and critical thinking, flexibility, lifelong learning and relationship building. From this framework, this study determines the mismatch between industry requirement and construction management students expectation towards generic competency. This study find the existence of mismatch are contributed by students attitude, inexperience lecturers and less opportunity in experienced onsite work during internship. The results in general reveal that students attitude play significant roles in the existence of mismatch. Moreover, from the finding, it is suggested that industry and university need to improve their collaboration in exchanging knowledge and experience in enhance the construction management students generic competency.

Name :

Siti Aekbal Salleh

Title :

Quantification of Land Surface Albedo Impacts in a Tropical Urban Environment

Supervisor :

Associate Prof. Sr. Dr. Zulkiflee Abd Latif (MS)**Associate Prof. Dr. Wan Mohd Naim Wan Mohd (CS)****Prof. Dr. Andy Chan (CS)**

The emergence of various climate campaigns and the establishment of numerous climate variables have been the backbone of this research framework. One of the Essential Climate Variables (ECV) called albedo was reported to be insufficiently recorded and documented in terms of its spatial scale and temporal resolution. Thus, the intensity of this variable towards the simulation of climate change effects needs to be quantified. This research aims to investigate and examine albedo pattern changes as a physical parameter to urban climate change effects generated through remote sensing and discover the functional relation with respect to the urban heat island (UHI) phenomenon. Therefore, the objectives are, to characterise the albedo pattern changes and their relationship with other biophysical, land cover and air quality parameters and their effects upon urban surface temperature; to explore and formulate a model and factorise the albedo of urban features based on selected variables (continuous air quality monitoring station (CAQMs) data and remote sensing biophysical parameters); to modify localised albedo for weather research forecasting (WRF) the Advance Research WRF (WRF-ARW) configuration; and to synthesize the impacts of localised land surface albedo towards urban heat island phenomenon. This research adopted a hybrid scientific approach combining inductive and deductive logic methodologies. The independent variables were induced based on literature, existing theories and problems and further deduced from observations using Multiple Linear Regression (MLR), the model was quantified and evaluated using Mean Area Error (MAE), Relative Standard Error (RSE) and Root Mean Square (RMSE). The importance of quantifying LSA in accordance to land use land cover was tested using Anova Single Way Post-Hoc (Tukey's HSD) and finally the impacts of localised albedo were quantitatively analysed using WRF-ARW dynamic solver. The novelty of this research lies in the establishment of statistical models to depict land surface albedo based on climatic variables and air quality parameters. This model utilises remotely sensed land surface albedo and in situ albedo for verification processes. While the spatial distribution of Continuous Air Quality Monitoring station (CAQMs) was used for validating archive remote sensing images used for this study as its continuous data capturing ability allows for temporal flexibility in validation process. The research advancement is comprehended through the profound relationship of land surface albedo with remotely sensed biophysical properties and indices. The innovation is achieved by developing an improved scale of land surface albedo which ultimately solves the spatial and temporal issues. Based on the modification of land surface albedo, it shows that the sophisticated model WRF-ARW simulation of surface and near surface temperature can be improved if the values of land use and land cover albedo are captured based on the exact on-site values of land surface albedo and its significance is discovered through comparative analyses where localised land surface albedo values were used as an input parameters in WRF-ARW.

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Name :
Husaini Yaacob

Title :
Artist and Themes: A Study on Social Commentary
Photographic Images

Supervisor :
Prof. Dr. Hj. Mustaffa Halabi Azahari (MS)
Dr. Adzrool Idzwan Hj Ismail (CS)

Social commentary is an alternative method to convey messages to the public with the hope to change their perceptions and attitudes toward certain social issues of ethical, political, moral and even religious. There have been various methods that have been used either in the form of electronic or printed medium. One of the methods has been the photographic images which have been used by the photography artists to convey their messages. This is called as the social commentary. In the advanced countries, social commentary images have long been accepted by the public and has become one of the most powerful medium of communication to alert or trigger the society toward change. In some developing countries as such in Malaysia, the acceptance of social commentary photography among the public is still arguable about the usage of photographic images as a medium of communication which has not been fully accepted and understood by the public. Most of the public has not been aware of what have been posted by the photography artists. Therefore, the photography artworks on social commentary which have been produced by these photography artists in Malaysia have just become an ordinary exhibited materials that do not carry any message or impact to the public. As a consequence, there is a communication gap between the artists and the public in the form of delivering, acceptance and understanding some of the issues which need to be addressed and highlighted through social commentary photography. This study therefore, focuses to investigate the social commentary photography artists and to what extend their messages in the artworks have been understood by the public. This study involves a fully qualitative method by interviewing the Malaysian photography artists to probe details with purposes and intention of why they produce their photographic works to be delivered to the public. The observations in various galleries, exhibitions and analyzing the artists' photography artworks have also been employed. Finally, it is hoped that this study would benefit various levels of people such as artists, different societies, personnel in government and public sectors to provide great impact and awareness to them as photographic images have become one of the most powerful medium in conveying and delivering various messages to public in this digital era.

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Name :
Muhamad Abdul Aziz Ab Ghani

Title :
The Influence Of Design Character On Logo Recall

Supervisor :
Associate Prof. Dr. Mohamad Hariri Hj Abdullah (MS)

Logo is an important part of branding aspect especially in creating an identity for the brand. The definition of a logo actually is virtually limitless and cannot be restrict in today's globalized and borderless world. The reason is the growth and evolution of logo design has made a logo being valued not only from the definition aspect, but going further as a medium for communication and conveying messages (Armstrong, 2009). Nevertheless, in theory, a logo must at least easy to be remembered and recognize, as mentioned by Klerkx & Meurs (2006) that a logo design must emphasize on the elements that are easily remembered by the audience and thus, the brand represented by the logo is more well-known than competitors. Once a brand is known, the products will have more sales potential. This, according to Haig & Harper (1997) depends on the role and function of a logo design, which is to be easily remembered. From the basic principle of a logo design that is to make it easy to be remembered, several important questions arises through a research process. The most important question is what is the most significant factor that makes a logo easy to be remembered. As the result, this research focused on design characters exist in a logo design which involve shape, line, colour, typography, and image in finding the most significant factor in making a logo easy to be remembered. There are three objectives outlined for this research. The first one is to explore the design characteristic of logos used in Peninsular Malaysia's SME companies and product. The second objective is to determine which of the design characteristic that are more easily recognize and remember. The final objective is to establish the design characteristic in the context Malaysia. This, to ensure the objectives of this research are achieved, the 'mix method' approach was applied and implemented during this research where qualitative approach was used to achieve the first objective while quantitative approach has helped to achieve the second and third objectives. Positively, the findings from the analysis shows that each of the design character (shape, line, colour, typography & image) used in a logo design is significant to our memorization. From the five design characters, typography is the most significant design character in terms of making a logo easy to be remembered. Finally, this research has a direct contribution in four main aspects. The first one is theoretical contributions where this research has collected various theories from different aspects and field related to design character. The second contribution is in the methodological aspects where this research has produced a new theoretical framework that can be used in future researches. Third, this research has a good practical contribution where it can be use by designer and decision maker as a guide in producing best logo design. Lastly, in the aspect of social contribution, this research can be benefited by the society in understanding the role and function of a logo in our daily lives.

45

Name :

Khairulfazi Haji Sa'ari

Title :

Repositioning Documentary Film in Malaysia: An Empirical Study of Production Criteria and Practices

Supervisor :

Prof. Dr. John Chesley Skinner (MS)

During the Malaysia Film Unit (MFU) era, Malaysia was renowned for producing good documentary and was a significant documentary film producer in Asia. The digital revolution has led to a new interest in documentary which has brought about the need for Malaysia to reform and reposition its documentary film production environment. However, despite the various government efforts it is still underdeveloped and its quality is generally considered to be low. This study examined the state of documentary in an effort to ameliorate the current practices of documentary production in Malaysia and, to identify essential criteria that are vital to producing documentary, determine the challenges to the current film makers and to make recommendations as to ways to improve the existing practices. A mixed methodology was utilized. A total of 124 self-administered survey questionnaires were received out of the 198 sent out to active practitioners in the Klang Valley. Outcomes from the survey became the basis for conducting the in-depth interviews during which fifteen major documentary players, which include regulatory bodies, policy makers and all those involved in the industry, were interviewed, in order to gain better insights into documentary production in Malaysia. The results of the study suggests that there is a lack of knowledge and understanding of documentary production among local filmmakers; both in the production aspect (technical know-how) as well as in the creation of content. The findings also reveal that in order to produce successful documentary, both its form and content must be of a high standard, thus emphasizing that the theoretical knowledge and operational skills are equally crucial. The study proposes a framework of 'Essential Production Criteria' (EPC), which is a set of guidelines for producing successful documentary. Additionally, the study offers a documentary repositioning model to help improve and to elevate the current state of documentary and hence contribute towards repositioning documentary in Malaysia.

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Name :

Wan Hasmah Wan Teh

Title :

Proses Adaptasi: Kajian Lapan Karya Terpilih dari Malaysia dan Indonesia

Supervisor :

Prof. Dr. Solehah Ishak (MS)**Prof. Dr. Hatta Azad Khan (CS)**

Kajian ini membicarakan lapan buah filem adaptasi dari Malaysia dan Indonesia dengan memberi tumpuan khusus kepada proses adaptasi yang berlaku ketika pengarah memindahkan novel ke filem. Filem adaptasi sering kali dikaitkan dengan persoalan "setia" iaitu melihat sejauh mana filem patuh kepada novel yang dijadikan sumber atau sebaliknya. Kajian ini memperincikan perbezaan yang terdapat pada kedua-dua medium iaitu novel dan filem bagi membuktikan percantuman antara keduanya pasti menghasilkan karya yang turut berbeza. Terdapat beberapa kaedah adaptasi yang telah dianjurkan oleh sarjana Barat seperti Morris Beja, Geoffrey Wagner, Michael Klein dan Gillian Parker, Dudley Andrew, dan McFarlane. Kebanyakannya mencadangkan agar karya asal dijadikan sumber untuk menghasilkan karya baru atau mengekalkan struktur teks dengan menambah tafsiran yang sesuai atau dalam keadaan tertentu meleraikan sumber teks tersebut. Bagi melihat proses adaptasi yang telah dilakukan oleh pengarah filem, kajian ini mengambil empat buah filem adaptasi dari Malaysia dan empat buah filem adaptasi dari Indonesia. Empat buah filem dari Malaysia adalah "Langit Petang" (1982), "Ranjau Sepanjang Jalan" (1983), "Mira Edora" (1990), dan "Jogho" (1997). Manakala empat buah filem dari Indonesia pula adalah "Salah Asuhan" (1972), "Badai Pasti Berlalu" (1977), "Ayat-Ayat Cinta" (2008), dan "Laskar Pelangi" (2008). Kelapan-lapan buah filem tersebut dianalisis berdasarkan proses adaptasi yang telah disebutkan oleh Desmond dan Hawkes (2006) iaitu proses pemotongan, pengekalan, penambahan, dan pengubahsuaian terhadap adegan, tema, watak dan latar yang ingin ditampilkan. Kesemua proses ini menentukan kelas setiap filem tersebut sama ada berada di bawah adaptasi setia, pertengahan atau longgar yang dipadankan dengan kaedah adaptasi Michael Klein dan Gillian Parker (1987) iaitu terjemahan dasar, interpretasi semula dan penghasilan karya seni baru. Dapatan kajian mendapati, pengarah filem lebih banyak menggunakan proses adaptasi pengubahsuaian akhiran cerita kerana didorong oleh hasrat dan harapan untuk memberi makna baru kepada khalayaknya dan dinilai berbeza dari makna novel. Klasifikasi filem adaptasi sebagai setia, pertengahan atau longgar bukan ukuran mutlak untuk memastikan kejayaan atau kegagalan filem tersebut, sebaliknya ditentukan oleh kreativiti pengarah dan krew yang terlibat ketika melakukan adaptasi tersebut. Kajian ini juga mendapati terdapat faktor-faktor lain yang menentukan sambutan penonton terhadap filem adaptasi antaranya populariti novel, tema ringan dan kerjasama baik di antara pengarang dan pengarah bagi mewujudkan persefahaman mengenai proses adaptasi.

Name :
Masturah Alias

Title :
Factors Affecting Job Interview Communication Competence of Unemployed Graduates in Malaysia

Supervisor :
Prof. Dr. Gurnam Kaur A/P Gurdial Singh (MS)
Prof. Dr. Chan Yuen Fook (CS)

One of the challenges that graduates faced at job interviews is their inability to communicate competently in English, the language most often used especially at the multinational companies and government-linked companies (GLCs) job interviews. This inability to communicate competently at job interviews is one of the reasons of unemployment among graduates. This study aimed to determine the factors affecting job interview communication competence of unemployed graduates in Malaysia. The present study employed the mixed method research design using questionnaires followed by a semi structured interview with thirteen respondents. The population sample comprised unemployed graduates participating in the SL1M program (Skim Latihan 1 Malaysia) launched by the government to address the unemployment problem among Malaysian graduates. Questionnaires were distributed to 506 unemployed graduates at three participating GLCs in the Klang Valley of which a total of 337 questionnaires were finally used for data analyses. The Job Interview Communication Competence Scale (quantitative instrument) consisted of items on the five factors of communication competence and also those of the dependent variable job interview communication competence. Overall, findings revealed moderate to low levels of general communication skills, context knowledge, English language knowledge and attitude towards the use of English language. Meanwhile, results indicated a moderate to high level of communication apprehension. Findings from qualitative data were found to be congruent with the quantitative data and further affirmed these results. A notable finding in this study seemed to be that general communication skills were very closely and negatively related to communication apprehension as revealed throughout the study in both quantitative as well as qualitative findings. Scores on general communication skills and communication apprehension showed significant relationship with job interview communication competence. The influence of general communication skills and communication apprehension on job interview communication competence was further validated in the final model of the multiple regression analysis where the two factors showed to be the predictors of job interview communication competence. The regression model was used to develop the Five Levels of Job Interview Communication Competence Descriptors to describe job interview communication competence in two ways – as a summary of performance at job interviews and secondly as an overall assessment of abilities in communication. The findings suggested students at the tertiary level may benefit from reinforcement and enrichment of language proficiency and communication skills that can be achieved in English language classes as well as subject area classes designed to facilitate general communication skills and in tandem promotes confidence in students when using the language.

Name :
Massila Hamzah

Title :
Cross-Cultural Communication Experiences Among International Sojourners In Malaysian Universities

Supervisor :
Dr. Mariah Muda (MS)
Dr. Chang Peng Kee (CS)

This qualitative study focuses on cross-cultural communication experiences among international sojourners (IS) in Malaysian universities. Four research objectives were addressed : 1) to identify the transition shock symptoms in cross-culture communication faced by the international sojourners in Malaysian universities, 2) to determine the building blocks faced by international sojourners in cross-cultural transition, 3) to identify the aspects of perceived similarities or differences by international sojourners in their manifestations of culture 4) to ascertain the adaptation strategies embraced by international sojourners in overcoming cross-cultural communication challenges. Salient discoveries were obtained through in-depth interview with fifteen IS residing in Malaysian universities. The findings painted a vivid picture of the sojourning experiences. Firstly, the symptoms of transition shock were highly characterized by initial sojourning experiences, home separation struggles, emotional distress, initial communication-related stress and acclimatizing to surrounding. Initial sojourning anticipations contributed to themes of: i) unexpected encounters ii) felt differences iii) influences of past experiences. Home separation verify various struggles along the themes of : i) homesickness, ii) attachment need and iii) nostalgic feeling. Indications of emotional distress derived to themes of: i) affective upheavals, ii) yearning to leave and iii) challenged by strangeness. Initial communication-related symptom were salient in themes of : i) initial engagement challenges ii) interaction gap, and iii) withdrawal. Acclimatizing to the surroundings contributed to themes of : i) weather condition, and ii) food acceptance. Secondly, findings warranted the building blocks in cross-culture transition were associated to communication tribulations, language barriers and cross-cultural disputes. Communication tribulations contributed to themes of : i) predicaments in forming relationships, ii) arousing suspicion iii) nonverbal cues. Language barriers derived to themes of : i) interaction difficulties, ii) code substitute and iii) differences in the representation of meanings and pronunciation. Cross-cultural disputes persists in themes of: i) adapting to differences, ii) treatment against IS, iii) socially inappropriate behavior. Thirdly, aspects of perceived similarities or differences were manifested in value orientation and, cultural norms and rules. The themes were associated with : i) familial attachment, ii) society conformity and iii) interpersonal engagement. Likewise, cultural norms and rules subscribed to themes of i) appropriate standards of behavior and ii) attitude towards time and work commitment. Fourth, the strategies to overcome cross-cultural communication challenges were adjustment approach, cross-cultural resilience approach and passive-defensive approach. The adjustment approach uncovered four emerging themes: i) seek balance while preserving cultural identity, ii) negotiating cultural differences, iii) building relationships through communication and iv) local language acquisition. Cross-cultural resilience approach contributed to themes of: i) receptive personality, ii) managing cross-cultural adversities and iii) avoid being judgmental. Passive-defensive approach revealed two salient themes of : i) submission to circumstance and i) seeking shared-group support. In conclusion, across the nexus of cultural diversity lies the challenge to fathom the nuances between home and host culture. Nonetheless, regardless of various ramifications, making adjustments to attain cross-cultural liberation demonstrated a life-changing journey and a rewarding experience.

Name :

Ambrose Anak Dango

Title :

Developing A Framework for Best Practices of Governance of State Statutory Bodies (SSB) in Sarawak

Supervisor :

Associate Prof. Dr. Fatimah Bujang (MS)**Associate Prof. Dr. Firdaus Abdullah@Kenneth Kevin Akeu (CS)****Associate Prof. Dr. Puan Sri Mary Lee Siew Cheng (CS)****Associate Prof. Dr. Azizah Abdullah (CS)**

According to Chief Minister Department report (2008) the total number of public complaints on poor level of services received by State Statutory Bodies in Sarawak increased to 629 in 2007 as compared to 520 in 2006. This is one clear evidence that the State Statutory Bodies have not been able to deliver the level of services up to the expectation of the customers and stakeholders in Sarawak due to unsatisfactory governance. This problem is being corroborated by the finding in the Auditor-General report on State Statutory Bodies in Sarawak (2010 and 2011). The Sarawak government is responsible to fulfill the needs, hope and aspiration of its citizen with limited resources available through best practices of governance. The main objective of this study is to evaluate the best practices of governance and its effects on the level of services in State Statutory Bodies in Sarawak. These best practices of governance were based on literature reviews from developed and developing countries and from the experiences of State Statutory Bodies in Sarawak. The level of services refers to the quality of services given by State Statutory Bodies to its stakeholders and the level of services are evaluated by survey questionnaire and interviews. Hence, the specific objectives of this study are to identify factors in best practices of governance for State Statutory Bodies in Sarawak, the predictor in best practices of governance and to recommend a framework of best practices of governance that can assist State Statutory Bodies in Sarawak. The comprehensive and extensive literature reviews on governance in the public sector in developing and developed countries clearly show the existence of factors in best practices of governance in the public sector. This finding is back up by the empirical evidence and findings obtained through questionnaires survey and rigorous data analysis of this study. An analysis on the feedback and recommendations from the open-ended questions further reinforce the existence of best practices of governance in State Statutory Bodies and its correlation to the level of services provided by State Statutory Bodies to its customers and stakeholders. The questionnaire for this study was constructed using 50 items related to best practices of governance and distributed to 700 senior officers and employees of the State Statutory Bodies, Board of Directors, Audit Committees and Auditors yielding a response rate of 61 per cent. The respondents are well educated, knowledgeable and vastly experienced in best practices of governance in State Statutory Bodies in Sarawak. Thus, their feedback and comments on the subject matter are reliable and accurately reflect the actual practices of governance in their respective agencies.

Factorial analysis involving exploratory and confirmatory factor highlighted the four new factors which determine the level of services rendered by State Statutory Bodies to its customers and stakeholders. In fact, the prime contribution of this study is the identification of these factors on best practices of governance in State Statutory Bodies. This identification of factors is very crucial as they will have direct impact on the level of services in State Statutory Bodies. In fact, the findings suggested that the best practices of governance is highly correlated with the level of services. The result of this study had determined four factors in best practices of governance in State Statutory Bodies in Sarawak namely; Human Resource, Process, Control and Direction (Cadbury Report, 1992; Monks and Minow, 1995; United Nation, 2000; Sidek, 2007; Aziuddin and Arfah, 2009). A multiple regression analysis indicates that all the factors contributed significantly towards explaining the variance in the overall level of services in the State Statutory Bodies. The findings also suggest that the correlation between the four factors and the level of services is highly positive. Finally, this study suggests a suitable and practical framework of best practices of governance for all State Statutory Bodies in Sarawak. However, this framework is only a general proposal and each State Statutory Bodies have to fine tune the framework according to each individual requirement and the uniqueness of each State Statutory Body at that period of time. In order to ensure the effectiveness of this framework, the State Statutory Bodies should have in place strategies to transform the human capital, embrace human governance, adopt knowledge management, restructuring and process re-engineering. Other suggestions include implementing the value for money model through on line services; reviewing the existing ordinances, rules and regulations; developing the integrity strategy; developing effective risk and strategic management; introducing Key Performance Indicators; implementing policy innovation and strategic value creation and adopting the blue ocean strategy. All these strategies will help in strengthening the best practices of governance and thereby improving the level of services in the State Statutory Bodies in Sarawak. This will enhance the competitiveness of Sarawak to compete with the best in the world and finally making Sarawak a develop state by 2020.

Name :

Hussein Hussein Hamood Sharaf Addin

Title :

Target Costing Implementation Decision and Organizational Capabilities from the Perspectives of the Balanced Scorecard Model: A Study on Malaysian Automotive Industry

Supervisor :

Prof. Dr. Normah Omar (MS)**Prof. Datin Dr. Suzana Sulaiman (CS)**

Target Costing (TC) is not only seen to be related to product cost reduction. Instead, it includes product quality, functionality and lead time which, to a similar extent, should be seriously considered. Organizational Capabilities (OCs), as a contextual variable, could affect organizational functions when particularly supported by Balanced Scorecard (BSC) perspectives model in relation to TC objectives. The main objective of this study is to assess TC implementation decision and OCs from the perspectives of the BSC model. Four specific research questions are recaptured in this study, which are in tandem with four specific research objectives formulated to support the main objective of the study. The first three specific objectives focus respectively on the business environment influencing TC-related changes, the practical level of TC implementation stages from the perspective of “financial” and “non-financial” OCs measures, and the applicability level of integrating TC indicators within the BSC model. The fourth specific objective examines the effect of OCs on TC implementation decision as well as the extended effect of TC implementation decision on ultimate organizational performance. From the 515 questionnaires distributed, a total of 201 questionnaires were collected and finally, a total of 176 questionnaires were used. The findings showed: First, significant changes were made during the past five years in TC-related aspects including price structure, cost structure, and product structure. Second, the findings showed excellent ability towards TC implementation stages, except for some capabilities that required TC follow-up activities in achieving cost reduction objectives, especially for Car makers as well as when employing the Confrontation strategy. Third, the findings showed an acceptable ability towards integrating TC indicators within the BSC’s perspectives associated with higher ability of Parts and Components makers as well as when employing the Confrontation strategy. Finally, through specific hypotheses testing, the findings showed a positive and significant effect of OCs on TC implementation decision which is significantly non-invariant across the two types of industries and significantly moderated by Non-Confrontation strategies (Cost Leadership and Differentiation). Further, a significant and positive extended effect was found for TC implementation decision on ultimate organizational performance. The findings overall conclude that the company strategy and industry type are main determinants for TC involvement. The main contributions of the study include: applying BSC’s perspectives to measure OCs (literature), using company strategy as a moderating variable, using industry type as a control variable, Rasch Model analysis in the pilot study as well as in the main study using its outputs as implications for SEM analysis (methodology), and providing further understanding on integrating TC and BSC as well as developing a conceptual framework for the integration of TC and OCs from BSC generation model based on the findings (knowledge/findings).

Name :

Noor Sufiawati Khairani

Title :

Green Supply Chain Management: An Advanced Corporate Environmental Governance Practice In An Automotive Case Firm

Supervisor :

Associate Prof. Dr. Indra Devi A/P S.K Kandasamy (MS)**Associate Prof. Dr. Nagarethnam A/P Sithambaram (CS)**

Green supply chain management [GSCM], recognised as an advanced corporate environmental governance [CEG] practice in this study, has gained widespread recognition as a corporate strategy to address firms’ environmental obligations. However, studies which examine this phenomenon in an accounting context are limited. The thesis addresses this gap in the literature by examining four fundamental GSCM issues: the procedure and practices involved in the GSCM deployment; the key CEG components for the deployment of GSCM; the development of environmental performance measurement system [e-PMS]; and, the role of accountants in the deployment of GSCM. The research issues are examined through a single case study, PROTON Tanjung Malim Sdn Bhd [PTMSB], a car manufacturing and assembly firm operating in Malaysia. . Drawing from the literature, a proposed interpretive GSCM framework is used to analyse and discuss the first research issue. As proposed in the Interpretive GSCM framework, the case findings affirm that the procedure-led *Plan-Do-Check-Act* [PDCA] ISO 14001 Environmental Management System [EMS] framework facilitates the deployment of GSCM at the case firm. The framework postulates ten GSCM practices associated with the procedure-led PDCA-ISO 14001 EMS framework. However, only six GSCM practices, viz green purchasing, green inbound logistics, green manufacturing, green building, green waste management, and inverse flow practice were found at PTMSB. The thesis next explores the fundamental CEG elements required for the deployment of GSCM. Towards this aim, a proposed interpretive e-5Ps CEG framework is used to analyse and discuss the findings.. The framework postulates five inter-linked CEG components namely environmental principle [e-Principle], environmental policy [e-Policy], environmental people/oversight [e-People], environmental process [e-Process], and environmental performance measurement system [e-PMS] for the deployment of GSCM. The results indicate that all five CEG elements are found in the case firm. However, the extent of application and commitment differs between these inter-linked elements. Furthermore, it is noted that several of the CEG elements are directly linked to the procedure-led PDCA -ISO 14001 EMS framework. Given that e-PMS is an element of the CEG framework, the thesis continues with the exploration of e-PMS at the case firm.. The findings indicate that procedure-based and measurement-based issues influence the development of the e-PMS. The procedure-based e-PMS is directly associated with the ISO 14001 EMS, suggesting a system-led development. A system-led e-PMS at PTMSB is supported by the needs-led, audit-led and model-led PMS procedures. Meanwhile, within the measurement-based perspective, several key environmental performance areas [KEPAs] identified within the case firm provide the direction for the development of key environmental performance indicators [KEPIs]. Finally, the thesis argues that the development of e-PMS fits closely with the role of management accountants. Despite these close parallels between the development of e-PMS and the management accountant’s role, the case findings found that management accountants have not responded appropriately to the potential opportunities for greater involvement in facilitating GSCM, particularly in the development of e-PMS.

Name :

Rina Fadhilah Binti Ismail

Title :

Voluntary Risk Disclosure and Firm Value Creation: From The Perspectives of The Agency and Signalling Theories

Supervisor :

Associate Prof. Dr. Roshayani Arshad (MS)

Dr. Suaini Haji Othman (CS)

Associate Prof. Dr. Roslani Embi (CS)

Managing the risks and uncertainties of businesses that operate in a volatile and complex market environment has attracted considerable attention among market participants. Such concerns are particularly related to how businesses deal with the occurrence of increased risks in their business operations. However, the concept of corporate risk reporting has never been the main focus of the Malaysian Code of Corporate Governance (MCCG) when the Code was first introduced in 2000. Even though, there were several effects of economic crisis in 2007 on to the public listed companies (PLC), risk reporting remains a voluntary exercise. One of the prominent characteristics of Malaysian PLCs relates to the highly concentrated ownership structure where companies are mostly owned either by family members and the government. It is expected that these PLCs may face some forms of governance conflicts from the perspectives of agency and signalling theories. Thus, this study aims to review and to examine risk reporting while there is also a tendency of “agency-signalling” conflict when reporting the risk and how it would influence the firm value creation. Specifically, this study adopts a quantitative investigation to capture the voluntary risk information in the annual reports of 233 PLCs, where the final sample involved a total of 656 firm-year observations over a four-year period. This study finds that the most fitting theory that could explain the variation in the choice of voluntary disclosure would be the Agency Theory. The voluntary risk disclosure indicates improvement during the post-financial crisis period (i.e. 2008-2009) due to the efforts of the regulators in promoting corporate transparency and governance. The study also finds that outsider ownership (i.e. government and foreign), board independence (i.e. INED) and board competency (i.e. leaders’ commitment and support) indicate significant influences on management decisions pertaining to voluntary risk disclosure. This study confirms that insider ownership (i.e. family and management) has an insignificant influence on the voluntary risk disclosure, which indicates they are not willing to change for the betterment of the firms in achieving the highest level of transparent corporate reporting. However, their resistance to insider ownership could be weakened when there is an influential dominant decision by the CEO or top management in the firms. In addition, voluntary risk disclosure, specifically the information regarding the Operations Risk and Integrity Risk, has been shown to influence the creation of firm valuation. With further mediation tests, the study also corroborates that the voluntary risk disclosure can be used to persuade firms to engage in decisions to maximise the value of shareholders, which becomes a signal for better value creation through the eyes of other stakeholders. Overall, the results affirm that comprehensive as well as quality of voluntary risk disclosure is useful as a medium to support corporate transparency and enhance firm valuation. This study makes a contribution to the extant literature by incorporating the theory of signalling into the model to provide new insights whether it could exert pressure on management decisions despite the effective exertion of governance mechanisms among Malaysian PLCs. Finally, it is hoped that the findings of this study provide valuable insights to regulators, practitioners, investors as well as other stakeholders for the betterment of corporate transparency initiatives. The results are also expected to address concerns regarding new aspects of firm valuation assessment that could offer a competitive valuation on business decisions.

Name :

Soheil Kazemian

Title :

Influences of Market Orientation on Sustainability of Islamic Microfinance Institutions in Malaysia

Supervisor :

Prof. Dr. Hjh. Rashidah A. Rahman (MS)

Dr. Zuraeda Ibrahim (CS)

Adewale Abideen Adeyemi (CS)

- For the past century, the human has been suffered by
- “Poverty”. Several attempts have been made to fight
- this particular moral challenge. Since last four decades
- providing small loans for the vulnerable entrepreneurs,
- which is called as “Microfinance”, has been known as
- one of the most efficient tools for poverty alleviation.
- But conventional microfinance or “Microcredit Program”
- that is based on pre-determined interest may cause more
- issues for the borrowers, in terms of repaying back the
- loans. In addition, all contracts based on predetermined
- interest is strongly prohibited in Islamic rules, which is
- called “Shariah”. Therefore, for meeting Muslim clients of
- microfinance products who were not interested in using
- microcredit, based on avoiding getting predetermined
- interest, “Islamic Microfinance” was born in South East
- Asia. But, after three decades and despite of having great
- market, Islamic microfinance institutions (Islamic MFIs)
- still face un-sustainability (unsustainable performance)
- which can result in high poverty rate in this region. The
- main purpose of this study is to determine influences of
- three dimensions of market orientation, namely customer
- orientation, competitor orientation and inter-function
- coordination on two aspects of sustainability of Islamic
- microfinance institutions (management sustainability and
- financial sustainability), in Malaysia that is considered as
- one of the pioneers in Islamic microfinance business. The
- “stakeholder theory” and also some of Islamic behavioral
- values like “Brotherhood” and “Al-Adl” have been used for
- supporting theoretical framework of the current research.
- The current study is conducted based on top two Islamic
- microfinance institutions in Malaysia, as the samples,
- namely Amanah Ikhtiar Malaysia (AIM) and The Economic
- Fund for National Entrepreneurs Group (TEKUN). The used
- data was gathered from three categorizes; *management*
- *level* inclusive 60 top managers of AIM and TEKUN (out of
- 90), *employee level* consists of 300 respondents and finally,
- *customer level* inclusive 400 customers from the both
- Islamic MFIs, chosen randomly. Using the variance based
- structural equation modeling (SEM), partial least squares
- (PLS) analyses, the results of this investigation have revealed
- that financial sustainability and management sustainability
- of Islamic MFIs in Malaysia are found to be influenced
- positively by their level of being customer oriented. Further,
- management sustainability of Islamic MFIs is demonstrated
- to be influenced positively by inter-function coordination.
- In contrast, the results also demonstrated that financial
- sustainability of Islamic MFIs is not influenced positively
- by competitor orientation and inter-function coordination.
- Finally, from the analysis, the positive relationships
- between competitor orientation and utility management
- sustainability of Islamic MFIs did not receive statistical
- support.

Name :

Ahmad Nizan Mat Noor

Title :

Relationship Between Human Resource Diversity Management Practices, Diversity Receptiveness and Organizational Citizenship Behavior

Supervisor :

Dr. Shaiful Annuar Khalid (MS)**Associate Prof. Dr. Hj. Nik Ramli Nik Abdul Rashid (CS)**

Organizations today constantly have to discover new ways to be successful and respond to challenges. The employments of workforces who are motivated and willing to exhibit extra role behaviors are important for the survival of the organization. For hotel industry, operational employees must demonstrate such voluntary behaviors in delivering quality services to customers. However, it is becoming more difficult if this type of hotel employees resist exhibiting extra role behaviors or doing something that is beyond the requirement. Therefore, what motivates employees to engage in or exhibit citizenship behaviors has been one of the mainly critical issues faced by hoteliers. While potential factors that could encourage employees' positive attitudes and behaviors considered being the primary focus of interest to practitioners and academia, perceived justice from the fair treatment they have received from the organization is argued to be a strong motivational indicator for such behavior. Based on social exchange theory, cognitive consistency theory and beliefs attitudes-behavioral intentions model, this study proposed a framework connecting human resource diversity management practices, diversity receptiveness and organizational citizenship behavior. A total of 430 operational employees from large (5-star rated hotels) and medium-sized (3 and 4-star rated hotels) hotels, representing a response rate of 42.2%, participated in this study. Self-administered survey questionnaires were utilized in this study. Hierarchical multiple regression analyses were used to test the hypotheses posited in this study. The regression results indicated that: (1) HRDM practices had a significant positive relationship with OCB (OCBI and OCBO), (2) HRDM practices were significantly related to diversity receptiveness, (3) diversity receptiveness were positively related to OCB (OCBI and OCBO) and (4) diversity receptiveness were found to mediate the relationship between HRDM practices and OCB (OCBI and OCBO). Theoretical and practical implications of the study as well as suggestions for future research were discussed.

Name :

Aziam Mustafa

Title :

The Impact Of Product Quality, Service Quality, Price And Location On Satisfaction And Behavioural Intentions In Housing Industry:the Moderating Role Of Delivery Systems

Supervisor :

Associate Prof. Dr. Maznah Che Ghazali (MS)

Customer satisfaction is essential for enhancement of competitive advantage in housing industry. Customer satisfaction brings about a lot of positive implications to the companies, which may contribute to a successful business. It is essential to maintain the customers' satisfaction by offering the right product and services that fulfill their needs and expectations. The customer satisfaction and behavioural intentions were studied and comparisons were made between two types of delivery systems; Sell Then Build (STB) and Build Then Sell (BTS) on the relationship between service providers' attributes, satisfaction and behavioural intentions in housing industry. The service providers' attributes are comprised of the product quality, service quality, price and location which refer to the aggregate services provided by the service provider to their buyers. The objectives of this study are threefold: (1) to examine the direct effect of service providers' attributes comprises product quality, service quality, price and location on buyer's satisfaction and behavioural intentions. (2) to examine the role of satisfaction as a mediating variable between product quality, service quality, price and location towards behavioural intentions and (3) to identify the moderating effect of the delivery systems (Sell Then Build and Build Then Sell) on the underlying relationship between product quality, service quality, price and location on buyers' satisfaction and behavioural intentions. A cross-sectional survey was conducted among house buyers in the urban areas in Klang Valley using self-administered questionnaires. The significant effect of product quality, service quality, price and location on buyers' satisfaction and behavioural intentions was tested using Structural Equation Modeling (SEM) procedure. The findings illustrated that only service quality and price have positive relationship with buyers' satisfaction while only price has a significant effect on behavioural intentions. It also revealed that the buyers would recommend and say positive word of mouth about the service providers. Satisfaction was found to mediate the relationship between service quality and price on behavioural intentions while product quality and location were not significant. Both types of delivery systems (STB and BTS) in this study moderate the effect of price and buyers' satisfaction. However, delivery systems (STB or BTS) do not moderate the effect of the independent variables and the behavioural intentions. The findings hold strong implications for governing bodies, industry practitioners and funding agencies as they magnify the need for new and holistic strategies to address buyers' expectations as well as the developers' intensity in developing innovative housing solutions.

Name :

Mohammed Hariri Bakri

Title :

**Determinants of Primary Market Spread in Developing
Securitization in Malaysia : A Panel Study**

Supervisor :

Prof. Dr. Rosalan Ali (MS)**Dr. Shafinar Ismail (CS)**

Securitization is the process of transforming illiquid assets into rated long-term marketable securities that measures the relationship between securitized assets and market spread. The previous researches provided some evidences on the relationship between the nature of the assets and the primary market spread. Their models provide predictions on how other pricing characteristics affect US and Euro markets. However, emerging markets, notably Malaysia, remain to be testified, and hence these pending results have motivated this study to testify other tests with reference to the Vink Model to fill the literature gap. Further research found that although credit ratings are the most important variables to determine loan spread at issue date, investors appear not to rely exclusively on these ratings, as well as liquidity and leverage beyond the assigned credit rating. The first objective statement to provide empirical contribution variable such as Liquidity and Leverage as determinant of the primary market spread based on Vink regression model of 2008 and 2012. The result shows that liquidity and leverage are significant determinant in the regression model. The next objective is to test the model of determinant of the primary market spread, the goodness fit model shows that all F-statistics are significant from models 1 to 6. Finally, the objective is to examine both internal (firm specific) and external (macroeconomic market condition) determinants of the primary market spread. It is interesting to note that the coefficients of the variable lose its explanatory power when other macroeconomic and financial indicators are controlled for. These results are testified as the study employs recently developed Panel Data approach and Least Method Regression analysis for the study periods of 2004-2012, eleven hypotheses support that their determinants have relationship with primary market spread. The results also verify that marketability characteristics represent the most important group in explaining loan spread variability in internal determinant. Likewise, the transaction size is the most important variables to determine loan spread at issue date. However, for macroeconomic market condition factor of determinants, capital structure characteristic plays main roles where interest and inflation are the main determinants for the primary market spread. As such, the study concludes that the selected determinants are helpful to issuers of bonds to offer alternative cheaper financing cost to their respective originators and better investment return to portfolio managers, and hence could stimulate the strong growth of the Malaysian securitization market in particular and capital market in general.

Name :

Noor Ashikin Mohd Rom

Title :

**The Development of a Microtakaful Model to Serve the
Underprivileged: Low Income and the Poor in Selected
States in Malaysia**

Supervisor :

Prof Dr. Hjh. Zuriah Abdul Rahman (MS)**Associate Prof. Dr. Hj. Asry Yusof (CS)****Associate Prof. Dr. Zainuddin Awang (CS)**

- Microtakaful is one of the mechanisms to alleviate the poverty and to provide necessary protection to low income and the poor. The purpose of this research is to investigate the need for protection (microtakaful) among low income and the poor respondents and finally to develop a suitable microtakaful model based on the findings of the survey, theories and literature reviews. Firstly, need for protection was examined by investigating respondents' demographic profile, their exposure to risks, vulnerability (coping strategies), their financial literacy (ability to save and indebtedness), the awareness level, their capacity to contribute, attitude and trust towards takaful or insurance. Secondly, a new variable namely capacity to contribute was established to investigate the statistical relationship with the need for protection. Thirdly, this study employed income and education level as moderators to moderate vulnerabilities and need for protection. The objective is to find the moderation effect of income and education level on vulnerabilities and need for protection. Another new moderator namely government role is employed to test the relationship between capacity to contribute and need for protection. Fourth, this study also investigates respondents' protection and contribution method preferences, mode of contribution and finally an affordable amount that they are willing to part with on a monthly basis. Need for protection would reflect the potential demand for these population; low income and poor. A face-to-face survey via 760 questionnaires from low income and poor group with household monthly income of RM2,000 and below has been conducted in Kedah, Kelantan and Terengganu. Data was collected and subsequently analyzed to gauge on how microtakaful will be able to assist them in uplifting their economic status. A Structural Equation Modeling (SEM) technique by using AMOS 20.0 software is applied to this research. Six hypotheses namely risks exposure (H_1), vulnerability (H_2), awareness level (H_3), attitude and trust (H_4), ability to save (H_5) and capacity to contribute (H_6) on the relationship with need for protection were examined. Another three hypotheses namely income level (H_7), educational level (H_8) and government role (H_9) were examined under moderation effect. Results indicated that five hypotheses (H_1 , H_2 , H_3 , H_5 and H_6) out of six hypotheses are statistically significant. However, hypothesis H_4 (attitude and trust) was rejected because it was not found to be significant in the hypothesized direction. Hypotheses of income level (H_7), education level (H_8) and government role (H_9) found to be statistically significant and have moderating effects. The eventual Microtakaful Model is proposed at the end of this research will include government role and relevant mechanisms that will be specially designed for the Malaysian low income and poor. A model will assist takaful operators and the government in serving this niche population. By establishing the model, optimistically low income and poor could have their own microtakaful scheme which should be able to provide sufficient benefits thus preventing them from being trapped in the poverty cycle permanently. Nevertheless, the intervention and support from government is vital in providing the financial capacity for low income and poor to have the needed protection.

Name :
Norlina Mohamed Noor

Title :
The Influence of Social Network in Moderating the Relationship Between Training Transfer Determinants and Goal Setting of Malay Women Owners of Small Businesses

Supervisor :
Associate Prof. Dr. Raja Munirah Raja Mustapha (MS)
Associate Prof. Dr. Rudzi Munap (CS)

The main objective of this research is to investigate the moderating effect of social network in terms of the interaction between trainees and primary stakeholders to establish its influence on training transfer determinants and Malay women owners of small businesses' goal setting. The majority of the studies on training transfer have focused on the individual and situational factors in contributing towards training transfer but a very small number concentrated on the role of social network especially among Malay women owners of small businesses. The instrument used for this research is a modification of Training Transfer Model by Baldwin and Ford (1988) and Model of Excellence by McLagan and Bedrick (1983). Three factors: training content, training delivery and opportunity to use as training transfer determinants were taken from the Model of Training Transfer and trainer competency, which was taken from Model of Excellence, formed the conceptual framework for this research. Social network as moderating variable was added in this framework. Interaction of Social Network before, during, after and four months after training between trainees with organizer, trainer and colleagues were included as part of the items asked in the questionnaire. Women attending basic training programs organized by INSKEN (National Institute of Entrepreneurs), MARA (Council of Trust for Bumiputera) and JPW (Department of Women Development) were selected as the respondents for this research. Multiple and hierarchical regressions were used to analyze the data. The findings have confirmed that the interactions between the trainees that exist in the network structure do play a very important role in enhancing training transfer and helping trainees to achieve their goal setting.

Name :
Puteri Fadzline Bt Muhamad Tamyaz

Title :
The Effects of Brand Strategy and Design Innovation on the Brand Performance of the Malaysian Furniture Firms

Supervisor :
Associate Prof. Dr. Norzanah Mat Nor (MS)
Associate Prof. Dr. Syed Jamal Abdul Nasir Syed Mohamad (MS)

Brand strategy and design innovation is frequently discussed as key sources of competitive advantage and subsequent brand performance, particularly in the context of SMEs and large sized firms. One of the sectors that are affected by the growth of branding and design innovation is the furniture manufacturing sector. However, there is a concern of whether the manufacturers are fully equipped with branding strategy and design innovation. This ambiguity comes largely from determinants of brand performance in the SME context that have received only limited research attention. This research addresses this issue. Therefore, the main objective of this study is to examine the effects of brand strategy and design innovation on the brand performance of the Malaysian furniture firms. More specifically, this research empirically examines (1) The influence of brand barriers on brand orientation (2) The influence of brand orientation towards brand distinctiveness (3) The relationship between brand orientation and brand performance (4) The relationship between brand distinctiveness and brand performance (5) The influence of brand distinctiveness on design innovation (6) The relationship between design innovation and its dimensions (7) The effect of design innovation on brand performance (8) brand distinctiveness as a mediator between brand orientation and brand performance (9) design innovation as a mediator between brand distinctiveness and brand performance, along with twelve hypotheses. Primary data were collected for a sample size of 269 firms in Malaysia for empirical verification using AMOS Structural Equation Modelling. The data collection was conducted over a two-month period from CEOs and marketing managers in the furniture manufacturing companies. The survey response rate resulted to 37.5 percent. The analysis of the structural model reveals all twelve hypotheses are significant including seven positive paths, three negative paths and two mediators. Overall there are four direct paths towards brand performance which are brand barriers, design innovation, brand orientation and brand distinctiveness. Two additional paths are found significant in the SEM model along with two mediators. Academically, these empirical sights fill the gaps of literature on the relationships between these factors affecting the brand performance of the furniture industry. It also provides insights into what are the key design innovations that contribute to the brand performance of the furniture firms. This will further enable firms to self-check their branding strategy and design innovation to enhance their performance in the market. Thus, policy makers in the furniture industry should give more priority in redesigning their brand strategy and design innovation to further improve and sustain their brand performance in the furniture sector.

Name :

Taufik Abd Hakim

Title :

Modelling the Impact of Tax Structure on Economic Indicators

Supervisor :

Associate Prof. Dr. Imbarine Bujang (MS)**Prof. Dr. Ismail Ahmad (CS)**

This study attempts to investigate further the recent impact of tax structure on economic indicators in the different group of countries which are the low income, lower middle income, upper middle income and high income countries over the period 2000-2009 (early of modern era). Additionally, the gap between traditional schools of thought which believe that lower income tax rates generate economic growth, while modern schools of thought propagate that higher income tax rates produce economic growth especially for high income countries (Slemrod, 2003; Bonu and Pedro, 2009) motivate researcher to reveal the impact of taxes among group of countries. In this study, researcher specifies models to relate tax structure and economic indicators and estimates them using several advanced econometric approaches which are, 1) the Feasible Generalized Least Squares (FGLS), 2) Two Stage Instrumental Variables (2S-IV), 3) Fixed and Random Effects Instrumental Variables (FE/RE-IV) and, 4) Arellano-Bond Generalized Method of Moments (GMM) estimators. The general finding implies that taxation in lower middle income and upper middle income countries has burdened the economic growth, while for high income countries it has contributed to stimulate economic growth. These results are contrastive with previous studies on tax and support the theory of taxes by modern schools of thought. Evidences from developing countries suggest that total tax revenue (TAX); taxes on income, profits and capital gains (INCOMETX) and highest marginal tax rates (MTR) are highly significant and negatively related to the economic growth. In contrast, the results for high-income OECD countries show that INCOMETX and MTR are significant and positively related to the economic growth. Therefore, this study concludes that, inconsistent impact of taxes is due to the different optimum level of tax rates among the group of countries.

Name :

Zaiton Osman

Title :

The Influence of Psychological Determinants and Retirement Planning on Perceived Bridge Employment: Examining the Moderating Effect of Job Satisfaction Among Employees in Sabah

Supervisor :

Prof. Dr. Ismail Ahmad (MS)**Associate Prof. Dr. Noryati Ahmad (CS)****Associate Prof. Dr. Imbarine Bujang (CS)****Associate Prof. Dr. Hj Asry Yusoff (CS)****Prof. Dr. Rosmimah Mohd Roslin (CS)**

- Retirement forces older workers to disconnect with their previous behavioural patterns and economic position.
- Transition and adjustment from working life to retirement places great psychological pressure and financial distress on older workers, especially those with dependent children.
- Bridge employment provides a solution for older workers to continue working after retirement while transitioning into retirement slowly and smoothly. As losing the job role has a significant impact on the psychological well-being of retirees, engaging in bridge employment helps to fulfil the important psychological functions of older workers by providing an adaptive style to retirement. This study investigates the influence of psychological determinants (future time perspective, retirement goal clarity and financial knowledge) and retirement planning on bridge employment. Moreover this study also examines the moderating effect of job satisfaction among employees in Sabah. Retiring individuals must adapt and make major life transitions. A self-administered questionnaire was used in this study and a total of 523 samples were collected for nine major district in Sabah. Pearson Correlation and Multiple Linear Regression were conducted to determine the relationship between psychological determinants, retirement planning and perceived bridge employment. The findings from this study show a positive association between future time perspective and financial knowledge on bridge employment and a negative association between retirement goal clarity and retirement planning on bridge employment. Subsequently, job satisfaction was proven to moderate the relationship between psychological determinants, retirement planning and bridge employment. The study indicated that there is a need for aggressive promotion on financial knowledge, especially on retirement planning as well as programs on retirement preparedness (seminars, workshops, consultations, talks and surveys) in all organisations (government or private firms) as it will help to prepare employees for retirement and educate employees on other available retirement options such as bridge employment. Moreover, bridge employment opportunities should also be drafted for middle class income employees with a low level of education in both the government and private sectors, rather than just for highly educated employees only.

Name :

Waleed Mohammed M. Al-Sabir

Title :

The Influence of Environmental Factors on The Effect of Market Orientation Towards Business Performance of SMEs in Yemen

Supervisor :

Associate Prof. Dr. Faizah Hj. Abd Rahim (MS)

Prof. Dr. Sofia Abd Rahman (CS)

Associate Prof. Dr. Azizan Abdullah (CS)

SMEs represent the vast majority of establishments in the Arab world and particularly in Yemen, where they represent 99% of the total number of establishments. These establishments lack a deep understanding of the importance of marketing to achieve their goals and continued growth. In addition, there are many SMEs that do not realize the concept of market orientation and how they apply it as one of the concepts of modern marketing that mainly focus on the customer. Furthermore, the supply and demand, forces of competition and the conditions of the market are the basic factors in the Yemeni environment that play a major role in determining to what extent large business companies, in general, are market-oriented companies, and SMEs, in particular, and their influence on the performance of these establishments. This study sought, firstly, to examine whether the relationship established between market orientation and performance in large business firm studies also holds in the context of SMEs in Yemen; and, secondly, to explore the potential effects of market turbulence, technological turbulence, competitive intensity, and market growth on the relationship between market orientation and the performance of SMEs. This study was conducted in four phases, which answered the research questions and addressed different research objectives in which the output from one phase was used in the next phase. Using a sample of 246 SMEs in three governorates of Yemen— Sana'a, Ibb, and Taiz – five hypotheses were tested using structural equation modelling (SEM) via AMOS (Analysis of Moment Structures) software package Version 16.0. The findings of the hypotheses testing indicated that the two hypotheses (H1 and H2) are supported; thereby indicating that market orientation is a key determinant of two dimensions of business performance in the SMEs of Yemen – employees' consequences and financial performance. In addition, the study did not find strong support for the moderating factor (H7) in the context of SMEs in Yemen, except the moderating impact of market turbulence (H4) and technological turbulence (H5). The robust, valid and reliable scale together with the developed model in this study can be used by managers in industry or by academicians for future research.

Name :

Rizati Hamidun

Title :

The Development of the Pedestrian Crossing Risk Assessment (PedCRA) Model at Signalised Intersections Using Petri Nets Approach

Supervisor :

Dr. Siti Zaharah Ishak (MS)

Dr. Intan Rohani Endut (CS)

Accident prediction models are used to estimate accident occurrences related to various identified factors. However, human behavioural factor is always absent from a model parameter since the information is usually unavailable in accident data. This study focused on the development of a model that is capable of integrating the human behaviour, engineering and environmental factors that contribute to pedestrian accident. The developed model can be used to quantify the potential accident risks of pedestrians crossing at signalised intersections in the urban area. Petri Nets π -tool has been applied in this study to achieve integration of behavioural, engineering and environmental factors in assessing the potential risks of crossing pedestrians. Petri Nets is a flexible graphical modelling tool with a strong mathematical basis that is capable of modelling and analysing the system with multiple interactions in pedestrian accident event sequence. Signalised intersections in Kuala Lumpur were used as case studies to predict the risk probability of pedestrian accident occurrences within specific time periods. Site observations were conducted to obtain the pedestrian crossing scenario. The event sequence extracted from this scenario was translated into Petri Nets elements for model formulation. Identified factors were organised into several sub models in the hierarchical model structure. The developed model is called PedCRA (Pedestrian crossing risk assessment) model. Twelve factors were identified as the model parameters and sensitivity analysis was conducted to evaluate the effect of these parameters to the potential pedestrian risk value. The results from this analysis showed that the important parameters are the compliance behaviour of pedestrians, the volume and approach speed of vehicular traffic, the number of lanes and the existence of median. Since the model is designed to only capture an interaction with one approach of the intersections at one time, calibration is required to estimate the risk value for the intersection with 3 or 4 approaches. Validation of the model successfully compared the predicted risk value obtained from the model with the actual risk value obtained from historical accident occurrences at 30 selected signalised intersections in Kuala Lumpur. Chi-Square goodness of fit test indicated that risk values from model and accident data follow the same distribution trend at a 5 percent significance level ($p = 0.05$).

Name :

Mazalan Mifli

Title :

A Simultaneous Assessment of The Hierarchical Models of Market Orientation and External Environmental Factors (EEFs) on The Relationship Between Innovation Orientation and Concept Development in Chain Restaurants

Supervisor :

Associate Prof. Dr. Rahmat Hashim (MS)**Associate Prof. Dr. Artinah Zainal (CS)**

This thesis is about extending the research on menu innovation process in chain restaurant industry. The global consumer foodservice markets, nowadays, are mostly at the stage of saturation, and this presents great challenges to the industry. Hence, a viable new model of menu innovation process has been long sought in hospitality literature. Yet, models of menu innovation process proposed in literature are mostly conceptual in nature rather than empirically derived. Thus, this poses a question of the viability of its usage given the fact that most business landscapes, if not all, are not homogenous. Furthermore, most companies, if not all, are also governed in difference managerial orientations that dictate the directional of the product development process based on the preference towards risk-taking, entrepreneurship, objectivity, assertiveness and information use. Because of this, external environmental factors that build up in the marketplace are, therefore, to be conceived differently by menu planners, which subsequently, dictate a new strategy in managing new menu innovation. Hence, this thesis aimed to empirically investigate the actual practice of managing menu innovation in the chain restaurants that are operating in the consumer market of Klang Valley in Malaysia. The objective is to empirically examine the two orientations that are commonly associated with product innovation that include radical and incremental product development. Specifically, to simultaneously assess the moderating effect of the external environmental factors (EEFs) along with the mediating effect of market orientation on the relationship between innovation orientation and concept development. The empirical setting of chain restaurant is chosen because they are known to be strategically better equipped in managing product innovation in terms of consistency, speed, standardise quality and adaptation as opposed to independent restaurants. Hence, with this empirical setting in the consumer market of Klang Valley, this study offers an excellent opportunity in finding out the practical insight into managing menu innovation. In this study, the quantitative methodology was used as the main pillar of the research methods to assess the hypotheses under investigations. Yet, as concept development and EEFs scales were newly developed for the purpose of this study, the adoption of qualitative in-depth interviewed method at the early stage was indeed necessary. Hence, theoretical conceptualization and the empirical validation were first being advanced using both statistical package for social science (SPSS version 19) and partial least squares (PLS) for these constructs. Empirically, the measurement and structural models of this study confirmed adequate estimations based on PLS path modeling parameters. A simultaneous assessment of both the mediating effect of market orientations and moderating effect of EEFs on the relationship between innovation orientation and concept development confirmed support for the mediating effect but the hypothesised moderating control of EEFs remained inconclusive although its effect size found to be large. This thesis contributes to theoretical knowledge by providing for the first time evidence about the structural linkages between innovation orientations and concept development along with the two higher-order constructs of market orientations and EEFs. Practically, this thesis contributes to knowledge understanding of the inseparable relationships of strategic innovation orientations and market orientations in the decision-making process when engage in today's dynamic consumer markets.

Name :

Zulhan Othman

Title :

The Influence of Service Delivery Failures, Service Recovery and Perceived Values on Customer Behavioural Intentions in Malay Restaurants

Supervisor :

Associate Prof. Dr. Mohd Salehuddin Mohd Zahari (MS)**Associate Prof. Dr. Salleh Mohd Radzi (CS)**

- Undeniable in restaurant operation service delivery failures occurred when service delivery performance does not meet the expectations of customers and classified as either pertaining to the outcome or process. A process failure happened when core service carried in a flawed or incomplete way, resulting in poor benefit and instigating in reduction of economic resources such as money, time, status or esteem to the customer. Knowing failures will occur even in the finest restaurant, it is imperative therefore for the restaurant to make provisions for recovery of these unfavourable instances and the provisions that restaurant makes are known as service recovery. Restaurant ability to recover from service delivery failure is an essential element of the whole service delivery system with significant implications as it is recognized to provide opportunities to decrease costs, improve customer experience and increase customer satisfaction. The effective service recovery not only corrects the service delivery failures, but also builds and maintains strong relationships which ultimately lead to behavioural intentions, including revisiting and word of mouth. In contrary, as to why customers are found of still patronizing some of the restaurants despite providing fewer recovery processes. It is therefore conjectured that the role of positive perceived values may influence customers repeat purchase behaviour or the underlying reasons that cause this causation. This study empirically investigates the causal relationship among service delivery failures, service recovery and perceived values with satisfaction and behavioural intentions of customers towards Malay medium restaurants. A mixed method of qualitative and quantitative investigation through interview with selected restaurant operators and questionnaire survey among the restaurant customers was opted. Through interview with 18 restaurant operators, occurrence of service delivery failures and service recovery as well perceived values in Malay medium restaurants as central issue of this study were identified. The quantitative approach in this study structured through survey questionnaire with customers who had visited and experienced service delivery failures when dining at pre-identified Malay restaurants in Klang Valley. With 481 respondents, the data analyses were conducted by a process of multivariate analysis using structural equation modelling (SEM) via AMOS (Analysis of Moment Structures). Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were initially performed to validate the scales. Five dimensions of the overall measurement model were generated and tested in compliance with stringent purification process for the models. The results of structural modelling provide evidence that three dimensions of service delivery failures, service recovery and behavioural intentions were significantly related and the relationship between service recovery and customer satisfaction were not significantly related. However, the strength of the relationship between service delivery failures and customer satisfaction would be altered by the presence of perceived value. In other word, perceived value mediates the relationship between service delivery failure and customer satisfaction. With this finding, the restaurant operators should not therefore ignore or being ignorant on the perceived value, but highly conversant with it as those elements could be used in retaining the customers despite having a slight service failure and slacking in service recovery.



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