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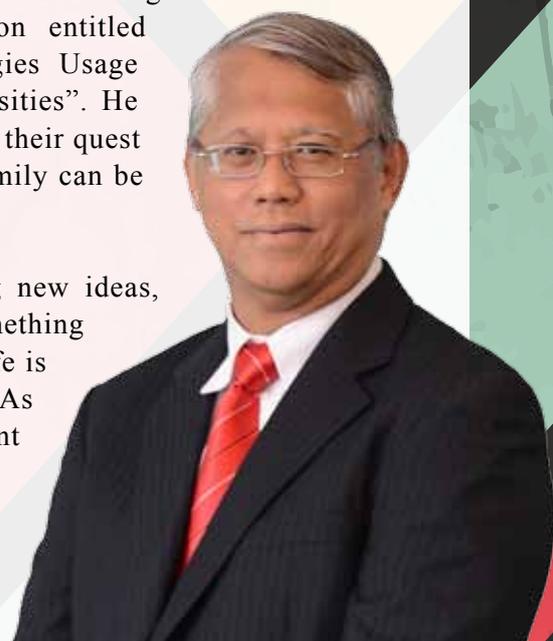
# FOREWORD

Seventy three doctoral graduands will be receiving their scroll today signifying their achievements in completing their PhD journey. The novelty of their research is shared with you through The Doctoral Abstracts on this auspicious occasion, UiTM 84<sup>th</sup> Convocation. We are indeed proud that another 73 scholarly contributions to the world of knowledge and innovation have taken place through their doctoral research ranging from Science and Technology, Business and Administration, and Social Science and Humanities.

As we rejoice and celebrate your achievement, we would like to acknowledge dearly departed Dr Halimi Zakaria's scholarly contribution entitled "Impact of Antecedent Factors on Collaborative Technologies Usage among Academic Researchers in Malaysian Research Universities". He has left behind his discovery to be used by other researchers in their quest of pursuing research in the same area, a discovery that his family can be proud of.

Graduands, earning your PhD is not the end of discovering new ideas, invention or innovation but rather the start of discovering something new. Enjoy every moment of its discovery and embrace that life is full of mystery and treasure that is waiting for you to unfold. As you unfold life's mystery, remember you have a friend to count on, and that friend is UiTM.

Congratulations for completing this academic journey. Keep UiTM close to your heart and be our ambassador wherever you go.



**Prof Emeritus Dato' Dr Hassan Said**  
*Vice Chancellor*  
Universiti Teknologi MARA

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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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1

**Name :** Alsaleh Saad Abdullah R

**Title :** Incorporating Knowledge Sharing Behaviour in a Knowledge Management System for Academic Institutions

**Supervisor :** Associate Prof. Dr. Haryani Haron (MS)



This thesis proposed a knowledge management system framework for academic institutions based on academicians' knowledge sharing behaviour. The current knowledge management systems in higher learning institutions do not capture and represent most of the knowledge types in the academic institutions and little attention has been given to human aspects. A qualitative research approaches were employed in this research. This research was carried out in four stages which are: knowledge acquisition; data collection; data analysis and findings; and development of a knowledge management system framework. The research site was at Malaysia's largest academic institution in terms of size and population. The study discovered two types of knowledge shared among academicians; namely: corporate knowledge and social knowledge. The knowledge sharing networks among the academicians include Community of Practice network, Personal network, and Business Club network. The study also

identified two main knowledge sharing methods used by academicians to share knowledge which are synchronous and asynchronous. Five knowledge sharing motivations among academicians were identified: building a reputation, acknowledgement, to be knowledgeable, vision and mission, and reciprocity. The study identified three issues that academicians recommended to be considered. These issues are: offer information about experts, manage and categorize contents, and ensure accessibility. This research contributed toward new knowledge through the development of a knowledge management system framework which drew upon qualitative findings. The administrations of universities may utilize the proposed framework as a guide for their KS activities among academicians.

2



**Name :** Hamirul Aini Hambali

**Title :** A Rule-Based Image Segmentation Method and Neural Network Model for Classifying Fruit in Natural Environment

**Supervisor :** Associate Prof. Dr. Sharifah Lailee Syed Abdullah (MS)  
Associate Prof. Dr. Nursuriati Jamil (CS)  
Prof. Dr. Hj. Khudzir Hj. Ismail (CS)

Image segmentation and object classification processes are gaining importance in image processing applications such as in agricultural area. In general, image segmentation divides a digital image into multiple areas while object classification classifies objects into the correct categories. However, segmentation and classification processes are challenging for images captured in natural environment due to the existence of nonuniform illumination. Different illuminations produce different intensity on the object surface and thus lead to inaccurate segmented images. The low quality of segmented images may lead to inaccurate classification. Therefore, this thesis focuses on the improvement of segmentation methods and development of classification model for images captured in natural environment. Based on the previous researches, most existing segmentation methods are unable to accurately segment images under natural illumination. Therefore, this research has developed three improved methods which are able to segment images acquired in natural environment satisfactorily. The first method is an improved thresholding-based segmentation (TsN), which adds algorithms of inverse process and adjustment on threshold value. However, there is some inconsistency in the segmentation of lighter colour images such as green, yellow, and yellowish-brown. Therefore, another segmentation method has been developed to address the problem. The new method, named as Adaptive K-means, is developed based on clustering approach.

This method adds separation and inverse processes to the algorithm in order to produce the best segmented images. However, Adaptive K-means has limitation in segmenting black images. Therefore, the improved thresholding-based segmentation (TsN) is integrated with the Adaptive K-means thus resulting in rule-based segmentation namely TsNKM method. This robust method is able to segment images for all categories of objects at a commendable percent accuracy rate. For object classification, some methods have the ability to identify objects as good as human experts who normally classify objects based on visual perception. However, classifying objects in natural environment is difficult due to the presence of direct illumination on the object surface. Therefore, this research has developed a semi-supervised Fuzzy c-means (FCM) and neural network (NN) model that are able to classify objects based on their surface colour. The result of the NN model shows that, with the network configuration of 6-7-4, the NN model works very well for objects exposed to the natural illumination. To justify our proof-of-concept, the proposed segmentation methods and classification model are tested on jatropha fruit images and the results show that the developed methods and model are able to improve the segmentation and classification accuracy, respectively

**3** **Name :** Nor Hashimah Sulaiman  
**Title :** Multiaspect Soft Sets and Its Generalizations  
**Supervisor :** Prof. Dr. Daud Mohamad (MS)



The theory of soft sets introduced in 1999 by Molodtsov is an alternative mathematical tool for dealing with uncertainties. It basically deals with information representations of objects characterized by parameters which are defined over a single common universal set. Combinations of the theory with fuzzy sets and interval-valued fuzzy sets have resulted in the so-called fuzzy soft sets and interval-valued fuzzy soft sets. Various theoretical studies on these theories and the variants have been made, and applications of the theories in various areas particularly in the area of decision making are continuously explored. Soft sets, fuzzy soft sets and interval-valued fuzzy soft sets have greater potential in information representation should the universe sets of elements not be restricted to only a common universal set. Real life situations may involve descriptions of objects, situations or entities based on certain characteristics or attributes which may be associated with different sets of elements of different types of universal sets. In this thesis, we introduce the concepts of multiaspect soft set (MASS), multiaspect fuzzy soft sets (MAFSS) and multiaspect interval-valued fuzzy soft sets (MAIVFSS) which are generalizations of soft sets, fuzzy soft sets and interval-valued fuzzy soft sets, respectively. These

concepts provide platforms for information representations that allow elements from different universal sets be taken into consideration in the description of a particular object, item or entity. MASS is defined for crisp data representation while MAFSS and MAIVFSS are respectively defined for fuzzy data representation with single and interval-valued membership degrees. For each concept, the set operations are established and the algebraic properties are studied. The concepts of mapping for multiaspect soft classes, multiaspect fuzzy soft classes and multiaspect interval-valued fuzzy soft classes are presented. In addition, we put forward the axiomatic definitions of distance, distance-based similarity measures and entropy for MAFSS and MAIVFSS. We introduce weighted and non-weighted distances and similarity measures based on the Hamming distance and the Euclidean distance. Relationships between the three measures are investigated. In the final part of the thesis, we highlight the applicability of some of the introduced concepts in solving group decision making problem under MAFSS and MAIVFSS environment.

**4** **Name :** Syerina Azlin Md Nasir  
**Title :** Development of Process Framework For Ontology Construction Through Ontology Mapping



**Supervisor :** Prof. Dr. Nor Laila Mohd Noor (MS)  
Dr. Wan Adilah Wan Adnan (CS)

Digitization of cultural heritage collections, both within and outside museums has led to the establishment of a new field of theory and practice of the digital curation of cultural information. Cultural heritage ontology construction a practice in museum documentation, faces the challenge of dealing with the abundance of information while struggling to maintain the authenticity and preservation of the cultural knowledge. Similar to other knowledge domains, the existence of various ontology of cultural heritage knowledge and their differences has caused predicament in accessing or retrieving information. To overcome this predicament, the standard ontology, in this case the CIDOC CRM is used to consolidate between two or more local ontology through the consolidation with a standard (global) ontology through a process known as ontology mapping. The effort needed to map two ontologies with some content similarity but different structures while minimizing knowledge loss is challenging. Knowledge loss is a situation where the concepts of local ontology are excluded from the result of mapping to the global ontology. Automated mapping through the use various existing algorithms offers an efficient solution but suffers in knowledge loss. A compromised method is needed to balance between the construction efficiency and the knowledge loss. This research seeks to establish a framework for constructing cultural heritage ontology through semi-automated ontology mapping. Using the traditional Malays textile (TMT) as the domain knowledge for this work and scoping on the Malaysian batik, this research is carried out in three phases. In the first phase, a manual mapping process between an existing TMT Knowledge

Model (local) and CIDOC CRM (global) was carried to produce a Malaysian batik heritage ontology (MBHO). This is also achieved due to active participation of batik and ontology experts in verifying the MBHO. In the second phase, several automated mapping tools were tested. The finding shows that the mapping tools able to produce a Malaysian Batik ontology close to MBHO with knowledge loss as the resulting mapping were mostly incorrect. In the third phase, the refinement of the processes undergone in phases one and two were made to deduce the actual steps carried out and the rules that govern the actions of ontology construction through ontology mapping process. Comparison between both processes showed that the semi-automated mapping can improve the efficiency of the construction while reducing knowledge loss. The work in this phase led to the construction of a process framework of ontology construction through semi-automation. This framework is then verified by an expert in framework development and two experts in ontology constructions. A revised framework was produced and is name as the Framework for Ontology Construction through Semi-Automated Mapping (MapOn). This new framework contributes towards the knowledge and practice of digital curation in general and ontology construction in specific. In addition the MBHO is a new ontology for the Malaysian cultural heritage. This research also produces empirical evidence of the phenomena of knowledge loss through automated mapping which supports the inclination towards semi-automated mapping.

**5****Name :** Zaheera Zainal Abidin**Title :** Furrow and Crypt Detection Using Modified Ant Colony Optimization for IRIS Recognition**Supervisor :** Prof. Dr. Hj. Mazani Manaf (MS)

Associate Prof. Dr. Abdul Samad Shibghatullah (CS)



Iris recognition has been widely recognized as one of the most performing biometric system. The accuracy performance of iris recognition system is measured by FAR (False Accept Rate) and FRR (False Reject Rate). FRR measures the genuine that is incorrectly denied by the system due to the changes in iris features (such as aging and health condition) and external factors that affected the iris image to be high in noise rate. The external factors such as technical fault, occlusion, and source of lighting caused the image acquisition which produce distorted iris images problem hence incorrectly rejected by the system. The current way of reducing FRR are wavelets and Gabor filters, cascaded classifiers, ordinal measure, multiple biometric modality and selection of unique iris features. Iris structure consists of unique features such as crypts, furrows, collarette, pigment blotches, freckles and pupil that are distinguishable among human. Previous research has been done in selecting the unique iris features however it shows low accuracy performance. As a solution, to improve the accuracy performance, this research proposes a new approach called as Modified Ant Colony Optimization that uses ant colony algorithm which search for crypts and radial furrow. The method consists of two tasks in obtaining the crypt and radial furrow features from the iris texture. The first task is the artificial ants that scan the pixel values according to the range of selected crypt or radial furrow. Then, the scanned pixels value is searched based on degree of angle (0o, 45o, 90o and 135o). The second task produces the confusion matrix and the blob of iris feature image is marked and indexed before stored into the database. In order to evaluate the performance of the proposed approach, FAR and FRR are measured

with Chinese Academy of Sciences' Institute of Automation (CASIA) database for high quality images and Noisy Visible Wavelength Iris Image Databases (UBIRIS) database for noisy iris. By using CASIA version 3 image databases, the crypt feature shows that the result of FRR is 18.05% and radial furrow gives 81.5% when FAR at 0.1%. For UBIRIS version 1 database, the crypt feature indicates that the value FRR is 46.93% meanwhile the radial furrow shows the values of FRR 33.87% when FAR at 0.1%. To evaluate Modified Ant Colony Optimization, the genuine acceptance value (GAR) is measured to recognize iris features detection in low quality image environment. The experiment finding indicates that by using the Modified Ant Colony Optimization, radial furrow is able to be detected in distorted iris images with 84.62% since its own characteristics is obviously revealed. Moreover, the interaction between FAR and FRR produces the Equal Error Rate (EER) with 0.21%, which indicated that equal error rate is lower than the previous standard value, which is 0.3%. Therefore, the advantages of using Modified Ant Colony Optimization are it has the capability to adapt with unique iris features in robust manner and use small amount of information in unique micro-characteristics of iris features to determine the user. The outcome of this new approach is to reduce the EER rates since lower EER rates indicates better accuracy performance. As a conclusion, the contribution of Modified Ant Colony Optimization extraction approach brings an innovation at the extrac extraction process in the biometric technology and provides benefits to the communities.

**6****Name :** Zainura Idrus**Title :** Flexible Role Transition Management in Scripting Language**Supervisor :** Associate Prof. Dr. Siti Zaleha Zainal Abidin (MS)  
Dr. Nasiroh Omar (CS)

Associate Prof. Dr. Hjh. Rathiah Hashim (CS)

Networked collaborative virtual environment (NCVE) allows users from diverse locations to work together via virtual workspaces. It is a complex environment requiring coordination amongst team members who are physically invisible and have loose-tie team relationships. To enhance team coordination, roles have been utilized to manage the segregation of tasks among users. Research shows that role transition is a key factor in a successful business process. It acts as a medium for a team to resolve conflict amongst its members. If the changes in roles are not managed effectively, the collaborative works can be disrupted and impose undue pressure on users. However, most studies in managing dynamic groups for NCVE are more inclined to resolve domain specific role transition issues. Furthermore, most existing role-transitions in NCVE must be dealt with manually by external entities to the NCVE system, which are solely done through human intervention. As a result, role transitions are hardly matched or coped with. Hence, this research explores the feasibility of having a socio-technical approach in managing role transitions that can be embedded in NCVE systems to assist both users and computer automation in managing role-transition. This research begins by conducting a case study, which is aimed at observing real-life scenarios in a call center environment. Using a goal directed approach; the real-life scenarios are

illustrated through four personas in eleven scenarios where they are further analyzed with abstract scenes analysis method to produce early findings. The findings are used as a basis to identify the dynamic behavior of roles and provisions of role transition through observation and exploration of the extensive possibilities of a Monopoly game. As a result, a new role transition structure is modeled. Next, the model is transformed into a set of language constructs via Baun-naun-form (BNF) to become a major extension to an existing scripting language named JACIE. Lastly, the language constructs are applied to a call center application to test their functionalities. This research has contributed to a flexible role transition management in the socio-technical approach in two ways: modeling and language constructs. The model supports a range of role transition management designs that are not bound by any specific domain. The language constructs enable programmers to develop prototypes of NCVE applications rapidly whilst hiding the complexity of technical details. In summary, this research shows that it is feasible to embed a role-transition manager into NCVE systems and it is applicable to a wider domain of applications as opposed to the current domain specific approach.

**7** Name : Amelia Ahmad

Title : Variations in Leisure Activity Preferences Based on Ethnicity of Urban Park Users

Supervisor : Prof. Dr. Nik Ismail Azlan Ab Rahman (MS)



Urban parks provide excellent setting for urbanites to pursue leisure time activities. In an ethnically diverse country as Malaysia, park designers, planners and managers are presented with challenges to ensure the promotion of equal access as well as to meet the needs and expectations of the different ethnic groups. Many urban parks failed to incorporate the socio-cultural and behavioural characteristics of the varied park users, focusing mainly on the material and physical aspects of their designs. The concern for ethnic variations in leisure activity preferences occurs due to the fact that the recreation behaviours of some groups may have caused them to be marginalised in their recreation experiences, or lead to facility damage and resource degradation, and also little is known on how ethnic background of recreational users shaped their recreational experiences. This research aims to examine the variations in leisure activity preferences of urban park users across three main groups, that is, Malays, Chinese and Indians. The leisure activity preferences examined includes park usage patterns and participation; social composition; and settings. Two urban parks located in Perak were studied, both being, Taiping Lake Garden (TLG) and Padang Polo, Ipoh (PPI). The data for this study was collected using two methods, that is, observation and survey; and data were then

analysed using descriptive statistics. Findings revealed differences and similarities related to leisure activity preferences of the three ethnic groups. Chinese park users were found to be the most enthusiastic users as compared to Malays and Indians. Physical exercising, such as walking, was preferred by most parks users. Majority of the park users preferred companion, especially of their same ethnic groups, when frequenting the parks. Different groups also have different setting preferences. Factors such as time availability, cultural values, park's physical characteristics, experiences sought and safety aspect, were identified to have contributed to the variations in leisure activity preferences. These findings contributed to a better understanding of the recreation style and leisure preferences of the culturally and ethnically diverse user groups. The findings will assist park designers, planners and managers to improve and enhance on the design, planning and management of urban parks. These can be achieved through better park designs, planned park activities and programmes, as well as, maintenance and clear management policies and strategies of the parks which will meet future park user's needs and expectations.

**8**



Name : Ani Saifuza Abd Shukor

Title : A Framework on Improving Integration of Supply Chain in Industrialised Building System (IBS) Using Design & Build Procurement in Malaysia

Supervisor : Associate Prof. Dr. Hj. Mohammad Fadhil Mohammad (MS)  
Associate Prof. Dr. Rohana Mahbub (CS)

The Malaysian Construction Industry Master Plan (CIMP 2006-2015) identified the innovative approaches of Industrialised Building Systems (IBS) and its supply chains as having important roles in improving productivity in construction processes. Supply chains in IBS involve relationships between many organisations and processes, with the evolution of specialised roles and embedded relationships. The procurement method is utilised as a mediator tool and as the means of controlling integration between players. A good supply chain integration practice leads to good integration among players. Although efforts exist to enhance IBS practice in Malaysia, establishing integration between IBS players is still a major hindrance. A framework for improving supply chain integration is needed. The research problem investigated is lack of supply chain integration and togetherness in IBS project delivery in Malaysia based on four objectives: (1) to investigate the SCM understanding and implementation in IBS projects; (2) to determine the challenges at each tier between players in order to facilitate supply chain integration among the players; (3) to identify means and dimension factors influencing successful integration at each tier between players; and (4) to develop a framework to enhance supply chain

integration for successful IBS projects. This study adopted a multiple methods approach involving two stages: Stage 1, an exploratory stage using a mixed approach of quantitative (with 27 respondents) and qualitative methods (with 6 respondents); and Stage 2, a qualitative methods stage consisting of semi-structured interviews (with 35 respondents) and four (4) project observations. The study identified eight challenges: (1) lack of sufficient knowledge, understanding, and familiarity; (2) attitude and mentality; (3) financial matters; (4) work planning and arrangement; (5) supply chain flow and interaction; (6) guidelines and requirements; (7) risk and conflict liability, and (8) contractual and procurement matters, and means and dimension factors influencing successful integration were grouped into four categories: (1) human and behavioural means, (2) supply chain process and exchange flow, (3) supply chain structure and collaboration, and (4) work environment. The research outputs seek to facilitate and provide a framework as a term of reference for improving integration between supply chain players for the successful implementation of IBS project delivery.

**9 Name : Edie Ezwan Mohd Safian**

**Title : Building and Locational Characteristics' Quality of Purpose-Built Offices in Malaysia and Their Relationship With Rentals**

**Supervisor : Prof. Sr. Dr. Hj. Abdul Hadi Hj. Nawawi (MS)  
Dr. Ibrahim@Atan Sipan (CS)**



Purpose-built office (PBO) market in Malaysia has shown positive developments and increasing level of competitiveness. Many characteristics of PBO were unveiled by virtue of recent studies, market demand, and technology growth and new guidelines/ standards in order to fulfil the property market participants' need. As a result, the characteristics of Malaysia's PBO have become more complex. The increasing complexity of characteristics would entail greater needs on their influence on the rental levels of the PBO space. Nevertheless, there is a lack of research in the country that had actually studied in detail the influence of both the building and locational characteristics on rental levels alone in Malaysia. Therefore, the purpose of this thesis is to establish the building and locational characteristics' quality of PBO and their relationship with rentals in the Malaysia's office property market. Integral to achieve this objective, various characteristics that cover all fields are grouped under eight categories. Delphi Method has been selected as a reliable qualitative method according to the local context in developing building and locational characteristics of ranking through the eyes of local expert panels that can deliver guidance to researcher in recognising the quality of each characteristics of PBO in the local environment. In line with the gap of knowledge in relation to the need to adopt a more consumer oriented approach and the utilisation of high level spatial technology to refine the measurement of variables, modification and improvement based on the current method that is Building Quality Index (BQI) has been applied into this research. Building and Locational Quality Index (BLQI) was introduced

as a unique approach whereby it emphasised on observation method for the quality level of each of the characteristics of PBO in detail. It is a comprehensive method that can combine the data between weightage of importance and weightage of score for each PBO characteristics. Analytical Hierarchy Process (AHP) method analysed the weightage of importance based on the occupants' perception towards PBO. An analysis through a detail observation was done based on previous developed building and locational characteristics' ranking of PBO. There are differences on PBO characteristics that became the variables, building characteristics of PBO that have been measured through building inspections and an informal interview whereas for locational characteristics of PBO, Geo-information System software measured the distance and radius precisely. BLQI method also takes into account the subjectivity and objectivity in making a measurement. Hence, by having quality index for building and locational characteristics of PBO, regression analysis was applied to analyse the relationship between these characteristics' quality of PBO and rental. Moreover, in benefiting from a plethora of variables, several areas in Kuala Lumpur were selected to provide the data on PBO. The study was successful in identifying the relationship of each characteristics of PBO with rental which they have given different results in each study area. Thus, this study is expected to provide insights to the property market participants in improving the performance of the office property market particularly in Malaysia so that it can compete in the international arena.

**10**



**Name : Husrul Nizam Husin@Husain**

**Title : Integrating Safety Elements into Post Occupancy Evaluation for Low-Cost Housing in Malaysia**

**Supervisor : Prof Sr. Dr. Hj, Abdul Hadi Hj, Nawawi (MS)  
Associate Prof. Dr. Hjh. Faridah Ismail (CS)**

The general building conditions in low-cost housing act as an indicator of human quality of life. The enhanced aspects on quality will create a safe environment for the occupants. However, issues arisen have concerning the delivery performance in Malaysia's low-cost housing since the occupants are likely to perceive safety hazards. The safety issues and challenges during the occupancy period include structural instability and falling building fragments. Without defining the occupants' requirements in the early housing development, it is hard to determine the prevailing safety factors. To achieve a better safety provision during the occupancy period, this study used the Post Occupancy Evaluation (POE) approach that incorporates participation from the occupants. POE is used to examine specific performance issues in the building occupancy stage. It generally encompasses a comprehensive review of the building's current situation. The fundamental concept of POE stresses the importance of obtaining feedback from the building occupants. Therefore, the main aim of this research is to develop a Post Occupancy Evaluation (POE) framework that integrates safety elements for low-cost housing (LCH) in Malaysia to meet the occupants' satisfaction level of LCH. A building inspection survey and occupants' satisfaction survey was conducted to 24 low cost housing schemes, known as Program Perumahan Rakyat (PPR) housing schemes in Kuala Lumpur, Malaysia. The sample size for both surveys was 380 (380 for housing units; 380 for occupants). Statistical correlation was used to affirm the incorporation of occupants in respect of safety performance in the POE approach. The analysis used Spearman's rho correlation since the variables in both surveys consist of an ordinal scale. It was found that all attributes have a significant relationship

and successfully support the research hypotheses. In other words, the user's satisfaction has a direct relationship with the overall safety performance of buildings in meeting the needs and expectations of the users. The results have generated an insight into the effectiveness of POE as a means of assessing safety performance. The development process of the framework utilized the vital phases of POE and inputs of safety elements, which were validated through the methodology phases in this research. There are three main phases in this framework: i) planning phase, ii) conducting phase and iii) applying phase, which are related to the concept of POE. The phases involved the safety category, safety elements and safety attributes that have been determined and developed through the preliminary survey, the semi-structured interviews and the main survey. The developed framework shows the steps undertaken for each phase and provides a description of the activities addressed in each step. The results from the validation interviews with the industry practitioners have allowed the usage of the proposed framework for improving safety performance to meet the satisfaction of the occupants. The proposed framework has fulfilled the vital phases of POE and integrates the safety elements with the satisfaction of occupants. The applicability of POE as the assessment tool has generated a new method to optimize housing safety performance during the occupancy stage. The proposed POE framework with integrated safety elements is able to provide a significant input to related government and housing agencies. It is also suggested that the framework is able to propose a modification and improvement concerning the safety performance and maintenance in low-cost housing during the period of occupancy.

11

**Name :** Noraliza Basrah**Title :** Corporate Real Estate Enterprise Risk Management Framework of Business Organisations**Supervisor :** Prof. Dr. Sr. Hj. Abdul Hadi Hj. Nawawi (MS)  
Prof. Dr. Zainal Mat Saat (CS)

Enterprise risk management (ERM) has been recognized as the best practice for risk management worldwide. It is an integrated approach that manages all significant risks of the business organisations. This research study explores the possibility to enhance the ERM concept into protecting the organisational business continuity using the principles of corporate real estate management. It aims to establish the corporate real estate enterprise risk management framework (CREERM) that incorporates the corporate real estate strategies as a specialized tool for strategic risk management in organisations. The research objectives are to identify the encompassing elements of risk management and ERM in theory and practice, to develop and test the CREERM conceptual framework and finally, to refine and validate the proposed CREERM framework. The research strategy begins with the review and observations of the established risk management frameworks in theory and published research as well as the ones in business practice. This involves the quantitative and qualitative content analysis of the academic literature and the Malaysian Top 100 company (by market capitalisation as at 28th June 2010) annual reports through a scoping study to determine the organisations' risk management capabilities. Results showed that regardless of the organisations' core business, among the key factors determining their rank position are the risk management skilled personnel and their risk management experience. The top three risk management capabilities that fall within the advanced level of maturity among these organisations are risk awareness and communication, risk management establishment and training for staff. Critically overlooked elements are their RM system, risk profile, BCM and RM strategies. Both the preliminary

observation and scoping study guided the researcher in developing the conceptual framework. Testing of the conceptual CREERM framework was done through semi-structured interviews on 61 organisations amongst the Top 100 companies. Results showed the importance of aligned CRE and business strategies is to achieve customer satisfaction, business RE requirements and location driven factors. Evidence for successful RM implementation in the 61 organisations indicated the top three RM elements as (1) RM shared responsibility, (2) Effective RM governance and (3) RM job specifications. The bottom three elements needing improvements are (i) recalibration of RM strategies, (ii) multiple risk perspectives and (iii) risk response strategies. The pattern of response during the testing of the framework portrays risk assessment strategies as the most important ERM component. Refinement and validation of the proposed CREERM framework were done through multiple-case study on another 12 selected organisations amongst the Top 100 Companies. The 12 organisations have verified the elements for RM process and risk mitigation strategies for the proposed framework to include crisis management, disaster recovery and business continuity plan besides risk avoidance, risk acceptance, risk reduction, risk sharing and risk transfer strategies. Finally, the 12 validating organisations have verified all the proposed CREERM framework elements consisting of the main principle (comprehensive framework), three core structures (integrated, focus and continuous) and five key thrusts (structured governance, defence mechanism, resilient risk culture, integrated risk management process and aligned track) and validated its workability, flow process and coverage.

12

**Name :** Roslina Idris**Title :** Three Dimensional Building Reconstruction Based on Airborne LiDAR, Aerial Photogrammetry and Topographic Datasets**Supervisor :** Associate Prof. Dr. Zulkiflee Abd Latif (MS)  
Associate Prof. Dr. Juazer Rizal Abdul Hamid (CS)

3D building model of man-made objects supports a diversity of applications such as urban planning, flood mapping and telecommunication. At present, a total automation towards the construction of a detailed and accurate 3D city model is not possible. In order to reduce the time of constructing the 3D building models, an integration of reliable dataset is explored. In mapping technologies, sophisticated sensor has been developed to serve the mapping community. Airborne LiDAR (Light Detection and Ranging) technology has changed the conventional method of topographic mapping, and the increasing interest of these valued datasets for the construction of 3D building models is an active research agenda. Airborne LiDAR provides three dimensional (3D) information of the earth surface with high accuracy point clouds. In this study, the capability of remotely sensed data for the reconstruction of 3D building models is explored, namely; LiDAR dataset, aerial images, digital topographic information and terrestrial photographic images. The study area comprised of residential buildings situated in Putrajaya within the Klang Valley region, Malaysia, covering an area of two square kilometers. The process of the reconstruction 3D building model includes integration of LiDAR dataset, aerial photo, digital topographic information and low cost terrestrial images couple with processing software namely the ArcGIS and SketchUp. Valuable building parameters are extracted based on automated retrieval from the normalized Digital Surface Model (nDSM) as a result from LiDAR DSM and LiDAR Digital Terrain Model (DTM) separation. Orthophotos are used as backdrop

and generated using digital aerial photographs based on photogrammetric technique and height information from the derived digital models. The Root Mean Square Error (*RMSE*) of the vertical component (*RMSE<sub>z</sub>*) for the derived (DSM and DTM) for LiDAR dataset are  $\pm 0.15\text{m}$  and  $\pm 0.14\text{m}$  respectively. As for the digital photogrammetric models, the *RMSE<sub>z</sub>* for the photogrammetric DSM and DTM are  $\pm 0.68\text{m}$  and  $\pm 0.52\text{m}$  respectively. Accuracy of the topographic DTM is assessed and found to be  $\pm 2.49\text{m}$ . It should be pointed out that, the nobility of the study include, assessment of LiDAR dataset and the determination of building footprint. The best accuracy utilizing various digital models for the constructed orthophotos to act as the backdrop for the 3D urban model was found to be  $\pm 0.37\text{m}$  using DTM LiDAR. The final 3D building models constructed were assessed having an accuracy of  $\pm 0.94\text{m}$  and  $\pm 0.61\text{m}$  for the vertical and horizontal component (*RMSE<sub>z</sub>* and *RMSE<sub>x,y</sub>*) respectively. Based on the qualitative assessment, the constructed 3D building models were found to be adequate in supporting the LOD3 (Level of Detail of Level 3) applications. In this study, an automatic evaluation of LiDAR dataset is highlight and automated determination of building footprint is proposed. Evaluation of all dataset in used as well as the accuracy of the 3D building models were critically assessed and found that the integration of remotely sensed dataset and terrestrial images were of high value for 3D building model reconstruction.

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

**13** Name : Siti Norsazlina Haron

Title : Usability Evaluation Framework for Malaysian Hospital

Supervisor : Associate Prof. Dr. Sr. Md Yusof Hamid (MS)

Associate Prof. Dr. Anuar Talib (CS)



The main priority of the Malaysian Hospital design quality has been to organise an informational domain for patient-oriented care design that requires a user-friendly environment. Despite the variety of quality design assessment, the usability evaluation has brought a new dimension in tracking the quality in-use by exploring the meaning of users' experiences. Furthermore, those methods lack the procedures that can effectively identify the needs of users would lead to what of the quality dimension to be considered in its implementation. Therefore, the aim of this research had been to develop a usability evaluation framework, in which the nature of patients and visitors' experience could affect the quality of Hospital environments. The theoretical part suggested that the experiences of hospital end-users might be understood through their feedback on the status of Hospital environments by extending usability and quality theories. This research adopted nine usability criteria, which were identified from the literature. After synthesising the literature, a usability evaluation framework was developed. In addition, the usability parameters for each usability criteria and the domain of user experience context of-use the Hospital physical environment were investigated. Phenomenological philosophy and qualitative dominant approach with case studies were carried out in three Malaysian public hospitals. The

data from the main case studies were retrieved from the viewpoint of patients and visitors through the conducts of semi structured interviews (n=36) and walkthrough journey experience (n=18 group). The data were analysed using content analysis that was run by NVivo9. The findings were validated by the end-users of hospitals, experts who were experienced in construction, design, maintenance, and Hospital domain experts. The findings suggested 25 usability parameters and six (6) domains of users' experience that affected those parameters. The findings were analysed and the refinement of the usability evaluation framework was carried out. The research findings confirmed that the usability evaluation had been an effective approach and the walk-through journey experience method was the best way to gain holistic information pertaining to users' experience. The main contribution of this study is that the usability evaluation has given an added value in assessing the experiences among patients and visitors, quality design assessment, designing, constructing, and managing the hospital. Hence, this study should help organisations to understand the needs of end-users and to support the design of a user-friendly environment. Furthermore, this research provided a starting point from a different setting with more perspectives from the viewpoints of different actors.

## FACULTY OF APPLIED SCIENCES

**14**



Name : Hasila Jarimi

Title : Design and Performance Analysis of A Single Pass Bi-Fluid Photovoltaic/Thermal (PV/T) Solar Collector With Fins

Supervisor : Associate Prof. Dr. Mohd Nazari Abu Bakar (MS)

Associate Prof. Dr. Mahmud Othman (CS)

Associate Prof. Dr. Mahadzir Hj. Din (CS)

The research on photovoltaic/thermal (PV/T) solar collector tends to focus on either water or air as the working fluid. Thus this study aims to investigate the feasibility of incorporating two types of working fluid (air and water) under the same PV/T solar collector. In addition to the electricity generated, this type of collector enables the production of thermal energy in the form of heated air and water. The use of both fluids (bi-fluid) also creates a greater range of thermal applications and offers options in which three modes of fluid operation namely: the air mode, the water mode, and the simultaneous mode (air and water) can be produced depending on the energy needs and applications. To investigate this type of collector, an improved design of a single pass PV/T solar collector which integrates both water and air as the working fluids (bi-fluid) into the system with the commercially available PV module as the thermal absorber was designed and fabricated. Heat transfer enhancement technique to the air flow has been introduced with the use of a series of low-cost fins. To test the fabricated collector, test-rig facilities were fabricated for indoor and outdoor testing with calibrated and reliable data acquisition tools were set-up. The performance of a PV/T solar collector is strongly influenced by the environmental factors, operating conditions and design parameters of the collector. Therefore mathematical modelling is crucial in order to predict the collector performance for further energy optimization purposes. In this study, when both fluids are operated simultaneously, 2-D steady-state analysis is used in modelling the performance of the designed collector. Thus energy balance equations using finite difference method were developed and solved using the inverse matrix solution procedure, with the Newton Raphson iteration implemented to compute the unknown temperature nodes using

MATLAB. Even though the model was developed for the simultaneous mode of fluid operation, it can be implemented for the independent mode by setting the mass flow rate of one of the fluids at stagnant condition (0 kg/s). Experimental studies were conducted to analyse the collector performance for both thermal and electrical characteristics. The total efficiency of the PV/T design was computed by considering the 'primary energy saving efficiency' for both indoor and outdoor testing. For the independent mode, at average wind speed of 1 m/s, air and water mass flow rate ranging from 0.0074-0.09 kg/s, and 0.0017 – 0.0265 kg/s respectively, the experimentally obtained primary energy saving efficiency for air and water are ranging from 34.87% to 72.59%; and 41.35% to 64.79% respectively. Meanwhile for the simultaneous mode of fluid operation, higher range of primary energy saving efficiency was computed such that when air and water is fixed at flow rate of 0.0262 kg/s and 0.0066 kg/s respectively, the computed efficiency are ranging from 64.02% to 77.90%; and 64.01% to 77.03% respectively. The developed model was then validated against the experimental results by conducting error analysis using the mean absolute percentage error (MAPE), and root mean squared percentage deviation (RMSD) methods. From the analysis, the theoretical and experimental results are concluded to be in good agreement and hence the model is proven valid. Using the validated model, parametric studies were conducted. To conclude, this study has significant contributions to the knowledge of PV/T technology in which the computer simulation and experimental results have proven the feasibilities of integrating both fluids into the same collector.

## 15 Name : Muhammad Umair Mohamad

**Title :** Elastic, Structural and Optical Studies of  $x\text{Na}_2\text{O}$ - $(35-x)\text{V}_2\text{O}_5$ - $65\text{TeO}_2$ ,  $y\text{WO}_3$ - $(40-y)\text{Ag}_2\text{O}$ - $60\text{TeO}_2$  and  $z\text{Nb}_2\text{O}_5$ - $(20-z)\text{BaO}$ - $80\text{TeO}_2$  Tellurite Based Glass Systems

**Supervisor :** Prof. Dr. Ahmad Kamal Hayati Yahya (MS)  
Associate Prof. Dr. Halimah Mohamed Kamari (CS)



Three glass systems with composition  $x\text{Na}_2\text{O}$ - $(35-x)\text{V}_2\text{O}_5$ - $65\text{TeO}_2$  ( $x=5, 10, 15, 20, 25$  mol %),  $y\text{WO}_3$ - $(40-y)\text{Ag}_2\text{O}$ - $60\text{TeO}_2$  ( $y=0, 10, 20, 30$  mol %) and  $z\text{Nb}_2\text{O}_5$ - $(20-z)\text{BaO}$ - $80\text{TeO}_2$  ( $z=0, 5, 10, 15$  mol %) were prepared by conventional solid state and melt-quenching methods. Elastic moduli and structural changes were studied by measuring ultrasonic shear and longitudinal velocities using the pulse-echo-overlap technique and Raman spectroscopy, respectively. For  $x\text{Na}_2\text{O}$ - $(35-x)\text{V}_2\text{O}_5$ - $65\text{TeO}_2$  glass system, both longitudinal ( $v_L$ ) and shear ( $v_S$ ) velocities showed small steady decrease with addition of  $\text{Na}_2\text{O}$  from  $x=5$  mol % to  $x=15$  mol % followed by large decrease at  $x>15$  mol %. Longitudinal modulus ( $C_L$ ), shear modulus ( $\mu$ ), Young's modulus ( $Y$ ), Hardness ( $H$ ) and Debye Temperature ( $\theta_D$ ) also showed similar behavior to the ultrasonic velocities. The decrease in elastic moduli is suggested to be due to weakening of network rigidity of the glass system with increase in formation of non-bridging oxygen (NBO) as revealed by Raman spectroscopy. Additional analysis using bulk compression and ring deformation models showed that ratio between theoretical bulk modulus ( $K_{bc}$ ) and experimental bulk modulus ( $K_e$ ) was around 2.1 for  $x=5$ - $20$  mol % before an increase to around 2.4 for  $x>20$  mol % indicating that the main compression mechanism was ideal isotropic compression. Meanwhile, optical band gap ( $E_{opt}$ ) showed increase with  $\text{Na}_2\text{O}$  content and this is related to the increase of  $\text{TeO}_3$  tp formation. For  $y\text{WO}_3$ - $(40-y)\text{Ag}_2\text{O}$ - $60\text{TeO}_2$  glass system, the  $v_L$  and  $v_S$  showed large increase at  $y=0$ - $20$  mol % before dropping with further addition of  $\text{WO}_3$ . Independent moduli ( $C_L$  and  $\mu$ ),  $K_e$ ,  $Y$  and  $\theta_D$  showed similar behaviors to both velocities. The large increase of the elastic moduli at  $y=0$ - $20$  mol % is suggested to be due to the increase in  $\text{WO}_6$  octahedral indicating the increase of bridging oxygen (BO) and also formation of stronger Te-O-W bonds compared to

Te-O-Te bonds. On the other hand, for  $y>20$  mol %, the decrease in the elastic moduli was due to increase in NBO as a result of formation of  $\text{WO}_4$  tetrahedral via breaking of Te-O-W network. Further analysis using bulk compression and ring deformation models showed a slight decrease in the ratio of ideal bulk modulus to experimental bulk modulus ( $K_{bc}/K_e$ ) and average atomic ring size ( $l$ ) for  $y<20$  mol % followed by a large increase for  $y>20$  mol %. Our analysis also indicates that limited ring deformation takes place and the main compression mechanism in this glass system was mainly ideal isotropic compression. On the other hand, optical band gap ( $E_{opt}$ ) showed small variation for  $y=0$ - $20$  mol % but decreased upon higher  $\text{WO}_3$  content while refractive index ( $n$ ) showed the opposite trend. This optical behavior is suggested to be related to the changes in cross link density and NBO concentration in the glass system. For  $z\text{Nb}_2\text{O}_5$ - $(20-z)\text{BaO}$ - $80\text{TeO}_2$  glass system, the  $v_L$  and  $v_S$  steadily increased with  $\text{Nb}_2\text{O}_5$  content and are suggested to be influenced by independent moduli ( $C_L$  and  $\mu$ ). Elastic moduli such as  $K_e$ ,  $Y$  and  $\theta_D$  also showed similar behavior to the  $C_L$  and  $\mu$ . The increase of elastic moduli is suggested to be due to the increase of bridging oxygen (BO) via  $\text{TeO}_4$  tpb formation. On the other hand, Raman spectra showed increase in intensity of  $\text{TeO}_4$  tpb and slight increase in  $\text{NbO}_6$  octahedral. Analysis on the spectra showed that the increase in BO is prominent compared to NBO. Optical energy gap ( $E_{opt}$ ) was found to decrease with  $\text{Nb}_2\text{O}_5$  which is suggested to be due to smaller difference between HOMO and LUMO states of  $\text{TeO}_4$  tpb compared to that of  $\text{TeO}_3$  tp and the averaging effect of  $E_{opt}$  of constituent oxides. Meanwhile, Urbach energy ( $E_u$ ) decreased with  $\text{Nb}_2\text{O}_5$  content indicating reduction in disorder of the glass structure.

## 16



**Name :** Nadzarah Abd Wahab

**Title :** Yeast System for Surface Display of Heterologous Protein

**Supervisor :** Associate Prof. Dr. Mohamad Faiz Foong Abdullah (MS)  
Associate Prof. Dr. Zainon Mohd Noor (CS)

This thesis discusses on the development of zinc oxide (ZnO) nanorods for the application as electron transport layer in MEH-PPV/ZnO Organic Light Emitting Diode (OLED). In general, the mobility of holes is higher than electrons in most semiconducting organic material. Therefore, it is essential to develop an efficient electron transport layer in order to balance out the number of carriers, hence increases the efficiency of the device. Furthermore, combining inorganic material with organic material in a device can take advantages of both materials. The thesis work involved three main parts for the fabrication of MEH-PPV/ZnO OLEDs. The first part was the deposition of novel layer-by-layer ZnO seeded catalyst. High (0 0 2)  $c$ -axis ZnO seed catalyst was prepared using simple and low cost method of sol-gel spin coating technique. Layer-by-layer method was applied in the deposition of the ZnO seed catalyst layer, which is defined by annealing of every layer of the thin film. The second part involved the growth of ZnO nanorods using thermal chemical vapour deposition (TCVD) method by employing vapour-solid (VS) mechanism, without using pump vacuum to control the pressure in the tube. Using single furnace TCVD, substrate positions with a distance of 3 cm from the zinc powder, at an oxygen flow rate of 5 sccm and temperature of 825°C were found to be the optimum conditions for the growth of the ZnO

nanorods in this study. The characterization revealed that the nanorods had low resistivity of  $5 \times 10^{-2} \Omega\text{-cm}$  at highest (0 0 2) crystalline structure. This strongly indicates that the ZnO nanorods had good electrical behaviour which can transport electrons more efficiently in the device. Third part involved the study of MEH-PPV thin films dissolved in non-aromatic solvent such as 1,2 dichlorobenzene and toluene to produce p-type conducting emissive layer. With an optimum solution concentration of 5 mg/ml, highest photoluminescence (PL) spectrum was produced with an emission centred at 590 nm. From the optimized thin films, OLEDs were fabricated. As a conclusion, by combining the ZnO nanorods with MEH-PPV in the OLEDs had improved the electrical characteristics of the device compared to single layer MEH-PPV based device. The fabricated device worked as a diode; which showed a rectifying current. The lowest turn on voltage was found to be at 0.4V using the ZnO nanorods grown at temperature of 825°C. At this deposition temperature, the Schottky barrier height was 0.59 eV, with an ideality factor of 12.91. The OLEDs were also tested using electroluminescence (EL) spectroscopy to prove the devices' functionality. The EL emission spectra were found to match with the PL emission

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

## 17 Name : Nadzirah Kamarul Zaman

**Title :** Extraction, Purification and Characterisation of Bromelain from Pineapple Crowns and its Application

**Supervisor :** Associate Prof. Dr. Zainal Samicho (MS)  
Prof. Dr. Noriham Abdullah (CS)  
Dr. Normah Ismail (CS)



Pineapple crowns are an agricultural waste available in large quantity particularly from canned pineapple industry. Alternatives to its efficient utilisation are necessary as the crowns contain high enzyme activity which can be potentially used as a meat tenderiser. Thus, the aims of this study are to extract and purify bromelain from the pineapple crowns. The purified bromelain was freeze dried to produce bromelain powder which was later applied to tenderise the toughest Brahman part, round. The action of bromelain in tenderising beef was affected by different pHs of beef, immersion temperatures and times, and bromelain solution concentrations. Thus, response surface methodology (RSM) was used to determine the feasible optimum condition for the beef tenderisation by bromelain. The effect of bromelain treatment on the physico-chemical properties of beef and its nutritional quality was determined. The nutritional quality of beef was determined from the proximate extent between the bromelain-treated beef and the reference pattern protein and compared with the untreated beef. SDS-PAGE revealed that bromelain from pineapple crowns is a monomeric with a molecular weight of 30 kDa. The bromelain powder was less pure compared to that of standard bromelain powder. The bromelain powder stored in the frozen temperature was the most stable since it

showed very little loss in bromelain activity and the lowest value in water activity compared to bromelain powder stored in the chilled and room temperatures after four weeks of storage. The beef tenderisation treated with bromelain could be optimised by 89.91% at the feasible optimum condition whereby the pH of beef was 5.6, the immersion temperature was 60°C, the concentration of bromelain solution was 0.17% and the immersion time was 10 minutes. Bromelain decreased the hardness, water holding capacity (WHC), moisture content and a\* value of beef. On the other hand, bromelain increased the pH, cooking loss, and L\* and b\* values of beef. Bromelain also fragmented and denatured the proteins in beef. The proximate extent of the bromelain-treated beef (0.57) was inclined towards the reference pattern protein (1.00) compared to the untreated beef (0.51). This indicated that beef treated with bromelain had a desirable effect on the nutritional quality of beef. This study can contribute in promoting and increasing the economic value of beef. At the same time, the extraction of bromelain from pineapple crowns can solve the waste disposal problem generated by the canned pineapple industry.

## 18 Name : Nor Zakiah Nor Hashim

**Title :** Studies on the Adsorption and Corrosion Inhibition of Substituted Benzylidene Schiff Bases On Mild Steel In 1 M HCl

**Supervisor :** Dr. Karimah Kassim (MS)  
Dr. Hamizah Mohd Zaki (CS)  
Dr. Yusairie Mohd (CS)



The objective of this thesis is to investigate the performance of newly synthesized substituted benzylidene Schiff bases as corrosion inhibitors of mild steel in 1 M HCl at 25°C. To accomplish this intention, a series of (E)-N'-benzylidene-N<sup>4</sup>-phenylbenzene-1,4-diamine Schiff bases that contain different substituent groups at *para* position of benzylidene were synthesized and characterized via physical and spectroscopic analysis. The azomethine double bond (C=N) infrared spectra found for the Schiff bases are at around 1590-1604 cm<sup>-1</sup>. From <sup>1</sup>H Nuclear Magnetic Spectroscopy (NMR) spectra, the azomethine proton (singlet) shifted in the range of  $\delta$  8.634-8.531 ppm, while the peaks at around  $\delta$  157.32-155.82 ppm found in <sup>13</sup>C NMR spectra are assigned for azomethine carbon. The corrosion inhibition performance of N-phenyl-1,4-phenylenediamine (NPPD), (E)-N<sup>1</sup>-benzylidene-N<sup>4</sup>-phenylbenzene-1,4-diamine (K1), N-[(E)-4-chlorobenzylidene]-N<sup>7</sup>-phenylbenzene-1,4-diamine (K2) and N-[(E)-4-methoxybenzylidene]-N<sup>7</sup>-phenylbenzene-1,4-diamine (K3) was measured in 1 M HCl using electrochemical methods which are polarization, Linear Polarization (LPR) and Electrochemical Impedance Spectroscopy (EIS). The analysis of substrate's surface via Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM) and X-ray Photoelectron Spectroscopy (XPS) was employed to determine the Schiff base adsorption behaviour on the surface of mild steel in the acidic solution. The electrochemical results revealed that the corrosion inhibition efficiencies of the Schiff bases are higher and achieved up to 96.0% as found for K2, thus more effective than the other Schiff base in the series, and the parent amine of NPPD. The adsorption of inhibitors at the metal-solution interface are well described

based on Langmuir adsorption isotherm because  $R^2$  and slope values are almost to the value of 1. In further work, the temperature effect of Schiff bases in 1 M HCl also has been evaluated using polarization method. The inhibition efficiencies found for K2 inhibitor retains its great inhibitive effect and increase slightly until become almost constant at the highest temperature of 55°C. XPS measurements showed that studied Schiff bases mainly adsorbed *via* chemisorption interaction which involves coordination bond mainly electron donation from  $\pi$  electrons in the benzene ring and azomethine double to the empty orbital of metal. This is supported by  $\Delta G_{ads}$  values which suggests the adsorption of Schiff base inhibitors on mild steel surface are due to the both combination of chemisorption and physisorption. The multilayers adsorption of inhibitors is due to subsequent layer physisorbed on the inner most (chemisorbed) layer via weak intermolecular hydrogen bonding of C-H- $\pi$  between Schiff base molecules. The relationship between the corrosion inhibition efficiency with physicochemical and electronic properties of N-phenyl-1,4-phenylenediamine and Schiff bases was examined *via* density functional theory method. Theoretical results clearly shown that the corrosion inhibition efficiency of inhibitors are essentially depends on the frontier orbitals parameters as example by the increase of inhibition efficiency always directly related to the decrease of band gap energy between HOMO and LUMO. It is proven there is an electron transfer interaction among the Schiff base molecules with the active sites at the metal surface..

**19** Name : Siti Hawa Jamil

**Title** : Role of Rare-Earth (Eu, Dy And Yb) Substitution on Determining The Structural, Thermal and Superconducting Properties of BSCCO Superconductor Prepared via Coprecipitation Method

**Supervisor** : Associate Prof. Dr. Azhan Hashim@Ismail (MS)  
Dr. Syed Yusainee Syed Yahya (CS)  
Dr. Azman Kasim (CS)

In this study, the  $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_{2-x}\text{RE}_x\text{Cu}_3\text{O}_y$  (RE = Eu, Dy and Yb) where  $x = 0.000, 0.025, 0.050, 0.100$  and  $0.200$  which were synthesised through the coprecipitation (COP) method was successfully prepared. The phase purity and structural properties were performed by X-ray Diffractometer (XRD), Field-Emission Scanning Electron Microscopy (FESEM) and Energy Dispersive X-ray Spectroscopy (EDX). Meanwhile, the powders at each stage of the coprecipitated powder, precalcined and calcined products were characterized by Thermogravimetric Analysis (TGA) and Fourier Transform Infrared Spectroscopy (FTIR). Furthermore, the resistivity and critical current density were measured by using the four-point probe method. The Bi-2223 superconductor induced the additional Bi-2212 phase with increasing RE concentration. The crystallographic structures of the samples were slightly changed from tetragonal to orthorhombic in higher concentration of  $x > 0.000$ ,  $x > 0.100$  and  $x > 0.025$  for the Eu, Dy and Yb samples, respectively. Consequently, the analyses showed a decrease of the lattice parameter  $c$  and volume fraction for the Bi-2223 phase with the substituted sample while the SEM investigations showed that the surface morphology of microstructures had degraded, the grain connectivity became weak and the porosity increased with RE concentration. This resulted in the degradation of superconducting properties and it exhibited less grain alignment and connectivity that resulted in the decline of  $J_c$  with

RE substitution. However, Yb showed better grain alignment compared to the Eu and Dy substituted samples. TGA results showed identical thermal behaviour for each substitution samples, which underwent different stages during their formation. TG analyses showed that there were five steps of mass loss for precipitated powder. TG curve for the sample  $x = 0.025$  Eu, Dy and Yb, which has been calcined for 24 hours at  $845^\circ\text{C}$  shows only one drop in temperature above  $800^\circ\text{C}$ . Apparently, no indication of mass loss could be seen below  $\sim 800^\circ\text{C}$ . Therefore, it revealed that the formation of the carbonate can be suppressed in the calcined stage. FTIR results showed that the apparent infrared spectrum on all the precursor powders qualitatively showed four main regions and the existence of  $-\text{OH}$  group has an ability to increase the diffusion rate between metals during synthesis process. Increasing the concentration of Eu, Dy and Yb substituted in the Bi-2223 caused the decrement of  $J_c$  and  $T_c$  values.  $J_c$  and  $T_{c\text{zero}}$  of the substituted samples were found to be lower than for the pure sample with almost the same  $T_{c\text{zero}}$ ; however, the Yb substitution showed greater  $J_c$  with  $4.1910 \text{ A/cm}^2$  compared with the other substitutions



**20**



**Name** : Suhaidi Ariffin

**Title** : Screening for  $\beta$ -Lactamase Inhibitors from Mangrove Soil Actinomycetes

**Supervisor** : Associate Prof. Dr. Sharifah Aminah Syed Mohamad (MS)  
Associate Prof. Dr. Mohamad Faiz Foong Abdullah (CS)

Marine-derived actinomycetes possess distinct and complex metabolic capabilities, resulting in the wide diversity of their secondary metabolites in terms of chemical structure and biological activity. The bioactive compounds of actinomycetes isolated from mangrove soils are reported to possess various biological activities such as antimicrobial, cytotoxicity, anticancer and antioxidant. The aims of this study are to isolate and characterize diverse populations of marine actinomycetes from mangrove soils, to identify selected morphologically distinct isolates by using 16S rRNA sequence analysis, to screen their potential biological activities as antimicrobial as well as  $\beta$ -lactamase inhibitor agents, and to elucidate the structure of selected bioactive compounds. A total of 73 actinomycete strains were isolated from 11 mangrove locations in Malaysia. Of these, morphological observations and 16S rRNA sequence analysis indicate the presence of representative species from at least 3 genera *Streptomyces*, *Pseudonocardia* and *Saccharomonospora*. The majority of the isolates belong to genus *Streptomyces*. It was found that the most productive medium for isolation is starch casein nitrate agar (SCNA). It was also found that addition of 3% sodium chloride (NaCl) improved the isolation

rate of mangrove actinomycetes. Disc diffusion assay showed that 9.6% (direct broth culture) and 8.2% (ethyl acetate extract) of these isolates were able to produce antimicrobial compounds active against *Staphylococcus aureus*, *Bacillus subtilis*, *Candida albicans* as well as *Saccharomyces cerevisiae*. Hexane extracts however exhibited no activity. A modified microdilution plate assay showed that 16.4% (ethyl acetate extract) of these strains were able to generate antimicrobial compounds active against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Candida albicans*. A rapid screening assay for  $\beta$ -lactamase inhibitors activity by resazurin microdilution plate assay was developed and showed that 4.9% of actinomycete isolates were able to produce inhibitor compounds against *Staphylococcus aureus* ATCC 43300. The KMS1 isolate was chosen as a lead candidate because this strain showed consistent production of antimicrobial and inhibitor active compounds throughout the screening experiments. Nuclear magnetic resonance (NMR) spectroscopy analysis showed that the active compound (KMS1-2B) was 4-hydroxybenzoic acid.

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

**21** Name : Ahmad Nazaruddin Mohd Roseli

Title : Growth, Physiological and Flowering Responses of *Xanthostemon Chrysanthus* (F. Muell.) Benth. to Paclobutrazol and Potassium Nitrate

Supervisor : Dr. Tsan Fui Ying (MS)  
Associate Prof. Dr. Adzmi Yaacob (CS)  
Dr. Normaniza Osman (CS)



*Xanthostemon chrysanthus* (F. Muell.) Benth. or golden penda (locally known as jambu kuning) is gaining its popularity in Malaysian landscape. However, under local climatic condition, the flowering of *X. chrysanthus* is very erratic and inconsistent. An investigation on the growth, physiology, flowering and identification of a suitable practice to induce flowering of this species was carried out. Based on the Biologische Bundesanstalt, Bundessortenamt and Chemical Industry scale, nine principal growth stages, i.e. bud development (stage 0), leaf development on tree branches (stage 1), formation of side shoots (stage 2), shoot elongation (stage 3), inflorescence emergence (stage 5), flowering (stage 6), fruit development (stage 7), maturity or ripening of fruit and seed (stage 8) and fruit senescence (stage 9) were determined in *X. chrysanthus*. Vegetative and reproductive stages of this species were completed within 198 and 176 days, respectively. *Xanthostemon chrysanthus* planted in loamy sandy soil at two selected urban sites in Kuala Lumpur, i.e. Metropolitan Batu Park (MBP) and Pusat Bandar Manjalara (PBM) showed that trees at MBP, which is a recreation park with bigger planting area, had better growth performance than those trees at road median at PBM. Significant higher coarse sand content in soil of PBM influenced the water holding capacity, causing significantly lower growth responses, especially the relative growth rate of canopy diameter and leaf area index. Physiologically, higher photosynthetic rate, transpiration rate and stomatal conductance were recorded during rainy season with vegetative branches as compared to reproductive branches. Profuse flowering was observed with some trees at MBP in certain times while none of the trees flowered at some other times. On the other hand, moderate flowering was observed with

all under study trees at road median at PBM at all time. A suitable approach to induce flowering was identified using a synthetic plant growth regulator (paclobutrazol, PBZ) combined with potassium nitrate ( $KNO_3$ ). Nine treatments with nine replicates, of different concentrations of PBZ and  $KNO_3$ , were assigned in a completely randomized design. PBZ lengthened the flowering period to up to 73 days as compared to only 40 days for the control tree. However, smaller flower and lower flower abundance were observed with PBZ treatment. Concurrent vegetative growth inhibition included reduced tree height, diameter at breast height, canopy diameter and leaf area, while leaf area index and relative chlorophyll content increased with PBZ alone or with combined treatment of PBZ and  $KNO_3$ . Palisade parenchyma thickness in the leaf was drastically increased, while xylem thickness in the stem reduced with PBZ existence. Similarly, photosynthetic rate, transpiration rate and stomatal conductance were reduced with PBZ. Total phenolic content was found increased, while total non-structural carbohydrate was reduced with the existence of PBZ. However, lower dosage of  $0.125 \text{ mg l}^{-1}$  PBZ combined with  $100 \text{ g KNO}_3$  per tree produced highest number of flowers per inflorescence and increased the inflorescence size. In addition, photosystem efficiency measurement showed that the trees were well adapted with the treatments. The practice of using PBZ and  $KNO_3$  has the potential as a tool to improve the aesthetic value of this species. It can be considered as a good candidate for the urban landscape. Besides being able to be induced to flower better, it also tolerates the harsh urban environments that are highly exposed to various biotic and abiotic stresses.

**22**



Name : Jurina Jaafar

Title : Grid-Based Remotely Sensed Hydrodynamic Surface Runoff Model using Emissivity Coefficient

Supervisor : Associate Prof. Dr. Wardah Tahir (MS)  
Associate Prof. Ir. Dr. Aminuddin Baki (CS)

The development of a hydrodynamic distributed model is designed to simulate discharge and water levels as a function of space and time. The development of the model strongly depends on the physical based parameters, examples of physical parameters that include roughness Manning's  $n$ , hydraulic conductivity, soil depth, river geometry and the surface land cover. Most Malaysian catchments are not gauged, albeit or scarce discharge data is available and the difficulty to access and hard to obtain in situ site area information. These scenarios have brought an interest into this study to use satellite images in obtaining information of the ground surface from inference in a digital elevation model (DEM) and other information such as the land use characteristics. The processes of infiltration and overland runoff flows are complex phenomenon. Both interact on the soil surface on the ground at its own capacity. Since soil surface is the primary order that control the hydrological and hydraulic processes, the topographic of the land use sensed by the satellite is used to describe the spatial variations of the ground surface. In this study, a quantitative surface runoff estimation using the information of emissivity from the remotely sensing technique is developed for potential input representing the surface roughness. The process from the satellite information allows an optimal judgment to decide the most appropriate Manning roughness to be used in the simulation of surface runoff. The algorithm is

applied for Sungai Pinang and Sungai Dondang river basin. Results from both catchment areas are validated against gauge recorded. A SRTM derived digital elevation model (DEM) is used to represent topography over the catchment area and provided hydrological bare earth elevations as required in the model. Model results for rainfall events are evaluated for DEM grid resolution of 30m with specified boundary and at given initial spatial condition. For model calibration purposes, the observed is quantitatively compared to the simulated surface runoff. The result for Sungai Pinang and Sungai Dondang showed satisfactorily simulation results in terms of differences between measured and simulation results. The best overall performance for Sungai Pinang is 5.05 % that indicate a good performance of surface runoff model for August 23, 2009 event. The Sungai Dondang result shows a total standard estimate of errors of 4.87 % and it is indicates as good performance of surface runoff model for Jun 6-7, 2006 event. The results from the model are promising and it is limited by its ability to model all the variables that are involved in the development of surface model. It is learned that creating an accurate description of the ground surface is a complex problem, which requires at least site study. The coupled remote sensing and surface runoff model is able to calculate surface runoff with an addition of emissivity value to represent the surface roughness coefficient.

**23** Name : Aishah Hartini Jahidin

Title : Artificial Neural Network Modelling for IQ Classification Based on EEG Signals

Supervisor : Prof. Dr. Hj. Mohd Nasir Taib (MS)  
Associate Prof. Dr. Nooritawati Md Tahir (CS)  
Mr. Megat Syahirul Amin Megat Ali (CS)



Electroencephalogram (EEG) is a non-invasive approach for measuring brainwaves applied extensively in cognitive studies. Intelligence, which is commonly gauged as intelligence quotient (IQ) is one of the human potential ability that originates from cognitive functioning of the brain. Recent researches have shown that correlation exists between EEG and IQ. Furthermore, various advanced studies on the EEG signal are conducted using advanced computation methods. However, a systematic approach for IQ classification based on brainwaves and intelligent modelling technique has yet to be studied. Hence, this thesis proposed a practical and systematic approach to develop IQ classification model via artificial neural network (ANN) based on EEG sub-band features which then, can be related with brain asymmetry (BA) and learning style (LS). The protocols involved EEG recording during resting with eyes closed and answering the conventional psychometric test. Fifty subjects of UiTM students are divided into three IQ levels based on the IQ scores from Raven's Progressive Matrices as the control group. Power ratio (PR) and spectral centroid (SC) features of Theta, Alpha and Beta are extracted from left prefrontal cortex EEG signals. Then, the distributions of sub-band features are examined for each IQ level. Cross-relational studies are also done between IQ and other cognitive abilities, which are brain asymmetry and learning style based on EEG features. Further, IQ classification models comprising of inputs

based on PR and SC features (Model A and Model B) are developed using multilayer feedforward network. Findings from this research showed that sub-band PR and SC features are indeed correlated with IQ. Consequently, the network models yielded low mean squared error (MSE) and fulfilled the correlation requirements in classifying IQ levels. In cross-relational studies, findings have also revealed that PR and SC in relaxed closed-eyes state reflect the relationship between intelligence and other cognitive abilities. The results showed that different balanced states of the brain and learning styles can be mapped to distinct IQ levels using the developed models. Results also demonstrated that high IQ is obtained when subjects maintain relatively balanced hemispheric control. Additionally, results also revealed that medium and high IQ levels are capable of utilising four learning styles compared to low IQ level where only three learning styles were utilised. In conclusion, this research has proven that IQ level classification via EEG and ANN modelling is successful specifically the PR and SC features at resting EEG that can be considered as a stable biological marker in relation to cognitive performance. In addition, the study also confirmed that left hemisphere of the frontal region is adequate for IQ recognition.

**24** Name : Ali Abd Almisreb

Title : Consonants Recognition and Noise Reduction for Arabic Phonemes Based Malay Speakers

Supervisor : Ir. Dr. Ahmad Farid Abidin@Baharun (MS)  
Associate Prof. Dr. Nooritawati Md Tahir (CS)



Arabic phonemes can be categorised into 28 consonants. The variations in each phoneme and vowel cause difficulties for the non-native Arabic speakers, particularly the Malay speakers, to pronounce these letters correctly. Hence, in this thesis, noise reduction and consonants recognition are conducted among the Malay speakers. The Malay race has been chosen due to the high usage of the Arabic language for reciting Al-Quran. Generally, the study is divided into two parts, namely, the study of noise reduction and consonant recognition. First, two noise removal methods were developed. The first method is based on combining Negative function with Gamma correction function. The second noise reduction method is addressed by utilising 2D Gabor filter. Furthermore, the consonant study was conducted based on Automatic Speech Recognition (ASR) system concept. The ASR composes of feature extraction stage followed by speech recognition. On the other hand, the feature extraction was implemented by investigating three different methods, namely, Mel-Frequency Cepstrum Coefficients (MFCC), Linear Prediction Coefficients (LPC) and Perceptual Linear Prediction (PLP). Finally, the speech recognition process was

conducted by utilising three methods: Dynamic Time Warping (DTW), Artificial Neural Network (ANN) and Deep Neural Network (DNN). Experimental analysis and results showed that the proposed noise reduction methods have advantages over the traditional methods in terms of the consonant waveforms enhancement quality and the computational time as well. The MFCC has shown better performance compare to LPC and PLP as a feature extraction technique. Additionally, the comparison between DTW and ANN has proven that the ANN more suitable for Arabic consonant recognition. On the other hand, the joining of ANN and DTW has worked optimally as well. Lastly, the DNN are the most suitable methods for recognition process of Arabic consonants based on Malay speakers' usage.

**25** Name : Fazlina Ahmat Ruslan

Title : Modeling of Flood Water Level Prediction using NNARX

Supervisor : Associate Prof. Dr. Ramli Adnan (MS)  
Associate Prof. Sr. Dr. Abd Manan Samad (CS)  
Associate Prof. Dr. Hj. Zainazlan Md Zain (CS)



There were a total of 58 events of natural disaster in Malaysia for the period between years 1980 to 2010 that claiming a total of 1,239 lives of the 640,000 people affected. These data were based on statistics provided by United Nation Officer for Disaster Risk Reduction (UNISDR). From all different categories of natural disasters considered, flood accounted for over half the registered events. Floods contribute to 8 out of 10 disaster events with the highest human exposure and affect over 85 % of all the disaster-stricken people. Floods are thus the primary hazard which affecting Malaysia, in particular the west coast of Peninsular. Therefore, an accurate and reliable flood prediction model is very much needed to provide early warning for residents nearby flood locations for evacuation purposes. However, current trends in flood prediction only involve flood modeling because no prediction time was mentioned and discussed. Furthermore, in Malaysia there is none of flood model or flood prediction model developed yet. An existing system in the Department of Irrigation and Drainage Malaysia is only the alarming system which alarms the users only when the water level exceeds the danger limit. Based on these scenarios, the research objective is to obtain a flood water level prediction model for Kuala Lumpur flood prone area using a new develops modeling technique that based on Neural Network Autoregressive Model with

Exogenous Input (NNARX). The samples used for model training, model validation and model testing were carefully selected. In order to obtain good flood water level prediction model, all samples must be the data when flood events happened. All samples were real-time data that were obtained from the Department of Irrigation and Drainage Malaysia upon special request. From carefully selected samples, several optimal flood prediction times were suggested for flood location in Kuala Lumpur. Model validation and model testing were conducted to observe the prediction performances. The optimal prediction time was selected based on the results of prediction performances. A new modeling technique was develop and implemented to improve the prediction performance of NNARX model. The prediction performance of the new develop method was compared with Elman Neural Network (ENN), Radial Basis Function Neural Network (RBFNN) and Multilayer Perceptron Neural Network (MLPNN). In order to justify that the new develop method is applicable to other locations, selected flood prone locations in Kedah and Terengganu were considered. Results from the new develop method show significant improvement to prediction performance as compared to NNARX model.

**26**



Name : Hajar Ja'afar

Title : Design of Plasma Antenna for Reconfigurable Beam Steering Technique

Supervisor : Associate Prof. Dr. Mohd Tarmizi Ali (MS)  
Dr. Ahmad Nazri Dagang (CS)  
Dr. Mohd Khairul Mohd Salleh (CS)

The industrial potential of plasma technology is well known and excellent demonstrated in several processes of microwave technology, which incorporate some use of an ionized medium. In vast majority of approaches, the plasma, or ionized volume, simply replaced a solid conductor. Highly ionized plasma is essentially a good conductor, and therefore plasma filaments can serve as transmission line elements for guiding waves, or antenna surfaces for radiation. Plasma antenna is a kind of antenna that radiate electromagnetic wave (EM) energy based on ionized gas instead of metallic conductor in antenna design. In this research work, the development using plasma medium as a conductor element instead of metal medium is investigated. Three new design antenna by using plasma concepts were proposed; namely cylindrical monopole plasma antenna using electrode-less discharge tube, monopole plasma antenna using fluorescent tube and reconfigurable plasma antenna array. The research described in this project introduces the analysis of cylindrical monopole plasma antenna. Three types of gases with three different pressure which are Argon gas, Neon gas and Hg-Ar gas (mixture of Argon gas and mercury vapor) with pressure at 0.5 Torr, 5 Torr and 15 Torr respectively is used in this research to observe the interaction

between plasma medium and radio frequency (RF) signal. The containers that use to fill the gas are namely electrode-less discharge tube. The technique that used in this experiment to generate plasma is using Dielectric Barrier Discharge (DBD). The monopole plasma antenna using fluorescent tube is designed at frequency 2.4 GHz which is aim in wireless application. The commercially fluorescent lamp is used as a plasma antenna. Coupling technique was used in this design. In the reconfigurable plasma antenna array, the behavior of the reconfigurable antenna array system using plasma medium has been investigated and discuss with respect to the beam shaping characteristics. The reconfigurable plasma antenna array is capable of scanning the radiation pattern over 360°. These results confirm that the main beam directions can be directed in the following directions depending on the states of switches which are 0°, 30°, 60°, 90°, 120°, 150°, 180°, 210°, 240°, 270°, 300° and 330°. The simulated and measured results are presented and compared, to demonstrate the performance of the proposed antennas.

**27** Name : Ilham Rustam

Title : Model Input and Structure Selection in Multivariable Dynamic Modeling of Batch Distillation Column Pilot Plant

Supervisor : Dr. Ismarani Ismail (MS)  
Mr. Abdul Aziz Ishak (CS)



In the wake of fast soft computing processing, advances in hardware interface provisioning and demand over cost efficiency, a substantial acquiesce over the interests in nonlinear control and optimal process operation can be seen in recent academic and industrial study particularly in multivariable control processes. Among such are the distillation processes which are susceptible to various operation perturbations that would directly influence the desired end product outcome. There are several recorded control approaches that have been successfully employed to meet with the end product quality requirement however the current study put the bulk of its focus on a control approach performed based on the reflux ratio as manipulated variable with the top tray temperature as the controlled variable. It is recognized that there is a need to have an offline representation of the pilot plant to allow for anticipation of experiment results to reduce operation error, hence, the main purpose of this study. The pilot plant used as reference process platform in this study is a binary mixture, batch process bubble cap distillation column that suffers from the time-varying nature of its process. It is established that a valid nonlinear multivariable case study is presented by the process plant via a systematic experiment conducted to justify the adopted nonlinear system identification. The implementation of Nonlinear Auto-Regressive with eXogenous input (NARX) technique was then explored in this study to prove its reliability as a comprehensive system identification approach which has been cited across various

recorded process identification platforms. The present work further investigates the effectiveness of Orthogonal Least Squares (OLS) and Error Reduction Ratio (ERR) as a model structure selection technique to represent a system that is heavily afflicted with intrinsic noise and poor operating conditions. Pre-screening method based on Correlation Coefficient analysis was elaborated to reduce the searching pool and comparison studies are presented to seek out the best process output conformity with the reference process dynamics using various well established model selection criteria. Ultimately, the developed identified model is designed and tested such that it can function extensively as an emulation of the plant in an offline environment. Comparison results have shown that the pre-screening method has an essential role in determining an effective process representation especially in real-time multivariable identification framework where *a priori* knowledge is not available and would help in resultant model generalization performance as opposed to simply using all available model input variables. Further, after a careful investigation into the OLS algorithm, it was shown that the ERR technique which is an essential part of the algorithm to reach model parsimony, has led the resultant model to select an incorrect model terms albeit some improvement in model selection criteria and validation method adopted in this study. This is made apparent when the resultant model was found not being able to generalize a process that deviates from its training parameters.

**28**



Name : Labeeb Mohsin Abdullah

Title : Self-Organizing Network Technique for Resource Allocation and Mobility Management in LTE Femtocell Network

Supervisor : Prof. Dr. Mohd Dani Baba (MS)

Ubiquitous mobile communication requires increased capacity and appropriate quality of services for real time applications. To meet these demands, the 4<sup>th</sup> generation LTE mobile network operators has deployed femtocell access points next to the conventional base station structure. This deployment will extensively enhance capacity and service coverage for the customers. However, the presence of femtocell generates new challenges. In this thesis, the issues of concern include assigning the limited resources of Physical Cell Identity (PCI) for the high number of deployed femtocells, to ensure network collision and confusion free after deploying the PCI, determine the exact geographic location of femtocell, and identifying the learning parameters for the optimized self-organizing handover process for LTE femtocell-based networks. The commonality between the aforementioned issues of concern is the adoption of Self-Organizing Network (SON) technology concept as the basis for the proposed solutions for the above-mentioned challenges. MATLAB and Vienna LTE simulators were used to conduct the experiments for the proposed algorithms, approaches and schemes and also used to verify the

results. Essentially, three experiments were conducted using Matlab; the first is to allocate PCI resources and to configure conflict free network. The first experiment was conducted by applying two approaches i) graph colouring algorithm, ii) DLS scheme. The second experiment was to determine the femtocell location by using DSL scheme as well. The third experiment was conducted using Vienna LTE simulator to evaluate the performance of the proposed optimized handover mechanism and reducing redundant handover by applying the most appropriate self-learning handover parameters. The result shows that the proposed SON-based mechanism for resource allocation and mobility management in LTE femtocell network has improved the overall network performance in terms of free network conflict, PCI reassignment reduction, capability to locate the geographic location of femtocell, higher throughput, reduced handover failure rate and the unnecessary handover.

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

## 29 Name : Musab Ahmed Mohammed Ali Al-Rawi

**Title :** Biometric Identification and Recognition for IRIS using Failure Rejection Rate (FRR)

**Supervisor :** Associate Prof. Dr. Nooritawati Md Tahir (MS)  
Associate Prof. Dr. Noraliza Hj. Hamzah (CS)



Iris recognition is reckoned as one of the most reliable biometrics for identification purpose in terms of reliability and accuracy. Hence, the objectives of this research are new algorithms development significantly for iris segmentation specifically the proposed Fusion of Profile and Mask Technique (FPM) specifically in getting the actual center of the pupil with high level of accuracy prior to iris localization task, followed by a particular enhancement in iris normalization that is the application of quarter size of an iris image (instead of processing a whole or half size of an iris image) and for better precision and faster recognition with the robust Support Vector Machine (SVM) as classifier. Further aim of this research is the integration of cancelable biometrics feature in the proposed iris recognition technique via non-invertible transformation which determines the feature transformation-based template protection techniques security. Therefore, it is significant to formulate the non-invertibility measure to circumvent the possibility of adversary having the capability in guessing the original biometric providing that the transformed template is obtained. At any process of recognition stage, the biometric data is protected and also whenever there is a compromise to any information in the database it will be on the cancelable biometric template merely without affecting the original biometric information. In

order to evaluate and verify the effectiveness of the proposed technique, CASIA-A (version 3.1) and Bath-A iris databases have been selected for performance testing. Briefly, the processes of the iris recognition system proposed in this research work are locating the pupil first via the novel technique that is the Fusion of Profile and Mask (FPM) Technique focusing on getting the actual center of the pupil then followed by localizing the actual iris region with the circular Hough transform. Next, select smaller yet optimal and effective normalized iris image size by applying different normalization factors. Instead of processing a whole or half size of an iris image, the 480 code size which is equivalent to the quarter size of an iris is selected due to its outstandingly accurate results and less computational complexity. The subsequent step is using the DAUB3 wavelet transform for feature extraction along with the application of an additional step for biometric template security that is the Non-invertible transform (cancelable biometrics method) and finally utilizing the Support Vector Machine (Non-linear Quadratic kernel) for matching/classification. The experimental results showed that the recognition rate achieved are of 99.9% on Bath-A data set, with a maximum decision criterion of 0.97.

## 30



**Name :** Norizam Sulaiman

**Title :** Determination and Classification of Human Stress Index Using Nonparametric Analysis of EEG Signals

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

Regardless of type of stress, either mental stress, emotional stress or physical stress, it definitely affects human lifestyle and work performance. There are two prominent methods in assessing stress which are psychological assessment (qualitative method) and physiological assessment (quantitative method). This research proposes a new stress index based on Electroencephalogram (EEG) signals and non-parametric analysis of the signals. In non-parametric method, the EEG features that might relate to stress are extracted in term of Asymmetry Ratio (AR), Relative Energy Ratio (RER), Spectral Centroids (SC) and Spectral Entropy (SE). The selected features are fed to the k-Nearest Neighbor (k-NN) classifier to identify the stressed group among the four experimental groups being tested. The classification results are based on accuracy, sensitivity and specificity. To support the classification results using k-NN classifier, the clustering techniques using Fuzzy C-Means (FCM) and Fuzzy K-Means (FKM) are implemented. To ensure the robustness of the classifier, the cross-validation technique using k-fold and leave-one-out is performed to the classifier. The assignment of the stress index is verified by applying Z-score technique to the selected EEG features. The

experiments established a 3-level index (Index 1, Index 2 and Index 3) which represents the stress levels of low stress, moderate stress and high stress at overall classification accuracy of 88.89%, classification sensitivity of 86.67 % and classification specificity of 100%. The outcome of the research suggests that the stress level of human can be determined accurately by applying SC on the ratio of the Energy Spectral Density (ESD) of Beta and Alpha bands of the brain signals. The experimental results of this study also confirm that human stress level can be determined and classified precisely using physiological signal through the proposed stress index. The high accuracy, sensitivity and specificity of the classifier might also indicate the robustness of the proposed method.

## 31 Name : Nur Azzammudin Rahmat

**Title :** Computational Intelligence Based Technique for Solving Economic Dispatch Problem

**Supervisor :** Prof. Dr. Ismail Musirin (MS)  
Ir. Dr. Ahmad Farid Abidin@Baharun (CS)



Electrical industry is no longer seen as a service to fulfill electrical requirement. Nowadays, the industry is more on business, and the utilities seek profits through efficient energy generation and supply. In order to maximize profits, the energy providers or utilities conduct economic load dispatch (ELD) process, where energy is feasibly generated and delivered to satisfy consumers' needs. However, the method is restricted by several constraints that cause challenges in providing satisfying energy dispatch. Therefore, this research proposes a new computational technique termed as Differential Evolution Immunized Ant Colony Optimization (DEIANT) as an approach to solve the complex economic dispatch process. DEIANT is developed through hybridizing Ant Colony Optimization (ACO), Differential Evolution (DE) and Artificial Immune System (AIS) together. The coding were written in MATLAB (Matrix Laboratory) software. The development of DEIANT technique is consequently utilized to solve ELD, which is performed on IEEE 30, 57 and 118 Reliable Test Systems (RTS). These test systems are also used to perform the study for the whole research. New economic emission dispatch (EED) solving techniques termed as pollutant-based and fuel-based EED have been consequently developed. This is to address the emission release during energy producing process. For this study, three fossil-fuels namely petroleum, coal, and natural gas are highlighted. These fossil-fuels combustion produces different pollutants including carbon oxides ( $CO_x$ ), sulphur oxides ( $SO_x$ ), and nitrogen oxides ( $NO_x$ ). The

pollutant-based EED determines the type and level of the pollutants. On the other hand, fuel-based EED determines the emission level based on the type of fuel consumed by a particular generator. DEIANT is utilized as the optimization engine to minimize the emission level. Combined load-emission dispatch (CLEED) technique, which combines ELD and EED simultaneously is proposed. Multi-objective approach is used to solve the CLEED through the implementation of weight-sum technique. This approach allows utilities to create trade-off relations or preferences between the operating cost and emission level. DEIANT technique is also utilized to optimize the operating cost and emission level. Next, this research proposes fuzzy logic multi-fuelled dynamic economic load dispatch (FzMF-DELD) to solve multi-fuel selection process. Multi-fuel selection occurs on generators that consume more than one type of fuel. However, different level of output power requires different type of fuel. FzMF-DELD uses fuzzy logic to select the suitable fuel based on the fuel price and required output power. This technique is proven to provide better fuel-selection as compared to conventional piecewise fuel-selection method. DEIANT is utilized to optimize the operating cost and emission level based on the selected fuel. Based on the comparative studies between DEIANT, ACO, PSO, and EP, it is revealed that the proposed optimization technique is superior and more reliable in terms of computing lower operating cost, emission level, power loss, and computation time.

## 32



**Name :** Pauziah Mohd Arsad

**Title :** Prediction of Engineering Students' Academic Performance using Neural Network and Linear Regression

**Supervisor :** Associate Prof. Ir. Dr. Norlida Buniyamin (MS)

This thesis describes the development of Electrical Engineering students' performance prediction model using Artificial Neural Network (ANN) based on SIMS data from three generations of Matriculation and Diploma students. It was observed that there was a certain pattern or trend between the strong ability students and the weaker ones in terms of performance. The strong ability students managed to graduate steadily with high CGPA upon graduation, while the weaker ones tend to waver and finally graduate with minimum CGPA or even extended for another one or two semesters to complete the required credit hours. The Grade Points (GP) of fundamental subjects attempted at semester one was used as inputs to the developed Neural Network Students' Performance Prediction Model (NNSPPM) to predict the output which is CGPA8 upon graduation. The fundamental subjects strongly influenced the overall performance of students. The NNSPPM was then tested with another set of input data consisting GP of subjects at semester three to see the predicted output. The NNSPPM was further validated with a different set of data, namely Diploma students taking the same subjects at semester three, sitting the same set of examination questions as that of Matriculation students. The

trend and pattern of predicted output seemed to hold true for all three different cases. It was found that at lower CGPA8, the predicted output is higher than the actual CGPA8; while at high CGPA8, the predicted is lower than the actual CGPA8 for the Matriculation and Diploma students. Subsequently a second method, Linear Regression was used to predict the final CGPA. GP of subjects scored by students form the independent while the CGPA8 formed the dependent variable. However, when the coefficient of Correlation R was compared between the two methods, NN method was found to be more accurate in terms of prediction. The Mean Square Error or Residual is almost the same in both methods. Thus the fundamental subjects at semester one or three have direct impact on CGPA8. The fundamental subjects strongly influenced performance of students. By using the prediction model, strategic intervention by the academic advisors can be offered to the underachieving students once detected by the model.

## 33 Name : Shafinaz Sobihana Shariffudin

**Title :** Zinc Oxide Nanorods as Electron Transport Layer in MEH - PPV/  
ZnO Organic Light Emitting Diodes

**Supervisor :** Prof. Engr. Dr. Mohamad Rusop Mahmood (MS)  
Dr. Sukreen Hana Herman (CS)



This thesis discusses on the development of zinc oxide (ZnO) nanorods for the application as electron transport layer in MEH-PPV/ZnO Organic Light Emitting Diode (OLED). In general, the mobility of holes is higher than electrons in most semiconducting organic material. Therefore, it is essential to develop an efficient electron transport layer in order to balance out the number of carriers, hence increases the efficiency of the device. Furthermore, combining inorganic material with organic material in a device can take advantages of both materials. The thesis work involved three main parts for the fabrication of MEH-PPV/ZnO OLEDs. The first part was the deposition of novel layer-by-layer ZnO seeded catalyst. High (0 0 2) c-axis ZnO seed catalyst was prepared using simple and low cost method of sol-gel spin coating technique. Layer-by-layer method was applied in the deposition of the ZnO seed catalyst layer, which is defined by annealing of every layer of the thin film. The second part involved the growth of ZnO nanorods using thermal chemical vapour deposition (TCVD) method by employing vapour-solid (VS) mechanism, without using pump vacuum to control the pressure in the tube. Using single furnace TCVD, substrate positions with a distance of 3 cm from the zinc powder, at an oxygen flow rate of 5 sccm and temperature of 825°C were found to be the optimum conditions for the growth of the ZnO nanorods in this study. The characterization revealed that the nanorods had low

resistivity of  $5 \times 10^{-2} \Omega\text{-cm}$  at highest (0 0 2) crystalline structure. This strongly indicates that the ZnO nanorods had good electrical behaviour which can transport electrons more efficiently in the device. Third part involved the study of MEH-PPV thin films dissolved in non-aromatic solvent such as 1,2 dichlorobenzene and toluene to produce p-type conducting emissive layer. With an optimum solution concentration of 5 mg/ml, highest photoluminescence (PL) spectrum was produced with an emission centred at 590 nm. From the optimized thin films, OLEDs were fabricated. As a conclusion, by combining the ZnO nanorods with MEH-PPV in the OLEDs had improved the electrical characteristics of the device compared to single layer MEH-PPV based device. The fabricated device worked as a diode; which showed a rectifying current. The lowest turn on voltage was found to be at 0.4V using the ZnO nanorods grown at temperature of 825°C. At this deposition temperature, the Schottky barrier height was 0.59 eV, with an ideality factor of 12.91. The OLEDs were also tested using electroluminescence (EL) spectroscopy to prove the devices' functionality. The EL emission spectra were found to match with the PL emission

## 34 Name : Suzilawati Muhamud@Kayat

**Title :** Reconfigurable Microstrip Antennas Integrated with Truncated Rhombus-Like Slotted Patch Structure

**Supervisor :** Associate Prof. Dr. Mohd Tarmizi Ali (MS)  
Dr. Mohd Khairul Mohd Salleh (CS)



Reconfigurable microstrip antennas have so many attractive features to offer such as the ability to reconfigure independently in order to perform entirely different functions for numerous applications. They can provide diversity functions to mobile communications in three main categories: operating frequency, radiation pattern and polarization. This is in contrast with the conventional antennas which normally offer one particular function at a time in a single antenna. There are many types of reconfigurable antennas that have been demonstrated in previous researches with regards to these three different categories. In this research, the development of reconfigurable antennas can be divided into two main categories, which are based on operating frequency and radiation pattern. Prior to that, two novel structures of aperture coupled microstrip antennas in a single configuration at two different frequencies have been developed, which are denoted as TRSPA-1 and TRSPA-2. Each antenna employs a truncated rhombus-like patch shape embedded with a unique 'zig-zag' patch slots. The introduction of different orientations of slot embedded on the radiating patch has resulted in two different operating frequencies. Each antenna has the same patch size although two different frequencies are achieved due to the fact that the size of the patch slot and its orientations in x- and y-axis give significant effects on the excitations of the resonant frequency. Based on the combination of these two designs, a frequency reconfigurable microstrip antenna was developed in two-element array configuration,

denoted as FRTRSPA-1. To further enhance the characteristics, the antenna elements of FRTRSPA-1 have been extended to four elements in a planar or corporate feed configuration, which is known as FRTRSPA-2. Both antennas can operate at two different frequency modes,  $F_1 = 5.3 \text{ GHz}$  and  $F_2 = 5.8 \text{ GHz}$  in a single structure. For pattern reconfigurable antennas, the development of the antenna structures namely, PRTRSPA and BRTRSPA were based on the design of FRTRSPA-2 with an addition of parasitic elements embedded on the same substrate as the radiating elements. The application of parasitic elements enables PRTRSPA to steer its main lobes to three different directions in the E-plane ( $\phi = 90^\circ$ ) at two different frequency modes,  $F_1 = 5.3 \text{ GHz}$  ( $0^\circ$ ,  $+15^\circ$  and  $-15^\circ$ ) and  $F_2 = 5.9 \text{ GHz}$  ( $0^\circ$ ,  $+25^\circ$  and  $-25^\circ$ ) and six different directions for BRTRSPA,  $F_1 = 5.3 \text{ GHz}$  ( $0^\circ$ ,  $10^\circ$ ,  $170^\circ$ ,  $180^\circ$ ,  $190^\circ$  and  $350^\circ$ ) and  $F_2 = 5.9 \text{ GHz}$  ( $0^\circ$ ,  $20^\circ$ ,  $160^\circ$ ,  $180^\circ$ ,  $200^\circ$  and  $340^\circ$ ). All simulation and measurement results were in good agreement

**35** Name : Zaiton Sharif

Title : Time Frequency Analysis for Wireless Channel Characterization

Supervisor : Dr. Rozita Jailani (MS)

Dr. Abdul Rahim Abdullah (CS)



The ability to accurately characterize the wireless communication channel is essential for testing and designing any wireless communication systems. It fulfills the demand for a better quality of communication service in terms of higher bits rate and the use of spread spectrum technology. One of the challenges for wireless channel characterization is the need to demonstrate an appropriate method to characterize the wireless channel hence, effective channel mitigation technique can be developed to minimize deleterious effect arise from the channel namely the short terms variations due to multipath fading. This propagation environment affects the transmitted signal in terms of scattering, diffraction and reflection as it traveled towards the receiver causing the signals to be received distorted or interfered. Therefore, the central issue in this thesis is to determine appropriate techniques to characterize such a channel. A statistical property was adopted to represent properties of the channel which was categorized under wide sense stationary uncorrelated scattering (WSSUS) conditions. In achieving research objectives, four methods are employed namely Cross Correlation Function (CCF), Cross Ambiguity Function (CAF), Cross Wigner Ville Distribution (CWVD) and Cross S Transform (CST). The

transmitted signals used are pass band modulation signals and linear FM signals. CCF and CST can determine the time delay profile of the channel while the other two methods were capable of estimating all the parameters required. Both the CAF and the CWVD are able to describe the signal spreading under multipath condition. The time delay spread is estimated based on peak detection between the paths while Channel Impulse Response (CIR) is estimated based on time marginal. Doppler spread in contrast is estimated from the spread of each path in Doppler axis direction. It was found that all the four methods had estimate the time delay profile correctly while CAF and CWVD with certain specifications had estimated the Doppler spread up to 98% accuracy. CWVD had shown to be better compared to other three methods in terms of computation of the Doppler spread and the duration of the signals used. In conclusion, the methods proposed in the time frequency domain were able to perform the channel characterization under multipath condition regardless of the propagation media encountered and the number of paths existed in the channel.

## FACULTY OF CHEMICAL ENGINEERING

**36**



Name : Nadiah Hanim Mohd Noordin

Title : Cooking Oil Waste as Corrosion Inhibitor for Mild Steel in 1M HCl Solution

Supervisor : Dr. Junaidah Jai (MS)

Dr. H N M Ekramul Mahmud (CS)

Associate Prof. Dr. Norazah Abd Rahman (CS)

Associate Prof. Dr. Md Amin Hashim (CS)

Metals generally tend to move to its original state by corrosion process. Mild steel is an alloy form of iron, which undergoes corrosion easily in acidic medium. Palm cooking oil waste (PCOW) was introduced as a new organic corrosion inhibitor due to its fatty acids content. PCOW was soluble and stable in water at pH 11, 50°C with ratio 75: 25 oil to water respectively. The reaction between fatty acid in PCOW with NaOH was produced surfactants which solubilise oil in water and produce o/w emulsion. The fatty acids in PCOW were further reacted with diethylene triamine to increase the adsorption process of PCOWAI on steels surface. The inhibition behaviour of palm cooking oil waste inhibitor (PCOWAI) on mild steel in 1M HCl as corrosive solution containing different concentrations of PCOWI at 299, 323 and 343K was investigated by weight loss and potentiodynamic polarization and electrochemical impedance spectroscopy. It has been observed that corrosion rate decreases and inhibition efficiencies and surface coverage degree increases with increasing in PCOWI concentration. The maximum inhibition efficiency 100% was observed in the presence of 0.25 M inhibitor at 299K. The recorded potentiodynamic polarization data indicated the basic modification of steel surface as a result in a decrease

in the corrosion rate. The results from this corrosion test clearly reveal that the PCOWAI behave as a mixed type corrosion inhibitor with the highest inhibition at 0.25M. The experimental data fitted into Temkin adsorption isotherms. PCOW exhibits a very good performance as a corrosion inhibitor for mild steel in 1M HCl. Corrosion inhibition could be explained by considering an interaction between metal surface and the inhibitor. Data obtained from EIS measurements, were analyzed to model the corrosion inhibition process through appropriate equivalent circuit model, a constant phase element (CPE) has been used. Surface analyses via scanning electron microscope (SEM) shows a significant improvement on the surface morphology of the mild steel. SEM studies reveal the formation of film on the metal surface. X-ray photoelectron spectroscopy (XPS) analysis was carried out to study the inhibition mechanism of PCOWAI on corrosion of mild steel in 1 M HCl solution. The binding energy values revealed the presence of carboxyl and amide group enhance the adsorption process of PCOWAI molecules on mild steel surface

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

**37** Name : Norin Zamiah Kassim Shaari

Title : PVA/PEG – Teos Hybrid Membrane for Permeation of Crude Glycerol

Supervisor : Associate Prof. Dr. Norazah Abd Rahman (MS)

Associate Prof. Dr. Ramlah Mohd Tajuddin (CS)



Purification of crude glycerol by employing membrane separation as a mechanism involved in the process had been widely conducted due to its environmentally process and sustainability of energy. Realizing that hybrid membrane has better thermal and mechanical stability as well as better processing flexibility as compared to membrane from pure organic polymer and inorganic material, this research investigated on the use of hybrid membrane as a barrier layer in thin film composite (TFC) for permeation of crude glycerol. In this study, thin film composite membrane consists of polysulfone as base support and hybrid membrane as the barrier layer. In a hybrid membrane formulation, a polymer blend of polyvinyl alcohol with polyethylene glycol was chosen as organic polymer which was cross-linked with tetraethylorthosilicate (TEOS). Glycerol was added as an organic additive to improve the plasticizing effect of hybrid membranes. There were three stages of work involved in the research. The first stage was investigating on base support where suitable concentration of polysulfone had been determined by water flux evaluation and investigation on suitable range of organic polymer, TEOS and glycerol concentrations. The evaluations were carried out through physical and chemical characterization and performance evaluation particularly on thin film composite through separation of crude glycerol solution. Besides good thermal and mechanical stabilities, and high surface hydrophilicity of hybrid membranes as compared to base support and membrane from pure polymer, the incorporation of glycerol had enhanced flexibility of membrane's matrix. These properties had overcome the rigidity of structure and brittleness of ordinary hybrid membranes. Major findings from this stage revealed that the suitable range of total polymer was between 5 to 7

wt.% and TEOS concentrations between 1 to 4 wt.% for formulation of hybrid membranes particularly in permeation process of crude glycerol. The second stage of research involves characterization of crude glycerol and permeation of synthetic crude glycerol which consists of glycerol, water, methanol and NaCl through the fabricated thin film composite. The main purpose was to evaluate the separation pattern of NaCl and glycerol through the TFC. Based on the evaluations, formulation of hybrid membranes with high percentage of polymer and tetraethylorthosilicate had led to high salt rejection but it suffered with low permeation of glycerol. Therefore the best formulations of hybrid membrane particularly in term of polymer and tetraethylorthosilicate concentrations and condition for feed solution that yields high NaCl rejection, high percentage permeation of glycerol and reasonable volume of flux had been determined by using design of experiment. Result showed that the regression equations generated from the experiment were accurate to predict all the responses and the best formulation was achieved at 5 wt.% total polymer with 4 wt.% TEOS, and feed condition with 75 % w/w water addition. The resulted responses were 36% NaCl rejection, 85% permeation of glycerol and 43 L/m<sup>2</sup>.day of flux rate. Permeation of crude glycerol through the fabricated thin film composite, which exhibits a nanofiltration behaviour with a pore flow model as a transport mechanism, has been found as a potential pathway for crude glycerol purification which has some advantages over the existing process that employs membrane such as operation at low pressure and at room temperature.

## FACULTY OF MECHANICAL ENGINEERING

**38**



Name : Ehan Sabah Shukri

Title : Numerical Analysis of Temperature Distribution Enhancement in Conical and Annular Diffusers Fitted with Swirl Generators

Supervisor : Prof. Dr. Wirachman Wisnoe (MS)

Associate Prof. Dr. Ramlan Zailani (CS)

Diffusers are essential components for turbo machines aircraft inlets, combustion chambers, etc. They serve as a converter of the flow dynamic head to static pressure. This is achieved by small angle divergent walls. In combustion chamber, good mixing is essential for high burning rate. The attainment of a satisfying temperature distribution in the exhaust gases is very dependent on the degree of the combustion mixing. As long as temperature distribution enhancement has an important role to achieve good mixing, different enhancement methods have been developed by introducing a secondary flow and increasing of turbulence intensity. Swirl flow generator is one of the essential methods that are utilized to enhance the distribution rate. It can be produced by swirl generators such as helical screw-tapes, twist tapes, dimples, fins, struts etc. These generators create turbulent flow and swirling motion that can force the fluid to move in the direction of the flow and in the radial tangential direction. Helical screw-tape and twisted tape insert are an active area for the researchers to study their effects; hence they increase the turbulence intensity and have a dominant role in enhancing heat transfer and temperature distribution. In this research study, a numerical simulation analyses were undertaken in two different types of diffusers; one was a conical diffuser and one was an annular diffuser to enhance heat transfer rate by enhancing temperature distribution in a turbulent flow with air as the working fluid. This aim was achieved by using different geometric models of swirl generators such as helical screw-tape, helical screw-tape hub, pimped hub and twisted square

hub with different pitch lengths and different height lengths. The study was conducted with inlet Reynolds number  $4.3 \times 10^4$  based on the hydraulic diameter and a heat source of 10 kW. The numerical analyses were carried out with the commercial software NUMECA FINETM /Open v3.1 as the Computational Fluid Dynamics tool. They were performed in three dimensional domains applying standard k- $\epsilon$  model as a turbulence model. Temperature distribution was evaluated in the proposed diffusers fitted to the swirl generator models to assess the real benefits of using those types of inserts in compared to the plain diffusers at constant inlet conditions. The results show that the proposed swirl generator models have a good influence on the temperature distribution in both diffusers. It shows that the temperature distribution rate is increased with decreasing pitch length under the same operating conditions. The best temperature distribution is provided by introducing a helical screw-tape hub and a helical screw-tape in the annular and the conical diffusers respectively. The numerical simulation findings were compared with those obtained from plain diffusers and they were confirmed by experiment. Finally, correlations based on the data generated from this work to predict the temperature distribution for turbulent flow through the proposed diffusers in terms of Eckert number, pitch length ratio and height length ratio were reported. From the correlations, the best temperature distribution is achieved by the insert of helical screw-tape hub and twisted square hub in the annular diffuser.

## 39 Name : Mustafa Jabbar Hayyawi

**Title :** Design and Implementation of a Real-Time Adaptive Learning Algorithm Controller for a 3-DOF Parallel Manipulator

**Supervisor :** Associate Prof. Dr. Ahmad Azlan Mat Isa (MS)  
Prof. Ir. Dr. Hj. Ahmed Jaafar (CS)  
Prof. Ir. Dr. Abdul Rahman Omar (CS)



A parallel manipulator is a closed loop mechanism which consists of a moving platform that is connected to a fixed base by at least two kinematic chains in parallel. Parallel manipulators can provide several advantages, such as high stiffness, high accuracy, and low inertia but also have some disadvantages, such as small workspace, complicated structures, a high cost, and also pose a major challenge to their analysis and control. To overcome the above shortcomings, progress on the development of parallel manipulators with less than 6-DOF has been accelerated. In this thesis, a new parallel manipulator with three degrees of freedom DOF is designed. Kinematic of the manipulator including inverse kinematic, Jacobian matrix and velocity equation are analyzed. Performance indices such as workspace, dexterity and stiffness, of the parallel manipulator are studied. The parallel manipulator is optimized based on the performance indices to obtain on the optimal design parameters for achieved maximum performance of the parallel manipulator. A prototype was fabricated to demonstrate the manipulator. An electronic board, transistor relay driver circuit, is designed for the purpose of establishing communication interface between the computer, adaptive learning algorithm and the actuator mechanism. Design and development an adaptive learning algorithm controller ALAC of position the actuators is presented in real time parallel manipulator based on artificial neural network ANN. The control of a parallel manipulator based on joint space control is implemented by determine the lengths of the electrohydraulic actuators EHA individually. EHA are known to have

nonlinear parameters and dynamic factors such as frictions, load variations and leakage. These effects, if not controlled, would lead to large scale oscillations that would damage system components. System identification is a prerequisite to analysis of a dynamic system. It is performed using neural network Auto Regressive with eXogenous (NNARX) model based on the input/ output experimental data. There some criteria such as loss function, Aikeke's Information Criterion, goodness of fit and correlation analysis of the residual are analyzed to determine the adequate model for representing the EHA. The real time ALAC is coded in MATLAB / SIMULINK and consists of two inverse ANN, feed forward neural network ANN1 and feedback network ANN2, and proportional feedback controller (P). The ANN2 is used to update the weights and biases online while ANN1 is used to implement the controller. Pcontroller is designed to improve the controller system and ensure the stability. The updated weights and biases of the ANN1 are same set obtained ANN2. The results of the proposed controller were compared with direct inverse neural controller DINC. It was found from experimentation that the ALAC was able to improve the position control of the parallel manipulator and adjusted the weights according to changing condition and control the system without any changes in the controlling algorithm. It is still effective with few overshoot compared with DINC.

## 40



**Name :** Syamimi Shamsuddin

**Title :** Development of Human-Robot Interaction (HRI) Methodology for Autism Rehabilitation using Humanoid Robot with a Telerehabilitation Platform

**Supervisor :** Associate Prof. Dr. Hanafiah Yusof (MS)  
Dr. Salina Mohamed (CS)  
Dr. Fazah Akhtar Hanapiah (CS)

Advances in technologies and improvements in diagnostic procedures have contributed to the rising number of autism detection worldwide. Autism is a brain disorder that affects behaviour, communication and social interaction. The use of intelligent robots to rehabilitate children with autism hosts great untapped potential. Robots offer rehabilitation applications that are accurate, motivating and repetitive. However, validity and access to such intervention are still scarce. This research investigates the potential use of a humanoid robot as an adjunct rehabilitation tool to assist children with autism. The focus is also on developing a single, web-based platform that enables stakeholders in autism rehabilitation to gain access to robotic applications. A robot in human shape has great potential to generalize the skills learnt during human-robot interaction to human-human interaction scenarios. The humanoid robot used in this study is NAO. It has moderate degree of likeness to human. Children with autism prefer robots with simplified features. NAO is also the most widely used humanoid platform by engineering and clinical researchers in autism research. The first objective analyses the behaviour response of children with autism when exposed to a humanoid robot for the first time. The pilot experiment took place at NASOM Titiwangsa, a special school for children with autism. A 24-items behaviour score sheet was developed as an observation instrument to measure the children's responses. Qualitative results from video evaluations showed that for the subscale of stereotyped behaviour and communication, 10 children responded positively with reduced autistic behaviour when the robot was present. For social interaction

subscale, 7 children showed encouraging responses. In addition, children with higher IQs (more than 80) responded better to robotic interaction. Next is the assessment study of the quality of the behaviour score sheet. Based on the expert opinion method, the instrument was found to have good validity. More than 67% of all experts scored at least 3 on the 5-point Likert scale. In reliability; high internal consistency was seen with a Cronbach's alpha of 0.872 for the whole tool. As a continuation from the pilot study, more interaction contents involving child and robot are in need. New robot scenarios that are socially engaging based on the pre-school curriculum for children with special needs by the Ministry of Education Malaysia and the Applied Behavioural Analysis (ABA) technique were developed. This resulted with six new programs choreographed with body movements and interaction dialogues to fit the purpose of the robot as a learning tool. The interaction scenarios were co-developed with experts from the special education and medical fields. In the final stage, a telerehabilitation platform was developed and tested for its usability by therapists. The RoBin website enables access of robotic technology to a larger population regardless of location. Survey results show that RoBin provides an acceptable usability level based on System Usability Scale (SUS) scores. In addition, 80% therapists agree that their overall first-time experience in using RoBin's website was good. This study was the first of its kind in Malaysia to develop a rehabilitation system involving robots to aid the autism population via the telecommunications technology.

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

## 41 Name : Wan Mazlina Wan Mohamed

**Title :** Aeronautical Revenues Optimisation Model (AROM) for Regional Airports via Airside Operations Stochastic Baseline Matrix Analysis

**Supervisor :** Prof. Ir. Dr. Hj. Ahmed Jaffar (MS)  
Associate Prof. Dr. Adibah Shuib (CS)



Maximising revenues is one of the greatest challenges of regional airports especially after the introduction of deregulation and privatisation of airports with the increase of aggressive competition in the markets. The calculation of aeronautical revenues generation has always been considered as a straightforward method and airport managers generally overlooked on the importance of daily operational factors such as the different flight services offered at the airports, the type of aircraft airlines utilised, time of the day the flight arrives or departs, and the number of passengers the airlines ferry in and out of their airport, types of destination and how these factors influence the generation of aeronautical revenues for their airport. The first objective of this research is to measure the airside operation factors that influence the generation of aeronautical revenues deterministically. The influential variables were determined through literature reviews and case studies of regional airports in the Netherlands and Malaysia, and were validated with regression analysis. Preliminary model was developed based on the determinants and the model was analysed using Bayesian Network theory. Thus, the research is also geared towards developing a **baseline matrix using stochastic approach to analyse the effect of airside operation factors on aeronautical revenues generation as the second objective**. The next objective concerns with the formulation of mathematical optimisation algorithm known as Aeronautical Revenue Optimisation Model (AROM) to generate maximum aeronautical revenues for regional airport in line with

the objectives of the airport. Finally, the research embarks on developing a graphical user interface (GUI) tool based on the model to estimate the possible potential aeronautical revenues that could be generated which will be useful for airport managers in their decision making. The GUI for AROM is a user friendly tool which allows airport managers to key-in the main input parameters such as mode of operations (arrival or departure), traffic types (Schedule, Business, Charter, etc.), flights details (day or night, weekday or weekend, number of passengers, international or domestic), fleet types (aircraft weight and engine type) and type of flights (domestic or international) in order to determine the composition of flight operations that produces optimum aeronautical revenues that could be achieved. Results obtained show that the maximum revenue achieved is based on flights composition, which is more focused towards certain types of traffic types with higher frequency for each of them in contrast to the current practise of offering small number of all sorts of traffic types. The model developed in this research is flexible; it allows decision makers to set the upper bound of flight constraints. The model can also be extended to include bigger sets of flight details, for example, to have day, evening and night flight instead of just day and night. Aside from that, the parameter can also be generalised such as to consider all international flights instead of domestic and international. The traffic types can also be adjusted to include shorter or longer list of traffic types to suit the airport's services.

## FACULTY OF HEALTH SCIENCES

## 42



**Name :** Ahmed Fadhil Farhan

**Title :** Injury Prevention Program for Juvenile Soccer Players: Effects on Physical Performance, Awareness of Injury Prevention Measures and Injury Rates

**Supervisor :** Dr. Maria Justine@Stephany (MS)  
Prof. Dr. Shamil Kamil Mahammed (CS)

The purpose of this study was to investigate the effects of an injury prevention program (IPP) on physical performance, awareness of injury prevention measures and incidence of injury among junior male Malaysian soccer players. Participants (N=50, age=13.34±0.47 years, BMI=20.96±1.57 kg/m<sup>2</sup>) were assigned randomly into experimental (EXP, n=25) or control (CON, n=25) groups. The IPP consisted of exercise training (five times per week) and educational classes (three times per week) for 12 weeks. The CON group continued training as usual. Both groups performed a battery of soccer-specific physical tests at baseline, middle and after the intervention; 1) Standing long jump test (explosive leg power); 2) Sargent jump test (vertical jump height); 3) Illinois agility test (agility); 4) Prone hold test (core stability) and 5) 20m sprint test (running speed). A questionnaire containing 24 questions regarding awareness of injury prevention strategies and practices, as well as a measure of injury rates was administered at baseline and post-intervention. The incidence of injury was calculated using a formula: (incidence rate = number of injuries/ hours of exposure) × 1000. At the end of the intervention, analysis using the repeated measures ANOVA showed the EXP group was significantly

higher in explosive leg power (7.82% vs -4.39%, p=0.01), vertical jump height (15.55% vs 5.12%, p=0.01), agility (-4.34% vs -0.59%, p=0.01), core stability (48.25% vs 12.29%, p=0.01) and speed (-7.69% vs 1.64%, p=0.01), compared to CON. The independent t-test for comparisons on the awareness of injury prevention measures (strategies and practices), and rates of incidence injuries were significantly higher (p<0.05) in the EXP group than the CON group. The incidence rates per 1000 hours of practice and match were 10.93 in the EXP group and 13.17 in the CON group, which equates to 17% fewer injuries in the EXP group. The incidence rates post-test in EXP group was 4.26 and 1.19 for 1000 hours of practice time, and 12.01 per 1000 hours of match time, while CON group incidence rates post-test was 6.72, and 3.02 per 1000 hours of practice time and 16.09 per 1000 hours of match time, which equates to (36%, p<0.05) significantly decrease in overall injuries in the EXP group. In conclusions, these findings demonstrate that the IPP may be effective for improving soccer-specific physical performance and enhancing awareness of injury prevention measures that may in turn reduce the injury incidence.

## 43 Name : Farah Wahida Ahmad Zaiki

Title : Physical, Morphological and Biochemical Effects of Prenatal Ultrasound Exposure on Rabbit Fetus

Supervisor : Associate Prof. Dr. Sulaiman Md Dom (MS)  
Dr. Hamzah Fansuri Hassan (CS)



Ultrasound is extensively used in various clinical specialties throughout the developed world since it was perceived to lack in bioeffects. Somehow, through the advances in the capability of ultrasound equipment that triggered greater image processing power, the revision of potential bioeffects is needed to be corroborated. Hence, this study is designed to determine the physical, morphological and biochemical effects on fetus development. This *in-vivo* experimental study involved twelve pregnant rabbits, exposed to ultrasound exposure durations of 30, 60 and 90 minutes in the middle of the stipulated gestational stages (1<sup>st</sup> stage; gestational day (GD) 6-7, 2<sup>nd</sup> stage; GD 17-18, 3<sup>rd</sup> stage; GD 28-29). Acoustic output parameters were kept constant (frequency = 7.09 MHz, intensity (ISPTA) = 49.4 W/cm<sup>2</sup>, power = 56.0 W, thermal index (TI) = 0.2 and mechanical index (MI) = 1.0). The rabbits were euthanized and data were analyzed using SPSS 21. Total 136 fetuses (1<sup>st</sup> stage, n = 34 (25%); 2<sup>nd</sup> stage, n = 28 (21%); 3<sup>rd</sup> stage, n = 74 (54%)) were analyzed for physical, structural and ultrastructural morphological, biochemical and haematological analyses. Physical analysis found to have significant differences in fetal weight between exposed and control groups at all stages (P < 0.001, P = 0.01, P < 0.001, respectively) with a negative correlation between different exposure durations and fetal weight at 1<sup>st</sup> and 3<sup>rd</sup> stages (P = 0.02, r = -0.40, P = 0.04, r = -0.23, respectively). There were also significant differences in brain volume and surface at all stages of gestation (P < 0.05). Ultrastructural morphological analysis showed statistically significant in apoptotic neurons

and glial cells (AC) count at 1<sup>st</sup> and 2<sup>nd</sup> stages (P < 0.05) with positive good and fair correlation (P < 0.001, r = 0.53; P < 0.001, r = 0.47, respectively). While, biochemical investigation reported that significant differences in AC at all stages (P < 0.001) with mean AC depicted lowest in control groups, in congruent to structural morphological analysis where neuronal cell death (NCD) count were significant at all stages (P < 0.001) and mean NCD least in control groups. Haematological analysis reported that significant differences in red blood cell (RBC) count, white blood cell (WBC) count, haemoglobin (Hb) concentration, platelet (PLT) count and lymphocytes (LYM) count (P < 0.001, P = 0.04, P < 0.001, P < 0.001, P = 0.01 respectively). There were negative correlation of exposure with RBC, Hb and PLT (P = 0.01, r = -0.38; P = 0.04, r = -0.27; P = 0.02, r = -0.32, respectively), yet a positive correlation with LYM (P = 0.03, r = 0.30). Results suggested that ultrasound might interfere with the sensitive stages of developing fetus by both thermal and mechanical effects that probably induced hyperthermia and heat stress to the fetus *in-utero* hence, plausibly interrupted the biological cells. Further empirical research is needed to endeavor for being sufficient to draw a conclusive safety statement of prenatal ultrasound and contributing to the current body of knowledge.

## 44



Name : Noor Azliyan Azizan

Title : The Effects of Exercise and Behavioural Program on Exercise Adherence, Exercise Self-Efficacy and Functional Status Among Community-Dwelling Older Persons

Supervisor : Dr. Maria Justine@Stephany (MS)  
Mr. Vikram Mohan (CS)  
Mr. Khairil Anuar Md Isa (CS)

Exercise is an integral component in the maintenance of health status among older persons. Unfortunately, it is difficult for sedentary older persons to continue and adhere to exercise training for a long term. The possible causes might be due to low level of exercise adherence and exercise self-efficacy (ESE). Thus, an intervention is needed to change this typical sedentary behaviour as it predicts physical activity participation. This study aimed to determine the effects of exercise and behavioural program on exercise adherence, ESE, functional status (physical and psychological functions) among community-dwelling older persons. Sixty-three participants (above 60-year-old) from three different villages voluntarily participated and grouped as (i) Exercise and Behaviour Group, EBG (n=18), (ii) Exercise Group, EG (n=23) and (iii) Control Group, CG (n=22). The participants in EBG received a 6-week group-based multi-component exercise training followed by a 5-week behavioural program. While, the participants in EG received the same exercise prescribed to EBG. The participants in CG did not receive any interventions, but they were asked to continue their daily physical activities and other normal routines. The exercise consisted of endurance, strength, balance, flexibility and loco-motor training for one hour per sessions, three times a week for a duration of six weeks. The behaviour program was delivered following the termination of the 6-week exercise training, for 30-minute per session, twice a week for duration of five weeks. Outcomes (score for exercise adherence, ESE, fear of falls, depression and

quality of life and score for balance performance, upper and lower limb muscle strength, exercise tolerance, upper and lower limb flexibility) of the intervention were measured by single-blinded assessors. Results from the repeated measures ANOVA showed significant differences between groups due to time factor (All, p < 0.05), group and time interaction (All, p < 0.05) and between-group factor (All, p < 0.05) for exercise adherence, ESE, balance, FoF, Right UL Left UL and LL strength, and exercise tolerance, respectively. However, significant results for flexibility were only shown for the right LL at time factor [F(3.44,206.12)=7.53], group and time interaction, [F(6.87,206.12)=3.26] and between-group factor [F(2,60)=0.86] (All, p < 0.05). Analysis of covariance (ANCOVA) (controlling for baseline performance and age) for depression [F(2,58) = 33.49], physical summary score, PCS [F(2,58) = 5.33] and mental summary score [F(2,56) = 4.08] (All p < 0.05) showed significant main effects among groups with the EBG presented less level of depression and higher scores for PCS and MCS. As a conclusion, the combination of exercise and behavioural program may be a promising intervention rather than exercise training alone in enhancing exercise adherence, ESE, and functional status of older persons residing in the community.

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

**45** Name : Mohamad Izwan Ismail

Title : Genomic Adaptation in Antimicrobial Resistance: Elucidating the Route and Effects in *Acinetobacter Baumannii*

Supervisor : Prof. Dato Dr. Mohd Zaki Salleh (MS)  
Prof. Dr. Teh Lay Kek (CS)



Antimicrobial resistance has been a looming threat ever since its conception and it has become one of the greatest global problems of the current era. Although various studies have been conducted to better understand the mutational triggers leading to antimicrobial resistance, the specific genomic path towards it have yet to be discerned. Here, we aim to elucidate the pathway of genomic evolution throughout the resistance induction of an *A. baumannii* strain towards ciprofloxacin, erythromycin, meropenem and imipenem, as well as comparing the mutations acquired clinically versus *in vitro*. Twenty-five (25) local clinical *A. baumannii* strains were isolated and screened for antimicrobial susceptibility, and their genome were sequenced using the Illumina GAIIx genome sequencer. The susceptible parent was then challenged with ciprofloxacin, erythromycin, meropenem and imipenem separately until growth is still possible beyond the Minimum Inhibitory Concentration (MIC) as defined by EUCAST standards. Once the resistance stability was confirmed, another sequencing run was done on the isogenic. Variant analysis was carried out using CLC Bio, and primers were designed to target the mutations of interest. PCR was then carried out on aliquots of the resistant mutants, each taken at increasing levels of antimicrobial tolerance throughout the challenging process. Phylogenomics and wgMLST analyses were carried out between the parent and resistant strain, as also the remaining isolates. Stable low and high-level resistant strains were successfully generated. Several genomic variants were identified in the high-level resistant strains. Validation of

variant calling via PCR removed all miscalled variants. Comparative genome annotation revealed a high consistency in the genome structures of the clinical strains, despite non-consistent phylogenetic and synteny profiles. The mutation validation revealed several variations arising in genes responsible for signaling (*yihG* *bvgS* and *srrA*), metabolic activities (*atpD*, *ribonuclease I*, and *epsL*) and cell structure maintenance (*ftsI* and *yceG*) in addition to targeted mutations (*mexB*, *acrB* and *gyrA*). Analysis of the mutation chronology shows that when exposed to *erythromycin*, *A. baumannii* incurs modifications to genes *bvgS* and *srrA*, on days 4, 6, and to *ftsI* and its ribonuclease I encoding gene on day 67. When exposed to ciprofloxacin, mutations developed in *gyrA* and *yihG* on days 28 and 48. Meropenem exposure on the other hand has led to variations in *epsL*, *mexB*, and *atpD* on days 4, 10 and 70. In contrast, meropenem exposure resulted in mutations to *acrB* on day 38, and two mutations in *ftsI* occurred on day 19 and 67. From the results it is deduced that the chronology of intrinsic mutations is dependent on the types and intensity of selective pressures enacted, even on the same bacteria. Antibiotic pressure under *in vitro* and *in vivo* conditions has also resulted in development of different mutations leading to similar resistance profiles. It was also found that a prolonged exposure to the drugs used in this study plays as much of a role as the sub-inhibitory concentration.

**46**



Name : Jasmine Anak Edmund Andrew

Title : Incorporating Logic of Indigeneity in Safeguarding Indigenous Knowledge of Medicinal Plants in Malaysia: Case Study of The Bidayuh in The District of Serian, Sarawak

Supervisor : Prof. Dr. Zaliha Hussin (MS)  
Associate Prof. Dr. Jasmine Ahmad (CS)

In recent years there has been a remarkable revision of the negative perceptions on knowledge traditionally held and practiced by indigenous peoples. A particular aspect of traditional knowledge that has been attracting much attention is indigenous people's knowledge and uses of medicinal plants. This indigenous knowledge has attracted particular attention for the economic potential it brings from new drug development, as leads provided by indigenous use constitute an important cost-savings factor in research and development. However, knowledge of medicinal plants among indigenous communities is facing the threat of erosion due to rippling forces of globalization and modernization. Studies among the country's indigenous communities have indicated that Malaysia is equally affected by this phenomenon. The impending loss of this valuable resource has stimulated policy intervention for affirmative action both at the international and national levels aimed at preserving, reinforcing, recording or adapting indigenous knowledge on medicinal plants, primarily through documentation and recording of medicinal plants specie and their uses in traditional treatments. Malaysia's recent membership

to the 2003 Convention on Safeguarding Intangible Cultural Heritage provide an opportunity for an indigenous stakeholder lens at policy intervention towards ensuring viability of the knowledge. The findings indicated that in spite of a lack of awareness of policy on traditional knowledge of indigenous plants, there is high appreciation and value of the knowledge among the elder generation as a cultural heritage and as a first course of treatment for illnesses and ailments; and that awareness and education on the value of this traditional knowledge among the younger generation impacts upon intergenerational transmission of knowledge. The study also identified several constraints and factors affecting public education and awareness of government policies and programs, as well as inter-generational transmission of knowledge and management of this knowledge among rural populations. Suggestions by the younger generation on ways to facilitate inter-generational transmission were incorporated into a logic model to encourage viability of the knowledge among indigenous communities in Malaysia.

**47** Name : Karna Mustaqim

Title : Reading the Visual Form of Malaysian Comics Art

Supervisor : Prof. Dr. Mulyadi Mahamood (MS)



People nowadays lives in a convergence culture who witnessing how the meeting of old and new media open up new possibilities in the contemporary culture. One of cultivates popular culture in late nineteenth century is the medium of comics. The amusement of comics invited its reader – young or adult – to be immersed into its world. Taking underrated subject matter in popular visual culture such as comics is an intriguing task. While people would agree that cartoons are valuable reflection of society, yet it is an arduous task to take since it was not yet count as a truly significant scholarship. The lack of appreciation made the richness of local comics unseen and as an important contemporary visual culture remains undiscovered. Articulating the expression of contemporary Malaysian comics is not even more a lucid mission. Working pace by pace in this study begins with documenting to perform an initial reading/viewing of all sources and to take notes about the general ways the visually appears

contents of four limited established and eligible comics' magazines at that time being such as *Gila Gila*, *Ujang*, *Gempak*, and *G3*, which consider to study its visual form and design. Second, researcher used semiotics analysis to generate the visual form categorization. Based on the contents of formal visual structure and semiotics visual analysis, researcher then finally gain insight from the phenomenology of the arts to explicate the findings. It is important yet meaningful to understand the perspectives in studying visual art such as the comics study; that researcher pre-reflectively involves as the first-person experience.

**48** Name : Rosnidar Ain

Title : Multimedia Novels for Internet Generation (Net-Gen) Readers in the Cyberspace

Supervisor : Associate Prof. Dr. Kamarudzaman Isa@Md Isa (MS)



In the midst of rapid technological advance, a new era in literature writing has emerged. Wider network of Internet has given the opportunities to authors to become more prolific and creative in producing their work. In the virtual space, the number of authors grows and each one of them strives to grab the readers' attention. Websites and social networking sites become the medium for authors to harness their creative mind through their writings. For writers who has envisioned becoming authors or writers who fail to establish themselves in the mainstream media, the Internet is perceived as a medium that is very easy for them to write. Nevertheless, with the impact of technological advances that covers almost all aspects of the public's life, literary work is seen as not too distant from the conventional literature. The type of written material still resembles the printed ones. In fact, the use of multimedia is not fully utilized to produce literary work, which is different from the conventional literature materials. This study aims to analyze the novel as a genre in the Internet realm for the Internet generation (Net-Gen) through the utilization of multimedia

in Malay literature. Through this study, the researcher will examine the novel genre, which is available on the Internet especially the novel in the form of multimedia, while investigating issues that might arise through observation, pilot survey and interviews conducted. Views and opinions obtained from this method will be used as data to form a model, which is a multimedia novel. This model will be tested on several respondents in order to collect data, which will be used as findings. Data, which are gathered, will be analyzed and a guideline about novel in the form of multimedia is created. Results from this research will benefit the field of literature in terms of literary knowledge in the form of multimedia that is distinguished from the conventional literature. With the advent of Internet, literary work must be more creative and not limited by the conventional literature alone but possesses its own distinct sets of disciplines.

**49** Name : Abdullah Ali Alassiri

Title : The Usage, Self-Presentation via Facebook, and its Psychological and Sociological Consequences Towards Saudi Arabia University Students

Supervisor : Dr. Mariah Muda (MS)  
Associate Prof. Rahmat Ghazali (CS)



Prompted by the widespread saturation of Facebook usage in Saudi Arabia, among university students to socialize with online members, this study investigated the usage, self-presentation, psychological and sociological consequences of the Facebook social networking site among undergraduate students in Saudi Arabia. The problem statements of this study were addressed by answering the seven research questions: 1) What motivation does undergraduate students have for joining Facebook? 2) How undergraduate students do consume Facebook? 3) In what condition does undergraduate students need Facebook? 4) How do undergraduate students manage their self-presentation via Facebook? 5) What are the experiences obtained by the undergraduate students from Facebook psychologically? 6) What are the experiences obtained by the undergraduate students from Facebook sociologically? 7) How have Facebook activities affected the lifestyle of the undergraduate students? The research questions were answered by analysing in-depth interview data collected from twenty male undergraduate students between the ages of 18 and 24 years selected from King Saud University (KSU) and King Khalid University (KKU) Saudi Arabia. Using thematic analysis, informants data were coded 'R1 to R20', validated and was transcribed to minimize error from translating into the research items from Arabic back to English Language. Using purposive sampling method informant perspective within the research context were explored. Data collection confined to motivations students have for engaging in online activities, self-presentation, psychological and

sociological consequences to their everyday life was investigated based on the theoretical and philosophical perspective underpinnings media and gratification paradigm and social influence theory. The research findings contributed to the development of important research themes that supported the development of a new research framework. Based on the analysis, all the research questions were answered. The findings for this study showed that the students use Facebook for the purpose of interacting with others, getting information and as knowledge sources. In terms of self-presentation, this study revealed that the students portray themselves in real and not fake image while socializing with others. Psychological and sociological consequences from the usage of Facebook are recorded ranging from cheerful to stress and from loneliness to having many friends. As a conclusion, this study conclusively drawn that Facebook is a very persuasive medium of communication among the University students in Saudi Arabia that bridges across socio-cultural boundaries and unites students to interact as a community.

**50**



Name : Azlina Binti Kamaruddin

Title : The Utilisation of Online Alternative Media and its Implications Towards Participatory Democracy: A Malaysian Case

Supervisor : Associate Prof. Rahmat Ghazali (MS)  
Dr. Mariah Muda (CS)

This study examines the utilisation of online alternative media and its implications towards participatory democracy. Since the enactment of the Communication and Multimedia Act 1999, online alternative media such as *Malaysiakini*, *Malaysia Today*, and the *Malaysian Insider* have played a pivotal role in many political events including the post-Mahathir-Anwar political crisis, the 2008 financial crisis, election campaign, Anwar's sodomy case, and Dr. Hasan Ali's disclosure of PAS weaknesses. Online alternative media assist in spearheading some other relevant issues that reflect the undercurrent of discontentment or otherwise the participation of peoples' voices towards democracy. Dissident voices become loud without fear to voice out their opinions and dissatisfaction on political issues via online alternative media. Indirectly, it forms a force for a shift of democratic paradigm. Among others this study has explored the role of online alternative media and answered the enquiry of how Malaysians have utilised it for participatory democracy. This study employed

the qualitative research method by means of doing semi-structured interviews and qualitative content analysis as data analysis techniques. Within this research approach, examples of the democratic phenomenon were analysed to gain a sense of its general essence. The findings imply that participatory democratic stance via the alternative media is less significant. There were instances where the people voices through online alternative media have gained attention from the policy and decision-makers, and in some other instances it has worked hand in hand with the traditional media.

**51** Name : Hazeline Ayoup

Title : Organizational Alignment using the Balance Scorecard Approach:  
Case Study of a Malaysian Government-Linked Company

Supervisor : Prof. Dr. Normah Hj. Omar (MS)  
Prof. Dr. Hj. Ibrahim Kamal Abd Rahman (CS)  
Dr. Faridah Maarof (CS)



The Balanced Scorecard (BSC) constitutes one of the most popular performance measurement systems for organizations. Used solely as a performance measurement system, the BSC highlighted a serious setback: inability of the traditional management systems to link a company's long-term vision with its short-term strategies. Premised on this deficiency, the BSC application has been further innovated to include using it as an organizational alignment tool. Specifically, the strategic use of BSC as an organizational alignment tool has been proposed by Kaplan and Norton in their 2006's book *Alignment: Using BSC to Create Corporate Synergies*. Despite the detail implementation framework outlined in their book, there has been very limited literature written by previous researchers or practitioners to implicate the usage of BSC as an alignment tool. Most works on BSC were based mainly on its role as a performance measurement tool or premised on limited, superficial and generic data. The present study examines the use of BSC as an organizational alignment tool in a large government-linked company (GLC) in Malaysia. To be named as ATB, the case study company was one of the pioneer companies to implement BSC in this country way back in 1996. The use of BSC as an alignment tool became prominent for ATB when the "GLC Transformation Programme" was introduced by the government and came into effect in 2006. This study demonstrates how ATB uses the BSC to create organizational alignment and addresses organizational issues faced by the company in the process. Data for this study were gathered through interviews, analysis of documents, observations and a survey to

the company's employees. The study found that the BSC helps the case company to create organizational alignment only to a certain extent. Failure to enjoy full benefit of the BSC as an organizational alignment tool is due to the lack of understanding in executing the framework. This study discovers that the level of alignment created using this framework is subject to the comprehensiveness of its adoption by the employees from various levels. This study also found that organizational alignment requires organization to align its technical behavioral elements simultaneously. The study highlighted that the key determinant to organizational alignment using the BSC is the effectiveness of the KPIs determination process. The KPIs helps to connect and align these elements. Result of this study suggested that managers' skill and knowledge, effective communication, partnership, restructuring, leadership, managers' acceptance, trust, managers' intention and attitudes, managers' involvement and commitment affect the process of determining appropriate KPIs in the case company. The study also outlined several contributions to the body of knowledge and practices. It extended the organizational alignment model developed by Kaplan and Norton (2006) to include the behavioral elements into the model. It also offers implementation guides to the practitioners and suggests several improvement initiatives. However, the finding of this study have to be carefully interpreted as it is only limited to the case company. Future study could focus on multiple case studies in different industries and relational study on the multiple factors affecting the process.

**52** Name : Maziana Zakaria

Title : Management Control Systems on Managing Employees and its  
Effect on Performance in Services Sector

Supervisor : Associate Prof. Dr. Hj. Nik Kamaruzaman Hj. Abdulatiff (MS)  
Associate Prof. Dr. Norli Ali (CS)



Management control systems (MCS) were regarded as a helpful tool for organization in terms of controlling employees due to its nature dealing with resources and capabilities. Employees, currently, have become the central part in sustaining competitive advantage which has been argued that have a significant impact on performance. Employers are constantly searching for more relevant approaches in managing employees to achieve utmost performance, whilst employees are keen to enhance the benefits at work such as opportunities for more absorbing and inspiring work patterns. Therefore, the main objective of this study was to examine the nature of employees control as the elements of MCS on performance and the influence of task environment on MCS in services sector. Further consideration of wellbeing will take place as moderator in the relationship of MCS and performance. As such, this model eventually leads to having better on-going decision making. The employees control was incorporated in general MCS (*omcs*), interactive control (*mics*) and enabling control (*mecs*) systems as the elements of MCS. A questionnaire survey was conducted among managers in services organization which located in Peninsular Malaysia. An analysis of 166 survey responses shows mixed results for the hypotheses developed which empirically tested using Partial Least Square-SEM. For direct relationship, the results revealed that there is significant positive relationship between

task environment and MCS. *Mics* and *mecs* were positively associated with non-financial performance; however, both insignificant on financial performance. The relationship between *omcs* and performance were found insignificant as expected. Findings also confirmed the moderating effect of the wellbeing in the relationship of *omcs* and non-financial performance. The moderating effect, conversely, was not established between *mics* and *mecs* on performance as well as *omcs* on financial performance. This study offers a significant contribution to the existing body of knowledge in MCS by expanding the theories (contingency and resource-based) via new elements, particularly, employees control and wellbeing. It was also shown that, an understanding of the antecedents of task environment in adopting MCS, notably, *mics* and *mecs* on non-financial performance in order to promote and support sounds employees' control. The moderating effect of wellbeing highlights preliminary evidence on the elements of employees control in MCS which focus on how to manage employees' documents and regulations for establishing commencement of MCS. Thus, enable managers to simultaneously exploit and explore richer management control information. However, this study also recognizes that the research limitations might diminish the generalization; particularly the number of sample and did not consider all the sectors other than services.

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**53** Name : Nor Azrina Mohd Yusof@Ghani

Title : Tax Non-Compliance of Small and Medium-Sized Corporations (SMCs) and Tax Auditors' Aggressiveness in Judgment when Auditing SMCs

Supervisor : Associate Prof. Dr. Lai Ming Ling (MS)  
Prof. Dr. Yap Bee Wah (CS)



The pervasiveness of tax non-compliance remains a serious concern to most tax authorities around the world. The loss of tax revenue due to tax non-compliance has prompted tax authorities to strengthen their tax audit and tax investigation. In Malaysia, although tax authorities have initiated tax audit regularly and impose tax penalties, the issue of tax non-compliance among small and medium-sized corporations (SMCs) still persist. The unresolved issue signals the question as to whether the increase in tax non-compliance is due to the tax auditors' aggressiveness in judgment when auditing SMCs. The importance of understanding tax non-compliance as well as tax auditors' aggressiveness in judgment, couple with the lack of empirical research is the motivation of this study. The first objective is to examine the determinants of tax non-compliance of SMCs. This study analysed archival tax data obtained from the Corporate Tax Department, IRBM, located at Duta Street, Kuala Lumpur. A total of 513 audited and resolved corporate tax cases in 2011 were obtained. Of these 513 tax cases, 286 are non-compliant SMCs. The findings show RM31.3 million additional taxes and penalties were collected from these non-compliant SMCs. The hierarchical multiple regression was used to test the proposed research model, which is formulated based on the economic deterrence theory. Out of six hypotheses, four hypotheses are supported whereby tax rate, foreign ownership, firm size and construction industry are found significantly related to tax non-compliance of SMCs. The most significant predictor is firm size followed by construction industry, tax rate and foreign ownership. The second objective is to test the tax auditors' aggressiveness in judgment model based on culpability theory. A total of 357 questionnaires were mailed

to tax auditors. Of these, 318 usable questionnaires were received and analysed. There are two important findings from this survey. Firstly, tax auditors indicate that the use of unqualified tax agents, types of industry and firm size cause tax non-compliance among SMCs. These findings are consistent with the findings obtained in Stage 1 where firm size and types of industry are two significant determinants of tax non-compliance. Partial Least Squares-Structural Equation Modelling (PLS-SEM) was used to test the proposed tax auditors' aggressiveness in judgment model. The results show that the culpability factor, job stress and partially task input factors (incompleteness of documentation) exerted significant effects on tax auditors' aggressiveness in judgment. The results also reveal that incompleteness of documentation significantly moderates the relationship between the culpability factor and tax auditors' aggressiveness in judgment, thus answering the third objective. When the degree of incompleteness of documentation is high, the culpability factor (e.g., size of audit adjustment and the number of years involved in tax non-compliance) will have greater influence on the aggressiveness of tax auditors' judgment when auditing SMCs. Overall, this study has merits as it used the actual tax audit cases in measuring tax non-compliance among SMCs in Malaysia. This study contributes to the tax compliance literature by testing the applicability of the economic deterrence theory and the culpability theory in the context of Malaysian tax setting. The findings provide important insights not only to the Malaysian tax authorities, but also to tax authorities and tax researchers in other parts of the world given the fact that tax non-compliance of SMCs is a prevalent and universal problem.

## FACULTY OF BUSINESS MANAGEMENT

**54**



Name : Amani Adnan M. Aqeel

Title : Determinants of Saudi Arabian Women's Luxury Fashion Brands Purchase Intention: Mediation Effect of Cognitive-Affective Model

Supervisor : Prof. Dr. Rosmimah Mohd Roslin (MS)

Saudi Arabia, a country that has often been described as traditional and conservative, has been experiencing rising consumption of luxury brands lately. This is indeed an area that is still underexplored as the consumption behaviour of Saudi women toward luxury fashion brands have not been given much attention in the literature. As luxury goods are products that have intrinsic values and high social standing, both rational and emotional variables must be considered in the study of consumer behaviour and the cognitive-affective model is one of the theoretical bases in understanding such purchase intention. The cognitive-affective model has been used to understand the purchase intention of goods but very little of its application is seen in the context of luxury goods where perceived quality and emotional value are incorporated. As such, the mediating effect of perceived quality and emotional value as suggested by the model is the emphasis of this study as this is an area that has yet to be pursued extensively in existing literature. In line with this, the main objective of this study was to determine the relationship between the social status of women consumers and their purchase intention of luxury brands in Saudi Arabia. Primary data were obtained through questionnaires distributed in Riyadh and Jeddah,

two major cities in Saudi Arabia, to Saudi women aged 20 and above who had luxury fashion brand purchase experiences. A total of 366 valid responses were collected and structural equation modelling was used to carry out a multivariate analysis. The findings of the research indicate that individual characteristic and consumer normative, two distinct constructs in the proposed framework, influenced perceived quality and emotional values of Saudi women's luxury fashion brands purchase. Both perceived quality and emotional value were found to motivate purchase intention and that perceived quality significantly mediates the relationship between the individual characteristics and consumer normative and purchase intention. Unlike previous studies that found emotional value as the most important element in the purchase intention of luxury goods with perceived quality having a negative effect, this study finds that perceived quality of luxury fashion brands is the key factor influencing the purchase intention among Saudi women. The present study thus contributes to the body of knowledge on luxury consumption in emerging markets like Saudi Arabia by proposing the inclusion of mediators in the relationship between social status and purchase intention.

## 55 Name : Dato' Anuar Md Nor

**Title :** The Internationalization of Malaysian Palm Oil Firms: The Role of Network Relationships

**Supervisor :** Prof. Dr. Rosmimah Mohd Roslin (MS)



There have been many studies conducted on multinationals from large developing Asian countries such as China and India. The multinationals from smaller Asian countries, such as Malaysia, Thailand and Singapore, are also active in investing outside their countries. In particular, the Malaysian multinationals are establishing large-scale oil palm plantations in Indonesia. The Malaysian palm oil-based multinationals, which are defined as POB MNCs, need to invest in Indonesia as they are facing limited suitable lands to plant oil palms domestically. They also have to rely on immigrants labour for their Malaysian oil palm plantations. As a result, the POB MNCs' costs of palm oil production in Malaysia are higher as compared to the costs in Indonesia. The POB MNCs' operations in Indonesia will have a major impact on their long-term business viability as their Malaysian oil palm operations would continue to incur higher production costs. The palm oil industry is important to the Malaysian economy. Thus, the POB MNCs need to be supported by the Malaysian government to develop competitive advantages to operate successfully in Malaysia and Indonesia. The competitive advantages of the POB MNCs have been their superior oil palm plantation management techniques and skilled estate managers, both of which had been accumulated over decades. This study examines the role of network relationships in the Malaysian palm oil industry, and how the network relationships contribute to firm competitive advantages of the POB MNCs. A qualitative research method was used to gather primary data on network relationships by interviewing a sample of informants. They were interviewed from July 2012 to March

2013. Secondary data was also gathered based on archives of industry conferences, annual reports of industry associations and notes made at industry workshops to provide research triangulation. The study shows that network relationships in the palm oil industry were formed as a result of long historical, economic, ownership and personal ties. The members of the network collaborate among themselves to develop solutions to address industry problems, such as access to markets, infestations of pests and diseases on oil palms, and R&D activities. The networks relationships also involve foreign R&D institutions and foreign experts. The study also shows that network relationships had helped in the accumulation of industry best-practices, which are applied in the operations of the POB MNCs in Malaysia and Indonesia. The study has shown that the POB MNCs were able to possess competitive advantages in their Indonesian operations based on the accumulated knowledge of industry best-practices. As a result, the phenomenon of the internationalization of Malaysian palm oil firms in Indonesia was explained in term of their motivation for investing in Indonesia and the possession of competitive advantages over their Indonesian competitors. The study, which is exploratory, contributes to new knowledge on the internationalization of firms from smaller developing countries. There are usual limitations of the study which are associated with the use of a qualitative research method. The results of the study cannot be generalizable to other agro-industry settings. The study has recommended areas that could be addressed in future studies.

## 56



**Name :** Fatima Abdelwahab Galal

**Title :** Islamic Insurance Model Revisited: Operationalizing the Business Paradigm Within the Shari'ah Parameters

**Supervisor :** Prof. Dr. Hjh. Zuriah Abdul Rahman (MS)

Associate Prof. Dr. Mohamed Azam Mohamed Adil (CS)

This thesis revisited the Islamic insurance models' operations and its various business paradigms within the *Shari'ah* parameters in three different countries which are Bahrain, Malaysia, and Sudan. Although, the Islamic insurance industry is experiencing a period of rapid growth in terms of its net contributions and profit, amidst tough obstacles and constraints due to the *Shar'iah* issues in certain aspects. Islamic insurance operations require fine-tuning in line with Islamic jurisprudence and Muslims need. There are many different operational models with various Islamic jurisdictions trying to meet the needs of Muslims in general as regard Islamic insurance in the global Islamic economy. However, each of these models has its own advantages and disadvantages. Moreover, there is no agreement amongst the Islamic scholars on which of these models can be considered the best. This means different organizations use the same Islamic contract but with different applications. These models, which are *Wakalah*, *Mudarabah*, *Waqaf* and the *Hybrid* model, have several shortcomings that need to be studied and addressed to strengthen global Islamic insurance industry. The two challenging issues that are studied are the ownership of the Islamic insurance risk fund or the contribution fund and the surplus distribution accumulated from the risk fund. There are differences of opinion regarding *Shari'ah* compliance of certain practices. This has led to layers of regulatory differences in countries like Bahrain, Malaysia, and Sudan, resulting in initiation of separate regulatory frameworks for Islamic insurance as a medium to ensure rapid growth and encourage Islamic insurance. This study adopts MANOVA because there are multiple dependent variables as well as independent variables within the constructs of the research.

The first objective illustrates a well-structured understanding of the insurance principle practiced in Islamic insurance. MANOVA was conducted to test for substantial differences in the application of insurance principles in the operation of Islamic insurance within the selected countries. Moreover, the second objective examines the association between *Shari'ah* rules and some items in the business operation of Islamic insurance in the selected countries that operate Islamic Insurance. Furthermore, the objective three investigates the similarities and differences in the running of Islamic insurance business in selected countries. On the other hand, objective four addresses the justification of Islamic insurers on their selected operational models and this segment concludes with the last objective that proposes an operational model that will be acceptable to all Islamic insurance companies. The main contributions of this research are the argumentative points provided by the experts of Islamic insurance, *Shari'ah* scholars and customers in the three countries sampled. The findings reveal changes in insurance principles; similarities in the models practiced and provide justifications in terms of features such as the operator fees and the general harmonization of the models. This study is joined together the application from the operators of Islamic insurance industry; the *Ulama* of the *Shari'ah* board and the experts of Islamic insurance industry to meet together to highlight a common model for Islamic insurance, and the best method for surplus (profit or loss) distribution, and other issues. For the Islamic insurance industry, this research can narrow the gap between the current practiced models. This indicates that the proposed Islamic insurance model which is *Musharakah-wakalah* will increase Islamic operation.

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

**57** Name : Allahyarham Halimi Zakaria

Title : Impact of Antecedent Factors on Collaborative Technologies Usage Among Academic Researchers in Malaysian Research Universities

Supervisor : Associate Prof. Dr. Norzaidi Mohd Daud (MS)  
Associate Prof. Dr. Fazli Idrus (CS)



Research collaboration through the use of collaborative technologies has the huge potential to improve research publication performance. In order to ascertain optimal usage of collaborative technologies in Malaysian research universities, the main objective of this study is therefore to investigate significant antecedents or drivers to usage of collaborative technologies. The research objectives addressed by this study include (a) the investigation of the relationships between each of these antecedent factors of personal innovativeness in IT, task-technology fit, perceived management support, subjective norm and perceived peer usage with perceived usefulness and individual usage; and (b) the investigation of the relationship between perceived usefulness and individual usage of collaborative technologies for research collaborations. Renowned technology acceptance theories and models, namely the Technology Acceptance Model (TAM) (Davis, Bagozzi & Warshaw, 1989), the Theory of Planned Behavior (Ajzen, 1985; Ajzen, 1991), the Task-Technology-Fit model (TTF) (Goodhue & Thompson, 1995) and the Technology-Organization-Environment (TOE) model (Tornatzky & Fleischer, 1990; Zhu & Kraemer, 2005) were used to form the broad hybridized research model of this study. The research model assessed the antecedents of collaborative technologies usage by looking at three critical contexts of technological, organizational, and social perspectives. The model also investigates the mediating effect of perceived usefulness on individual usage. The study used questionnaire survey method as its main data assessment instrument. Data analysis was conducted on data

collected from 156 academic researchers from the five Malaysia research universities namely; Universiti Kebangsaan Malaysia (UKM), University of Malaya (UM), Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia and Universiti Putra Malaysia (UPM). The study employed the extensive quantitative approach of the structural equation modeling (SEM) method to evaluate the research model and to test the hypotheses. The main findings of this study are that (a) personal innovativeness, task-technology fit and perceived peer usage are significant predictors of individual usage of collaborative technologies; (b) perceived managerial support and subjective norm were found not to be significant predictors to perceived usefulness and individual usage; and (c) perceived usefulness is a significant mediator to individual usage in that perceived usefulness had fully mediated personal innovativeness while partially mediated peer usage. This study is perhaps one of the first to address the collaborative technologies usage in these five research universities in Malaysia using a broad extensive hybrid model to investigate influences of antecedent factors on collaborative technologies usage. The results provide practical insights on how the Malaysian higher education sector and other research organizations of not-for-profit structure could enhance on their collaborative technologies usage.

**58**



Name : Khalad M. S Alrafadi

Title : Analyzing The Production Activity of Banking Institutions in Libya : Productivity and Efficiency Determinants

Supervisor : Associate Prof. Dr. Mazila Md Yusuf (MS)  
Associate Prof. Dr. Badrul Hisham Kamaruddin (CS)

Measurements of banking efficiency and productivity have received increasing efforts in applied economics in recent years due to the rapid acceleration of changing nature of financial industry. The financial sector, especially the banking system, plays a central role in the process of economic development and growth in a specific country. The efficiency of the banking system is one of the most important issues in the financial market because the efficiency of banks could affect the stability of the banking industry and thus the effectiveness of the whole monetary system in a country. Bank's efficiency is measured as the difference between the bank's position and its best production frontier. Generally, there are two main techniques that would be used to evaluate banking efficiency: parametric and non-parametric techniques. This study analyzed the technical efficiency and productivity of the banking sector in Libya during the period from 2004 until 2010. A nonparametric data envelopment analysis (DEA) method is employed to estimate the mutually exhaustive components namely pure technical efficiency (PTE) and scale efficiency (SE) of the 17 banks in Libya. Also, the Total Factor Productivity (TFP)

of the Libyan banks is calculated using the Malmquist Productivity Index (MPI). The decomposition of the MPI such as technical change, efficiency change, pure technical efficiency change and scale efficiency change were included in the measurement. Finally, the second stage is used. The Ordinary Least Square (OLS) model to determine the factors that could influence the efficiency score. The findings of the first stage indicated an average efficiency scores in the banking sector in Libya during the periods of study. The results showed that the most efficient banks were the specialized banks, followed by commercial banks and lastly the private banks. In term of productivity, the results showed that Libyan banks productivity declined during the period of study. As for the determining factors that influencing the efficiency scores of the Libyan banks, the results showed that only profitability, size operation, government link, mergers and ownership structure that have significant relationship with the Libyan banks' efficiency scores.

## 59 Name : Mahdi Borzooei

**Title :** Halal Brand and Purchase Intention of Halal Processed Food in Malaysia: The Influence Of Brand Theory and Religious Commitment

**Supervisor :** Associate Prof. Dr. Nor Hashima Hashim (MS)  
Dr. Siti Zaleha Sahak (CS)  
Associate Prof. Dr. Anizah Zainuddin (CS)



Halal is extended beyond religious values into the realm of business and trade and is fast becoming a global brand for both Muslim and non-Muslim consumers. Current international markets need a brand that appeals to global religious consumers and buyers with common values and practices. In response, this research develops a model to investigate implementing brand theory and model, as well as religious commitment on Halal purchase intention. In particular, the mediation effect of consumer-brand relationships is another considerable stream of this study. A quantitative survey methodology using self-administered questionnaires has been adopted to collect data for the proposed constructs in the theoretical model. The target sample of this study includes Muslims and non-Muslims in Malaysia by focusing on three ethnic groups (Malays, Chinese and Indians). Structural equation modeling is used to validate the model. The findings of this thesis largely support the hypothesized relationships proposed in the theoretical model. The results of the study indicate that consumer-brand relationships is a completed mediation variable between brand personality appeal, brand personality, and purchase intention. The results also reveal that although religious commitment has direct influence on consumer-brand relationships, it has no significant effect on purchase

intention. However, consumer- brand relationships has a significant influence on purchase intention. These results have extensively practical implications for brand building, establishing consumer relationships, and enhancing purchase intention of the Halal brand. In this regard, this study opens a new window for marketers and managers to see Halal as a brand in the market; it also helps marketers to employ different brand strategies in order to introduce Halal in a unique format in various cultures and countries. In particular, personality of the Halal brand is a significant tool for marketers in making concrete relationship with consumers in the marketplace. This study also displays a new platform for consumers (Muslim and non-Muslim) to adopt a unique approach towards Halal. Indeed, it clarifies the evolution of Halal from a religious symbol to a brand. Finally, originality of this thesis improves our understanding of consumers' relationships with the Halal brand and provides managers with guidance on developing, nurturing, and utilizing these relationships in order to enhance purchase intention of the Halal brand.

## 60



**Name :** Maryam Asgari

**Title :** Learning Outcomes of Iranian Students as Educational Tourist in Malaysian Universities

**Supervisor :** Associate Prof. Dr. Nor Hashima Hashim (MS)  
Dr. Siti Zaleha Sahak (CS)  
Associate Prof. Dr. Anizah Zainuddin (CS)

Today, international students are recognized as a rather unique category of tourists. The perceptions of this group are shaped based on whole life experiences in the host country. In response, this thesis develops a model to evaluate the learning outcomes of Iranian students who study in Malaysian universities from the educational tourist perspective. This model extends the effect of service quality, image, price, and student perception on learning outcomes of Iranian students. Learning outcomes is a product of the university that is as an indicator of institutional quality and effectiveness. In addition, this model examines the influence of these constructs on learning outcomes by mediating effect of satisfaction. The methodology of study is based on mixed method research. The researcher used embedding dataset in the mixed method in order to support the proposed theoretical model. In the qualitative part, a semi-structured in-depth interview with Iranian students was conducted in order to gain a deeper understanding of the perception of those respondents towards Malaysian universities and Malaysia as a destination study. In this regard, the constant comparative method was used for data analysis as it allowed the researchers to identify foundation categories by focusing on three different types of coding (open, axial, and selective). In the quantitative part, a survey, by using self-administered questionnaires has been adopted to collect data for the constructs proposed in the theoretical model from Iranian students who are in the last year of their studies, graduated,

or have graduated from Malaysia and starting with another degree. Structural equation modeling is also used to validate the model. The results of the study indicate that satisfaction is a complete mediation variable between image and learning outcomes. The results also reveal that satisfaction is a partial mediation variable between price and learning outcomes. Finally, the model failed to support the relationships between service quality, student perception and the learning outcomes of Iranian students, as well as by mediating effect of satisfaction. These results have extensive practical implications for the education and tourism organizations. Managers of universities must pay attention to reliable, responsive, and empathetic services which are indeed related to improved service quality perceptions. A commitment to excellence in the delivery of services causes student satisfaction as international students have different forms of motivation for studying abroad. Lastly, a favorable image can boost a university attraction through increased student satisfaction. Likewise, high international image and prestige of a destination is an attraction to international students as it is expected that image and prestige would open up better career opportunities for them. Finally, this thesis reveals the perceptions of Iranian international students towards Malaysian universities and Malaysia as a destination study.

**61** Name : Mohamad Nizam Jaafar

Title : Capital Structure Determinants of Islamic Hybrid Securities

Supervisor : Prof Dr. Ismail Ahmad (MS)  
Dr. Hairulnizam Hashim (CS)  
Prof. Dr. Muhammad Rahimi Osman (CS)



Firms raise their capital via the common external funds either debt or equity. However, under certain conditions, firms are required to issue more complex financial engineering instruments namely hybrid securities. Literatures showed that very little studies have been conducted on Islamic Capital Market and in establishing the determinants of hybrid securities. Based on theories of capital structure which related to non hybrid capital structure, the variables and the models on hybrid financing are developed. In further filling the gap of the preceding studies, we developed a dynamic model by incorporating important variables that are associated to macroeconomic indicators that are economic growth (GDP), interest rate (BFR), level of stock market development and bond market development. Several estimation models are developed namely convertible bond plus loan stock which signify for debt treat hybrid (model 1) and warrant which is represent equity treat hybrid (model 2) respectively. This study employs the static model via panel ordinary least square (OLS), fixed effects model and random effects model to identify the best estimation model. Besides that, the study also include dynamic model via General Method of Moment (GMM) – first and second generation GMM, to get the most excellent model. From the analysis of static model, it reveals that the best estimation models for both hybrid securities are from model 1 and 2 of fixed effect model. Meanwhile from dynamic analysis, system GMM is considered the most excellent model. As inferences to the body of knowledge, this research has established several factors that are significant in determining hybrid

securities for both debt and equity feature hybrid respectively. For Model 1, risk and profitability is considered the most determinant considerations for issuing convertible bond and loan stock in conjunction with its highest coefficient among all the variables under review. Meanwhile for Model 2, financial risk and adverse financial position is the most determinant factors for issuing hybrid equity. These results suggest that, the firms that expose with high risk but low profitable position will opt for warrant for expansion and the firms that have high risk and strong financial position will choose convertible bond or loan stock. Since the high risk firms but profitable are difficult to secure additional credit facility from the financial institutions, there always opt for hybrid security of convertible bond as proposed by risk shifting theory where hybrid securities allow the high risk firm to further venture into riskier business. For high risk but adverse financial position will opt for warrant securities. Meanwhile, the result from model 1 also support the sequential financial problem theory where the hybrid securities enable the profitable firms to venture into positive NPV project by issuing convertible bond as it offer lower coupon rate as compare to the normal debt rate. These findings can be considered as indication that firms generally use hybrid securities implied by sequential financial problem theory and risk shifting in addition to other capital structure theories such as trade off, pecking order and back door listing.

**62**



Name : Mohamed Saladin Abdul Rasool

Title : Proposing A Non-Monetary Islamic Index for Poverty Measurement at Lembaga Zakat Selangor (LZS), Malaysia

Supervisor : Associate Prof. Dr. Arifin Md Saleh (MS)  
Associate Prof. Dr. Abd Halim Mohd Noor (CS)  
Associate Prof. Dr. Mohd Fauzi Mohd Haron (CS)

In practice, most zakat organizations in Malaysia use the monetary approach in measuring poverty through the conventional Poverty Line Income (PLI) method, and recently the *had al kifayah* (HAK) approach was adopted by zakat institutions. The main aim of the present study is to present a multidimensional poverty measurement from an Islamic perspective as an alternative to the current monetary measurement. The study proposes an Islamic Poverty Index (IPI) which consists of non-monetary indicators comprising of *maqasid-al shariah* (objective of religion) elements, namely, religion, knowledge, physical self, offspring and wealth. The respondents of this cross-sectional study were recipients of zakat aid from Selangor Zakat Board (LZS), which has the highest zakat collection in Malaysia. The two main phases involved in the study are the development of a questionnaire as the research instrument and the data collection stage. An expert review was conducted to develop the questionnaire and the data collection was carried out through a survey aided by a structured questionnaire on selected heads of poor households using the proportionate sampling method in the state of Selangor, the most populated state (with the highest number of Muslims) in Malaysia. In achieving the objectives of the study, data collected

from 258 respondents were analyzed using various statistical methods, namely, descriptive statistics (frequency tables and cross tabulation), comparative mean analysis (T test and ANOVA), correlation analysis and regression analysis. The results of the study revealed that there were five dimensions of IPI with thirteen indicators incorporating *maqasid-al shariah* principles with religion and physical self being the highest weighted dimensions, followed by knowledge, offspring and wealth. In addition, there was a significant correlation between both of the monetary dependent variables. However, PLI was not significantly correlated to both of the monetary dependent variables. The study also found out that the number of respondents who were poor in all the three poverty measurement employed in this study was relatively small. Furthermore, the determinants of each of the three dependent variables were also identified. As a summary, the proposed IP in the present study would be able to reflect the multidimensional phenomenon of poverty in a more holistic way and is expected to have an impact on zakat organizations as it gives a new perspective on measuring poverty.

## 63 Name : Mohammed Abdullah Ali Alkhawlani

**Title :** Mediating Effects of Organizational Culture on The Relationship Between Organizational Context and Organizational Performance

**Supervisor :** Prof. Dr. Zaini Abdullah (MS)

Associate Prof. Dr. Norlida Abdul Hamid (CS)



This research examine the construct relationships between organizational structure, strategy, and the congruence between structure and strategy in terms of organizational context, and their effect on organizational performance, then examine the effect of organizational culture as a mediator between these relationships. A total of 216 of Yemen airways non-managerial employees from four main departments participate in the study. The main objective of the study was to examine the significant of organizational culture as a plausible mediator between the congruence of organizational structure, and strategy and organizational performance and then between organizational structure, strategy and organizational performance. The findings stated that an organizational culture significantly and partially mediate the relationship between organizational context and organizational performance. Similarly, organizational culture significantly and partially mediates the relationship between organizational structure and organizational strategy. Other objective is to identify the effect of organizational context on organizational performance and organizational culture. The findings reported that organizational context is positively effects on organizational performance and organizational culture. Then the next objective is to determine the effect of organizational culture on organizational performance, and the finding is organizational culture has a significant correlation with the organizational performance. Last objective is to identify the effect of organizational structure and organizational strategy on organizational performance and organizational culture. In this objective the research findings stated that organizational strategy has a positive effect on organizational culture and organizational performance.

Meanwhile, it's found that there is no significance relationship between organizational structure and organizational performance but it has a significance effect on the organizational culture. This study reported that organizational culture served as a significant mediator for the relationship between organizational structure and organizational performance. Organizational culture was also found to be a significant mediator for the relationship between organizational strategy and organizational performance, and the more important is that the plausible significant effect of organizational culture as a mediator between the congruence of organizational structure and strategy, show a higher correlation and effect on the organizational performance better than the effect of structure and strategy separately. Furthermore, this research shaped in ten hypothesis to analyze an organizational context structural model (congruent of structure and strategy) as an independent variable, organizational culture as a mediator and organizational performance as a dependent variable. The results indicate that 48 percent of the variance explains organizational performance was accounted for by the dimension of organizational context as a congruent factor. However, only 20 percent of the variance explained organizational culture was accounted by dimensions in organizational context and then organizational structure explained 34 percent of organizational culture while an organizational strategy explains 22 percent of organizational culture. Moreover, the variance percentage explain an organizational performance where 11 and 12 respectively. Finally, theoretical, practical, and methodological contributions as well as recommendations for future research were discussed.

## 64



**Name :** Nur Zahidah Bahrudin

**Title :** Determinants of Bank's Efficiency during Financial Liberalization in Malaysia

**Supervisor :** Prof. Dr. Ismail Ahmad (MS)

Associate Prof. Dr. Imbarine Bujang (CS)

Associate Prof. Dr. Taufiq Hassan Shah Chowdhury (CS)

Associate Prof. Dr. Jaafar Pyeman (CS)

Financial institutions have been found to be one of the major contributors to the economy of numerous countries. The failure of this industry can affect the economic growth and the expanding economic opportunity. In the globalization landscape, financial liberalization also takes place, in which, the central bank permits foreign bank ownerships to invest and to establish their plans locally. The existence of foreign banks has created competitions for local owned banks when they attempt to achieve full efficient performance, as well as in becoming leaders in the market. In addition, the Malaysian government has implemented the new policy named Financial Sector Master Plan (FSMP) in order to strengthen and enhance the local banks operation. Therefore, the assessment of whether local banks have outperformed foreign banks is crucial, especially due to the execution of FSMP for the Malaysian banking system. For that reason, this study examined cost, revenue, and profit efficiency of both local and foreign banks in Malaysia. As the banking system has experienced major changes as a result of the program implemented by the central bank to improve the Malaysian banking sector, the analysis of this study was divided into three time range periods, which were: i) during the Asian financial crisis, ii) before the implementation of FSMP,

and iii) since the inception of FSMP program. The DEA method was used to analyse the efficiency of 17 local and foreign banks from 1997 to 2011. The analysis revealed that local banks had been more efficient than foreign counterparts had been. As the competition among the banks increased, the risk also arose, whereby, along the way to be efficient, the banks were also involved with various types of risks. This factor led the study to incorporate credit risk, operational risk, and liquidity risk, together with two specific factors of bank (size of bank and ROA) with the efficient performance scale in order to analyse their influences towards the three types of efficiency. Besides, the Arellano Bond GMM approach was utilized for the analysis of risk and bank specific factor. The results illustrated that all types of risks and bank specific factors had been a significant influence towards cost efficiency. In fact, similar results were obtained for revenue efficiency, except for credit risk, in which there was an insignificant influence on revenue efficiency. On the other hand, the results for profit efficiency proved to be perplexing as all risks and bank specific variables did not significantly influence profit efficiency for the Malaysian banking institutions.

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

**65** Name : Safiah Omar

Title : The Influence of Positive Work Attitude and Emotion on Intention To Leave Among ICT Professionals In Malaysia

Supervisor : Prof. Dr. Fauziah Noordin (MS)

Associate Prof. Dr. Abdul Rahman Abd Rahim (CS)



The disequilibrium growth between the skills supplies and the growth of technologies raise a concern for this study to carry out research in the area of intention to leave among the ICT Professionals in Malaysia. This is due to the statistics report on the high rate of turnover in the ICT industry. At the same time the role of the ICT industry is also very important in contributing to the growth of the country. Two types of intention to leave were tested in this study which is the intention to leave the organization and the intention to leave the career. A considerable amount of literature has been published on intention to leave but mostly studied from the negative perspectives such as job dissatisfaction, burnout, work conflicts, psychological distress, and employee disengagement. This study answering the call from the positive psychology movement where the study area focus on positive side and the strengths of individual such as positive work attitude and work emotion in determining the factors to reduce the levels of intention to leave. The constructs are career commitment, positive organizational behaviour (POB), work happiness as mediator, and career adaptability as moderator. Using questionnaires as the main assessment instruments, this study adopts quantitative approach for the analyses and using mainly on structural equation modelling (SEM). Confirmatory factor analyses (CFA) were conducted among all the constructs prior to the hypothesized testing. Results from the CFA suggested that the hypothesized framework needed to be separated between intention to leave the organization and intention

to leave the career. The two hypothesized framework were tested using SEM and good model fit indices were achieved for both framework. Both Framework 1 (intention to leave the organization) and Framework 2 (intention to leave the career) found that POB was negatively related to intention to leave and positively related to work happiness, while work happiness was negatively related to intention to leave. Career commitment was found to be negatively related to intention to leave but not to work happiness. Work happiness also partially mediates the relationships between positive organizational behaviour and intention to leave for both frameworks. The analyses also showed that career control and career curiosity in the constructs of career adaptability moderate the relationships between work happiness and intention to leave both in Framework 1 and Framework 2. The findings indicated that the encouragement of positive attitudes such as hope, optimism, resilience, the commitment that individuals have over their career, and the emphasis on positive emotions such as work happiness can contribute to reduce the level of intention to leave. The existence of career adaptability did not increase the level of intention to leave when work happiness exist which means organization may encourage and provide adaptability trainings to increase the career adaptability level among the ICT professionals. The research findings are discussed in relation to the literature. Implications and recommendations for the future research are also presented.

## ARSHAD AYUB GRADUATE BUSINESS SCHOOL (AAGBS)

**66**



Name : Megat Zuhairy Megat Tajuddin

Title : External Networking, Leadership Style and Innovation on Organizational Performance in Malaysian Construction Industry

Supervisor : Dr. Hadijah Iberahim (MS)

Prof. Dr. Noraini Ismail (CS)

Associate Prof. Dr. Isahak Kassim (CS)

This study aims to investigate the factors influencing organizational performance through innovation in construction industry in Malaysia. External networking (EN) and leadership style (LS) were identified as the determinants for innovation (IN) and organizational performance (OP) in this study. EN links various parties in project implementation in the form of inter-organizational collaboration and appropriate LS adopted by managers are capable in bringing industry players to work together as a team, reducing the adversarial relationships among them for greater performance. While EN facilitates in establishing the channel for information and resource flows, managers influence their subordinates to pursue ambitious goals through innovative efforts. EN brings together a project team to innovate and leaders who encourage their subordinates to be innovative will effectively lead to greater performance. These indicatively explain the potential role of IN in mediating the relationship between the two determinants and OP. The Diffusion of Innovation Theory by Rogers (2003) is identified as the underpinning theory of this study. The nature of the study is based on hypothesis testing in a cross sectional setting. Contractors and consulting companies were the population

frame and were captured from the list provided by the industry's professional and regulatory bodies in Malaysia. A sample of 378 organizations was selected based on a stratified sampling method to grasp the sufficient representation of the different groups in the population. Regression analysis was performed to assess the hypothesized relationships between the identified variables. The results revealed six hypotheses are partially supported and one is rejected. EN and LS are identified significant in influencing both IN and OP. Nevertheless, not all dimensions of both variables support these outcomes. This result also supports the positive mediating role of IN in the relationship between LS and OP but not in mediating the EN and OP relationship. Theoretically, this study supports the needs for communication channels in a social system for innovation to diffuse. However, the finding implies the channel established through short-term relationship in the form of networking among project players in a project team, is not sufficient in influencing IN in the construction industry. Practically, the study implies construction managers are required to possess different styles of leadership in leading a project team and in leading an organization.

## 67 Name : Ibrahim Tawfeeq Alsedrah

**Title :** Influence of Heuristics and Framing Factors on Speculating and Investment Behavior: Evidence from Individual Traders in the Saudi Stock Market

**Supervisor :** Associate Prof. Dr. Noryati Ahmad (MS)  
Prof. Dr. Ismail Ahmad (CS)  
Prof. Dr. Rosidah Musa (CS)



Traditional finance (TF) assumes that people are rational. However, TF ignores the fact that people are human; their decisions, and subsequently, their behaviors, are influenced by emotions and psychology, especially when trading in the stock market. Therefore, Behavioral Finance (BF) has arisen to compliment TF. BF is a relatively new field that applies psychology to financial decisions and subsequently examines its effects on stock prices and the market. Most BF studies are conducted in developed markets, which are dominated by institutional investors. Most of these studies have used the experimental approach, and a few have used observation of trading accounts. However, there remains a lack of quantitative studies using surveys, especially in frontier markets like the Saudi Stock Market (SSM). The SSM is dominated by individuals who control around 90% of the market value. The market has witnessed stock mispricing, market inefficiency and sharp corrections, which have negatively affected individuals' investments. Irrational behavior on the part of individuals is suspected to be the root of this problem. While many studies that have been published examine rationality in decision making in emerging and developed markets, little is known about the behavior of individuals in the Saudi stock market. In response to these issues, this research aims to determine the degree of heuristics and framing factors exhibited by individuals and to propose a theoretical model that explains the influence of heuristics and framing factors on individual speculating and investment buying behavior simultaneously. It then aims to quantify how much speculation and investment behavior is due to the influence of heuristics and framing factors. Lastly, it examines the role of experience in moderating

the relationship between behavioral finance factors and individuals' buying behavior. The model used was chosen based on a review of the literature and is empirically investigated using individuals trading in the biggest brokerage firms in Saudi Arabia. The findings of this research are drawn from 294 valid surveys collected from individuals trading in largest brokerage firms in Dammam, Riyadh and Jeddah City in the kingdom of Saudi Arabia. The Partial Least Square (PLS) approach to Structural Equation Modeling (SEM) is utilized in this research and SmartPLS version 2.0 software was used to analyze the empirical data. Analysis of the research model indicates that individuals exhibit a moderate degree of heuristics and framing factors during the decision making process. However, the results become more meaningful after examining the influence of these factors on the individuals' buying behavior. The results indicate that confirmation heuristics, loss aversion and regret aversion influence speculation and investment behavior. Additionally, representativeness heuristics influence investment while anchoring influence speculation behavior. The analysis indicates that the majority of heuristics and framing factors introduced in this research model can explain a large portion of individuals' speculation buying behavior (37%) and investment buying behavior (21%). Lastly, Multi Group Analysis was conducted to investigate the role of experience (low vs. high). However, no significant difference is found between the two groups. The research contributes to behavioral finance body of knowledge and is of interest to practitioners and scholars alike.

## FACULTY OF INFORMATION MANAGEMENT

## 68



**Name :** Azree Ahmad

**Title :** Pre-Online Information Searching Model of Doctoral Students: A Grounded Theory Approach

**Supervisor :** Prof. Dr. Sohaimi Zakaria (MS)

This study was conducted with the purpose of exploring the beginning stage in information searching process. As far as it is concerned, most would agree that information searching is a constructive and evolving process that has several stages. Based on few discoveries, pre-searching was found to have existed much earlier than the actual search or main interaction stage of the information searching process. However, not all users including doctor of philosophy (Ph.D.) degree students were successful in the beginning of their information searching. One way to look at this problem is to understand their pre-searching. The importance of pre-searching in information searching is that it has a significant impact on the quality of the search result. During the study, the data gathering activity involved a great length of doctoral students pre-searching experiences which were obtained through semi-structured interview sessions. The selection of twenty three doctoral students as participants started with purposive sampling which was used to draw the first participant, while subsequent participants were selected based on theoretical sampling. Data was later transcribed and interpreted according to the coding paradigm of the grounded theory approach where emerging concepts were identified, arranged, linked and presented in a meaningful way. In addition, the constant

comparative technique was also applied throughout the coding process which had helped to develop the emerging theory. As a result, an inductive theory describing the pre-searching phenomenon had been constructed. In actual, the theory is based on five categories that had emerged during the analysis phase. The first two categories which are exploring and venturing explain doctoral students' activities in relation to the identification and retrieval activities of their research topics. Besides the two, another category named enriching shows how they would interact and learn from what they have retrieved from the first two categories. Another category known as ensuring describes how they would further enhance their learning and understanding process. The last category is engaging which enlightens doctoral students' activities that are associated to the development of search terms that was used to engage pre-searching. Thus, this could also be seen as the earliest encounter in preparing a candidate search terms to be used later during the real information searching session. All emerging categories found in the present study are devoted in answering an area which before this has little explanation and understanding, hence is hoped to contribute to the body of knowledge and become the basis for future research.

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

## 69 Name : Asad Khan

**Title :** The Acquired and Required Competencies of Pakistani University Librarians: Determining The Job Satisfaction, Organizational Commitment and Training Needs

**Supervisor :** Associate Prof. Dr. Mohamad Noorman Masrek (MS)  
Associate Prof. Dr. Fuziah Hj. Mohd Nadzar (CS)



Modern innovations have enhanced the significance of competent, satisfied and committed workforce. However, these innovations have caused numerous potential challenges for university librarians. University librarians are expected to be highly competent, satisfied and committed employees to serve users in their information needs. However, previous researchers indicated that acquired skills of Pakistani university librarians are not matching with modern professional demands. This has given birth to numerous questions, such as ineffective performance, poor attitude of university librarians towards the attainment of required skills, negligence of professional values, compatibility between LIS curriculum and job market, perplexing levels of satisfaction and commitment of librarians, limited training opportunities due to undefined areas of required skills etc. Modern librarianship demands university librarians to achieve high level of skills under different areas such as emotional intelligence, cognitive abilities, leadership, communication, collection management and technology management. Thus, in the perspective of Pakistani university librarians, the current exploratory study examines; 1) association of acquired competencies with job satisfaction and organizational commitment; 2) difference between the acquired and required competencies that further prompted to training needs assessment. The present research study employed cross-sectional survey methodology involving 225 samples, randomly selected from the population of 540 Pakistani university librarians. The survey response rate was calculated as 82%. The UniLIBCQ, as structured questionnaire was utilized to collect data on acquired and required competencies, job satisfaction and organizational commitment of Pakistani university librarians. The psychometric properties of UniLIBCQ were established through Cronbach alpha and exploratory factor analysis. In terms of Pakistani university librarians, descriptive analysis indicated that perceived

and desired levels of acquired and required competencies are moderate. Based on findings of correlation analysis, all six variables are positively and significantly correlated with JS and OC. Similarly, regression analysis showed that all acquired competencies have significantly predicted JS and OC and thus all research hypotheses (H1-H12) are supported. Further, stepwise multiple regression analysis showed emotional intelligence and collection management competencies as the strongest predictors of JS and OC. Further, findings of the paired sample t-test showed that difference between all dimensions is significant, however in terms of resource sharing are insignificant. Thus, fifteen hypotheses are supported, while one is rejected (H24). Additionally, training needs analysis determined that less than fifty percent of librarians need training to enhance their current level of skills. In Pakistani perspective this study was the first attempt to investigate empirically the theoretical links of competencies with job satisfaction and organizational commitment. In addition, this study is significant as it explored certain training areas. The concerned Pakistani authorities may organize training programs for university librarians to manage gaps in the levels of acquired and required competencies. It may further prompt to high levels of satisfaction and commitment because findings indicated a positive and significant association between the study constructs. It is established that competencies, JS and OC are three important variables that positively and significantly affect workers' performance. The findings of this study are also significant for other organizations that are interested to enhance workers' performance through JS and OC. It is concluded that enhancing level of competencies may produce highly satisfied and committed librarians and probably augment their performance.

## 70



**Name :** Hairoladenan Kassim

**Title :** Factors Promoting Knowledge Sharing Behavior using Virtual Mode Among Researchers in Government-Linked Companies

**Supervisor :** Associate Prof. Dr. Mohd Sazili Shahibi (MS)  
Prof. Dr. Adnan Jamaludin (CS)

Knowledge sharing is recognized as an important facet in the Knowledge Management (KM) process. As an essential tool for the successful implementation of KM, knowledge is considered the most important resource that an organization possesses. Previous researchers have defined knowledge sharing as the process through which one group, department, or division is affected by the experience of another. Presently, people are using virtual modes and web-based technologies, including Internet, Intranet, social media and other online technologies, through which knowledge can be extracted, shared and distributed globally. Promoting knowledge sharing behavior is a challenge for most knowledge-savvy organizations, including research organizations. In developing a behavior that values and practices knowledge sharing, factors to be considered are social, organizational, user attitudes and technical components of this behavior. Previous studies on knowledge sharing have cited various gaps or barriers to knowledge sharing, which include functional silos, individualism, ineffective means of knowledge capture, inadequate technology, internal competition and managerial gaps in the organization. The purpose of this study is to evaluate factors that can promote and strengthen the knowledge sharing behavior for the researchers through the virtual platforms. Previous theories and models, namely Theory of Reasoned Action, Technology Acceptance Model, DeLone and McLean IS Success Model, and Unified Theory of Acceptance and Use of Technology, were used to develop the conceptual framework of this current research. Based on relevant theories and framework, this research had proposed five important predictors or key success factors for promoting

knowledge sharing behavior: performance expectancy, effort expectancy, social influence, facilitating condition, and attitude towards knowledge sharing. This research used a quantitative methodology for the collection and analysis of data by conducting a questionnaire survey. Self-administered questionnaire was distributed to 510 respondents from five Research and Development organizations from selected Government-Linked Companies (GLCs). These research organizations were selected as respondents because they represent major GLCs that host the largest number of researchers with technical expertise from energy sectors. A total number of 220 questionnaires were returned, but only 201 were valid for analysis. This study had employed various types of multivariate analysis, namely Structural Equation Modeling (SEM) and Multivariate Analysis of Variance (MANOVA) analysis using SPSS and AMOS version 19. The results of Confirmatory Factor Analysis (CFA) had stated that the several fit indices satisfy the recommended range of value, which assumed the model development to be acceptable. The findings also showed that all independent variables (performance expectancy, effort expectancy, social influence, facilitating condition and the users' attitude) indicated a positive association with the virtual knowledge sharing behavior. Furthermore, the findings of this study revealed that the effects of knowledge sharing behavior through the virtual platforms were moderated by gender and research organization. Consequently, this study had suggested these factors in promoting and strengthening the implementation of knowledge sharing using the virtual platforms for the respective research organizations.

## 71 Name : Khasiah Zakaria

Title : The Embedded Librarianship in Scholarship and Research among Academic Librarians in the Malaysian Research Universities

Supervisor : Prof. Dr. Norliya Ahmad Kassim (MS)



This study investigates the concept of the embedded librarianship in relation to scholarship and research support. This study started with the aim of investigating the perception of academic librarianship in scholarship, research and knowledge production. However an embedded librarianship in support of scholarship and research emerged. Embedded librarianship in this study refers to a situation where librarians embedded programme in training users, provide ready reference, perform in-depth topical research, and involve in library resource development. The population of the study comprises the academic librarians from five Malaysian researcher universities. This quantitative method of study used questionnaire as the instrument to collect data. Eighty nine items from three variables formed the basis of a survey instrument using a seven-point interval scale. The instrument was distributed to the two hundred twenty academic librarians working in the five Malaysian research universities. A total of one hundred and thirty nine (59%) respondents returned the questionnaire. A combination of descriptive statistics, means ranking, one-way analysis of variance (ANOVA), independent-samples t test, regression and Pearson's Product Moment Correlations were used in this study using the SPSS version 19.0. The findings revealed that the level of scholarship roles among academic librarians is quite high, particularly in the teaching of information literacy such as accessing and using information. Academic librarians are involved in research support activities but only at a moderate level. The involvement in publishing support activities is lowest compared to the other variables of

the scholarship roles, such as teaching of information literacy, publishing support activities and information consultancy. Academic librarians have positive attitude towards research particularly those that can benefit library users. The academic librarians have low research anxiety, implying that they are comfortable with the various aspects of research. With respect to knowledge production they acknowledge their support on research related with library service fields. Furthermore, there is no evident of significant relationship between the overall level of scholarship roles of librarians and the levels of support on knowledge production ( $r = 0.119$ ;  $p = 0.179 > 0.05$ ). There is a positive moderate correlation between attitude towards research with knowledge production ( $r = 0.550$ ;  $p < 0.01$ ). Scholarship roles ( $r = 0.376$ ,  $p < 0.01$ ) as a whole is positively but rather weakly correlated with attitude towards research ( $r = 0.350$ ;  $p < 0.01$ ). However, there are differences in terms of perception about scholarship roles, attitude towards research as well as knowledge production in regard with designation, age and education, working experience and salary grades. The findings will be useful for curriculum planners involved in managing the development of librarian's competencies and training of information professionals in the Faculties and Departments of Library and Information Science, librarians at all levels and industries, and students who aspire to work in the library or information science organisations.

## 72 Name : Mohd Shamsul Mohd Shoid

Title : Organisational Learning Capabilities (OLC) and Knowledge Performance in Academic Libraries in Malaysia

Supervisor : Prof. Dr. Norliya Ahmad Kassim (MS)  
Prof. Dr. Adnan Jamaludin (CS)



Organisational learning capabilities (OLC) can be defined as the organisational and managerial characteristics of factors that encourage learning process or facilitate an organisation to learn while knowledge performance can be explained as the ability of individual, group and organisation to understand what they have learned. Various works and research have dealt with the analysis of this construct from different views and perspectives. However, research has shown that there were lack of studies that explored the perceptions and relationships between organisational learning capabilities' (OLC) dimensions and knowledge performance in academic libraries. This study was set out to capture the perceptions of organisational learning capabilities among librarians and knowledge performance in academic libraries in Malaysia. A research survey method using questionnaire was distributed to 240 librarians in selected university libraries in Malaysia which reflected the study objectives. From the feedback, only 186 (78%) of the questionnaires were returned and usable for further analysis. Quantitative approach was adopted for this study. The statistical analyses included descriptive and inferential statistics. Parametric tests were used to analyse the data. For parametric analysis, independent samples t-test, one way analysis of variance (ANOVA), Pearson's correlation of coefficient and multiple regression analyses were used. From the findings, the OLC's dimensions

on *information communication and technology (ICT)* was ranked as the highest (mean = 5.65) indicating that it was the most preferred response as perceived by the respondents. Using ANOVA test, the results showed that there were significant differences on *shared vision and mission, systems thinking, organisational culture and leadership* among respondents with different years of working experience. In terms of work department, the results showed that there were significant differences on *transfer of knowledge, organisational culture, leadership and ICT* among respective respondents. Results of the findings also revealed that there were significant positive relationship between OLC dimensions and knowledge performance in academic libraries which scored moderately correlated. From multiple regression analysis using stepwise method, dimensions on *employees' skills and competencies, information communication technology, shared vision and mission and transfer of knowledge* were found to be the most significant predictor of knowledge performance. Meanwhile, the dimensions on *organisational culture, systems thinking, leadership and teamwork cooperation* were not significant in predicting the knowledge performance as they were excluded from the model. The outcome of the study is expected to assist the librarians and academic libraries for improving the skills of acquiring knowledge and learning capabilities towards enhancing the knowledge performance.

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

**73** Name : Osama Mahmoud Yassenn Al-Husyni

Title : Fatigue Damage Ratios and Rutting Damage Ratios for Overloaded Heavy Vehicles

Supervisor : Dr. Intan Rohani Endut (MS)

Associate Prof. Dr. Mohamed Ahmed Hafez Ahmad (CS)



It is impossible for any country to have a rapid economic growth without a good and efficient transportation system. However, there are several problems affecting the transportation systems. One of the most important and common problem currently is the overloading of heavy vehicles and trucks. Road pavements performance, infrastructure performance, and safety are severely reduced by heavy vehicles overloading. Several studies carried out in Malaysia, United States of America, Colombia, Australia, France, Portugal, South Africa, China, Thailand, Pakistan, and Taiwan confirmed that overloading is a serious problem around the world. This study aims to investigate the effects of overloaded heavy vehicles on flexible pavements in Malaysia, by developing models describing the degradation of flexible pavement fatigue and rutting lives under different axle loadings, axle configurations and tire pressures. The study also aims to determine fatigue and rutting damage ratios for each heavy vehicle types based on their actual weights for usage in flexible pavements design. Secondary data were collected from Weight-In-Motion stations, Falling Weight Deflectometer, Coring, Dynamic Cone Penetration and Ground Penetration Radar. The secondary data were used to form plenty of finite element models to form the deterioration models and damage ratios. Apart from the development of fatigue and rutting damage models and ratios, several other conclusions were derived. The study found that fatigue and rutting damage ratios increased rapidly due to overloading. Furthermore, it was found that the damage caused by single axle with two wheels is the

largest, then the single axle with four wheels followed by tandem axle and then the tri-axle configuration. It was also found that tire pressure has a high effect of fatigue and rutting damages and thus regulations should include tire pressure limitation. Twenty four models were developed in this study to calculate fatigue damage ratios and rutting damage ratios for flexible pavement in Malaysia. Furthermore, Single trailer trucks with four axles, single unit trucks with two axles, and buses were identified to be causing most of the fatigue damage, while rutting is mainly caused by the same types of vehicles and single trailer trucks with six axles. The study also found that an average value of 4.23 for fatigue damage and 6.20 for rutting damage could be multiplied with heavy vehicles traffic volume to represent their effects and to be used for flexible pavements design in Malaysia.





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