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The Value of Communicating Clearly and Succinctly

Conveying Value to A General Audience via 3MT

ABSTRACT COLLECTION of RESEARCH-3MT HIGHLIGHTS

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Editor's Note

"STRIVE TOGETHER"

Dr. Hyreil Anuar Kasdirin

Assalammualaikum and Greetings,

Welcome to the first edition of the 3 Minute Thesis (3MT) abstract collection bulletin of UPgrade UTeM. We hope that this issue of 3MT-UPgrade will provide valuable insights into our current postgraduate research and research communication skills to effectively explain their research in three minutes presentation.

We intend to make this bulletin yearly publication to meet the demand of 3MT competition in general. This abstract publication is intended to 3MT highlight and in an engaging form that can be understood by an intelligent audience with no background in the research area. The information and abstract in this bulletin allow us to reflect our successes and progress in pioneering academic communication skills and the development of research student's capacity in explaining their work effectively.

On behalf of the editorial board, I would also like to thank all 3MT participants of UTeM and UTeM staff members especially from the Centre for Graduate Studies (PPS) who have contributed to the success of this edition. We hope all of you will enjoy reading and abstract to be shared with the reader's context.

Best regards and enjoy reading.

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DEVELOPED NEW PARAMETER OF CFRP MICRO DRILLING PROCESS USING FACTORIAL METHOD

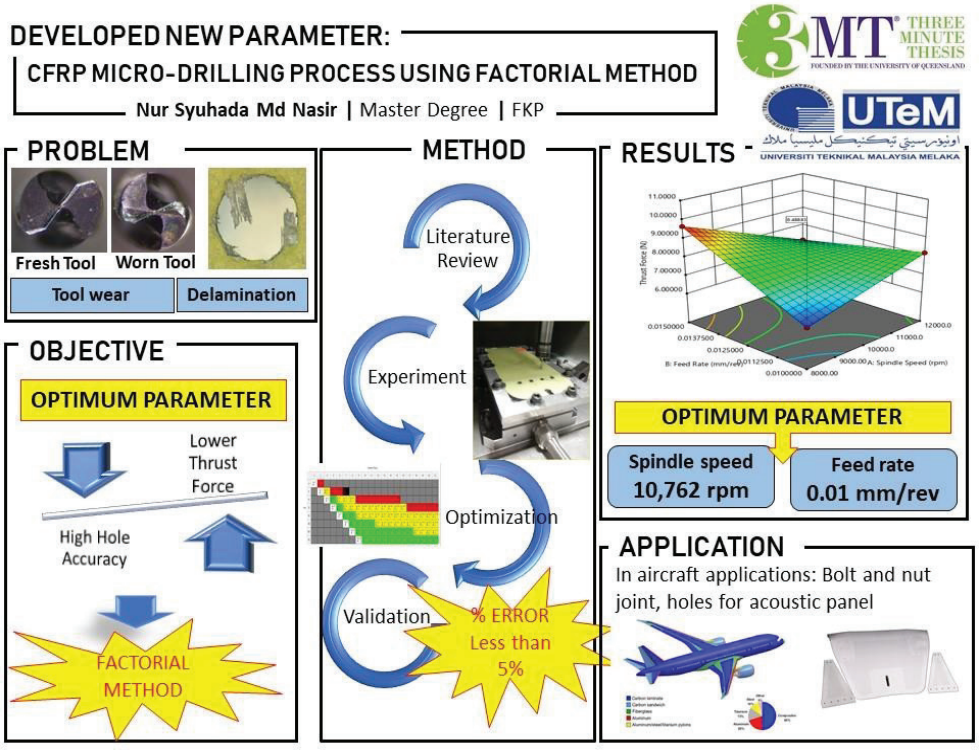
By: Nur Syuhada Binti Md Nasir

Supervisor: Ts. Dr. Norfariza Binti Ab Wahab

Co-Supervisor: Associate. Professor. Dr. Raja Izamshah Bin Raja Abdullah

ABSTRACT

Carbon Fiber Reinforced Polymer (CFRP) is extensively used in aircraft and automotive industries due to it exceptional material properties such as high strength to weight ratio and corrosion resistance. Nevertheless, micro drilling process of CFRP material poses various challenge as it has irregular material properties along the structure. High cutting force which lead to poor hole quality is one of the issues that always occur when drilling this material. Hence, the understanding on the relationship between process parameter and material behavior is vital to achieve optimum performance of machining process. The experiment was carried out using 2-level factorial design with variable spindle speed range of 8,000 – 12,000 rpm and feed rate range of 0.01-0.015 mm/rev. Micro drill bit with diameter of 0.9 mm was used and new fresh drill were used for every run to avoid tool wear effect. As a result, lower thrust force of 6.3742 N is obtained from the combination of spindle speed 10k rpm and feed rate 0.0125 N. Whereas, the most accurate data for entry and exit hole diameter was obtained from the combination of spindle speed in a range of 10,000 – 12,000 rpm and feed rate of 0.01-0.015 mm/rev. Therefore, it can be concluded that, optimum parameter to achieve minimum thrust force and high hole accuracy falls between the range of 10,000 – 12,000 rpm of spindle speed and 0.01-0.015 mm/rev of feed rate. Validation of the optimum parameter suggested from 2-level factorial which are 10,762 rpm and 0.01 mm/rev is executed. The result obtained shows less than 5% of error from targeted value and this result is acceptable and portray the reliability of the experiment.

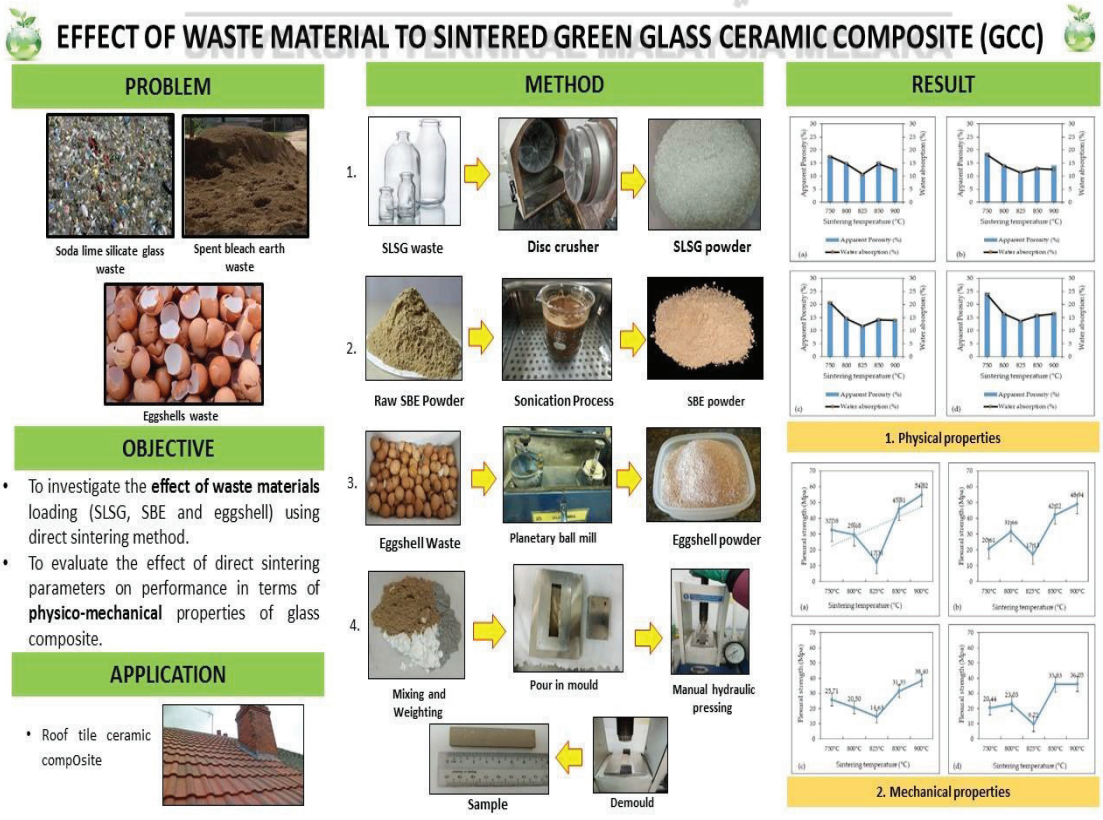


EFFECT OF WASTE MATERIAL TO SINTERED GREEN GLASS CERAMIC COMPOSITE (GCC)

By: Masturah Binti Mesri
Supervisor: Dr. Zurina Binti Shamsudin
Co-Supervisor: Dr. Rafidah Binti Hassan

ABSTRACT

The influence of sintering temperature on properties of green glass ceramic composite (GCC) on various filler loadings was investigated. GCC was prepared using soda lime silicate glass (SLSG), spent bleach earth (SBE) and eggshell (ES). It was believed, by increasing the sintering temperature, physical and mechanical properties of the GCC were improved. Sintering temperature was divided into 750, 800, 825, 850 and, 900 °C at 2°C /min heating rate with holding time 1 hour. The GCC was formed using hydraulic dry pressing for eggshell at 0, 5 and, 10, and, 15 wt. % as filler loading. The GCC was analysed in terms of physical properties which involved apparent porosity, water absorption, linear shrinkage, and bulk density meanwhile mechanical properties by using flexural strength at three bending point. This result was verified by using Analysis of Variance (ANOVA). From this study, percentage of apparent porosity and water absorption is decreasing as the sintering temperature increased. The lowest percentage of apparent porosity and water absorption contributed by sample A2 which is 11.85% and 11.39%. However, trend of bulk density and flexural strength were increasing when the sintering temperature increased. The highest bulk density contributed at 1.05 g/cm^3 and the lowest is at 1.03 g/cm^3. The findings concluded that the suitable sintering temperature can be controlled for alternative materials for structural applications.

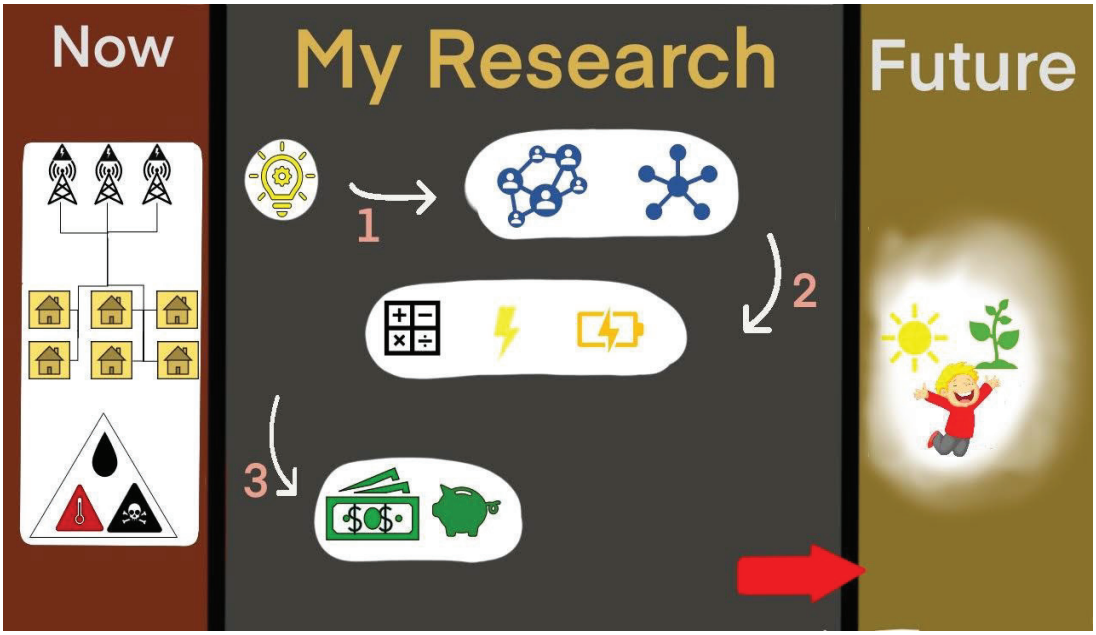


OPTIMAL VIRTUAL MICROGRID DESIGN USING COMMUNITY ENERGY STORAGE IN PHOTOVOLTAIC-RICH RESIDENTIAL NETWORKS

By: Hasan Yahya Ali Alawami
Supervisor: Dr. Junainah Binti Sardi
Co-Supervisor: Associate. Professor. Ir. Dr. Gan Chin Kim

ABSTRACT

Malaysia has set a target of 20% of the country's electricity will be generated from renewable energy (RE) sources, mostly solar by 2030. Although, increment in photovoltaic (PV) generation has many advantages, its high penetration in traditional power grids consequently leads to some technical challenges. These challenges include reverse power flow, voltage fluctuations, power quality issues and others. Meanwhile, energy storage which is believed can solve the problems caused by high PV penetration is still costly. To prepare for achieving the RE target and solving the above-mentioned problems, this research proposes a framework of Virtual Microgrid (VM) construction using Community Energy Storage (CES) in residential networks with rooftop PV units under Malaysia's electricity context. VM is a new concept, in which multiple prosumers (consumers who own small-scale RE sources) are orchestrated into bigger associations towards optimizing their benefits while supporting high PV integration. Despite VM advantages, until now, there is no such framework being proposed or implemented in Malaysia. Proposed framework in this study considers the major revenue streams for CES to justify the economic viability of VMs. In this framework, a new business model will be proposed to increase the profit gained by the utility and consumers. A methodology will be systematically developed to optimally cluster a distribution system into a specified number of VMs and identify the optimal location, size, and operational characteristic of CES in each VM. The effectiveness of the presented framework in solving the technical problems caused by high PV penetration will be thoroughly examined. Finally, A cost-benefit analysis also will be conducted to evaluate the profitability of the proposed framework.

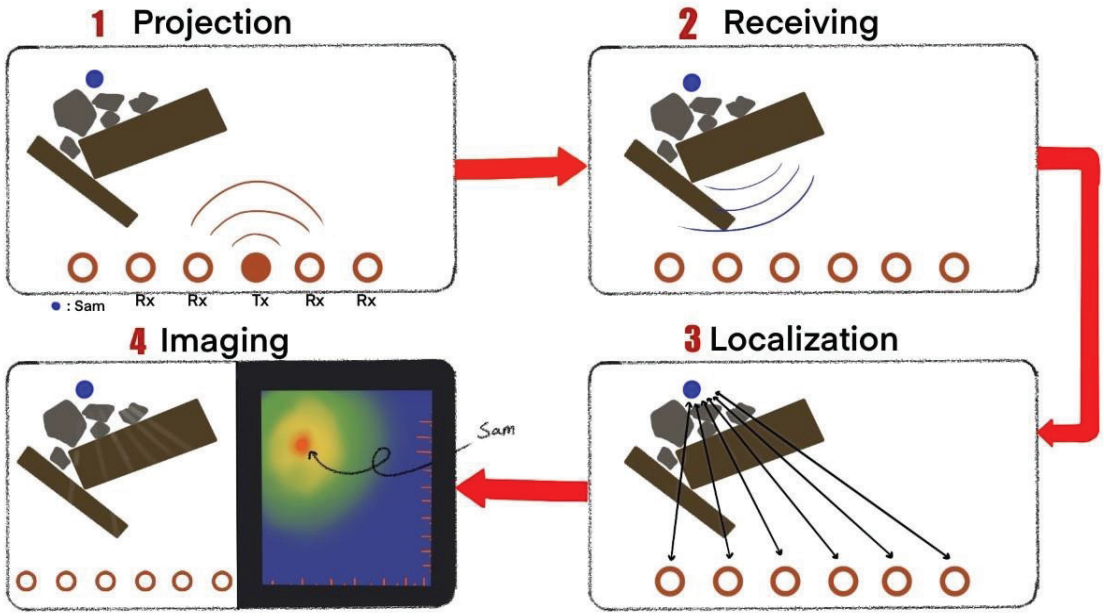


SEARCH AND RESCUE FOR UNDER RUBBLE APPLICATIONS USING MULTI-STATIC MICROWAVE IMAGING

By: Eyad Abdullah Saleh Beshr
Supervisor: Dr. Nik Syahrim Bin Nik Anwar
Co-Supervisor: Dr. Hairol Nizam Bin Mohd Shah

ABSTRACT

The earth experiences more natural disasters and extreme weathers as before due to human's impact on nature as explained by the Anthropocene theory. ASEAN region also has been hit by many major disasters such as the 2004 Indian Ocean's Tsunami. The biggest enemy in a search-and-rescue (SAR) operation is time. Every second separates between life and death. Recently, National Aeronautics and Space Administration (NASA) introduced a prototype called FINDER that can sense human's vital signs through rubbles in 60 seconds. However, a technology like FINDER gives only 1-dimensional range information. This is due to its mono-static nature i.e. consist of only one transmitter-receiver (TX-RX) pair. If the system can be upgraded to a minimum number of three TX-RX pairs, the system can be operated in multi-static ways. This will allow a detection and localization in 3-dimensional space. Thus, a human target can be pinpointed in less time. This is in line with the recent trend in ultra-wide-band (UWB) technology, where multiple cheaper devices are replacing one single and expensive system. The objective of this project is to perform simulation study to estimate the system's requirements such as the transmitting power, central frequency, bandwidth, and antenna configuration to achieve a certain successful detection rate and positional accuracy. This project proposes a finite difference time domain (FDTD) simulation technique with realistic environmental and human models. Novel findings expected from this study is an estimation on the system's requirements and the previously mentioned design parameters. This will help engineers or developers in designing the first prototype of the system. The rising rate of natural disasters globally and in this region can cause conflict, civilian unrest, and economic impact. Therefore, it is necessary to have a more advanced disaster recovery system that will reduce time, cost, and save more lives.

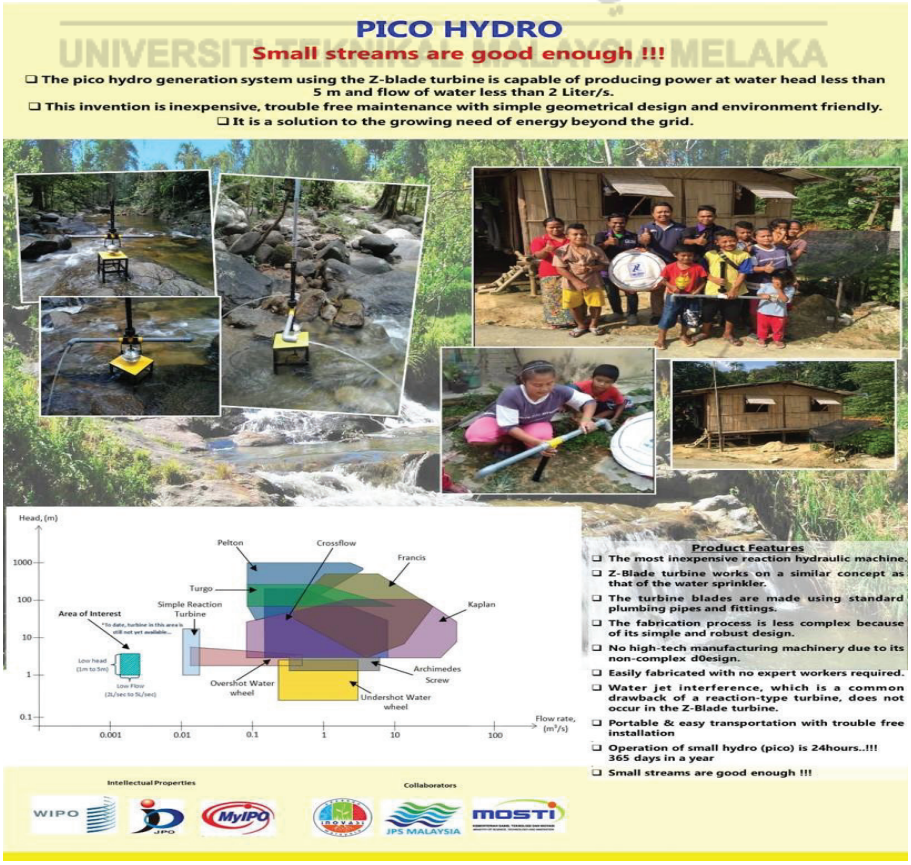


PARAMETRIC ANALYSIS FOR A NOVEL PICO HYDRO GENERATION SYSTEM

By: Fatin Syakira Binti Mohd Hassan
Supervisor: Ir. Dr. Mohd Farriz Bin Hj Md Basar
Co-Supervisor: Professor. Dr. Marizan Bin Sulaiman

ABSTRACT

This project is declared as Pico hydro since the power generation capacity of this green scheme is up to 5kW. Pico hydro is one of the most practical methods of harnessing small stream of water as energy sources where the technology is typically implemented by means of the run-off or run-on-river approach and the plant is built on a small land area. The main objective of this research is to develop a simple design and low cost, yet with high performance of a pico hydro system included with a new simple reaction water turbine known as Z-Blade turbine (ZBT) for the mean of power production from low-head low-flow hydro sources. Such design and procedures address the problems associated with the cost and applicability of the device to low head low flow water source. The theoretical analysis and experiments prove that the pico hydro system with Z-Blade turbine performs successfully at low operational water head and water flow. It has the capability to achieve high values of rotational speed (up to 500 rpm) with minimal mass flow rate (2 Liter/sec), higher power capacity (approximately 180kWh per month), low energy loss (average 20%), and high efficiency (up to 78%) at low head water condition (3 meter and above). As a conclusion, an optimized simple geometrical design, high performance, and low cost pico hydro system has been presented, in which, with a highly potential power production to be used for low head low flow hydro sources.



DESIGN OF A MULTI-BAND RF ENERGY HARVESTING RECTENNA WITH HARMONICS SUPPRESSION CAPABILITY

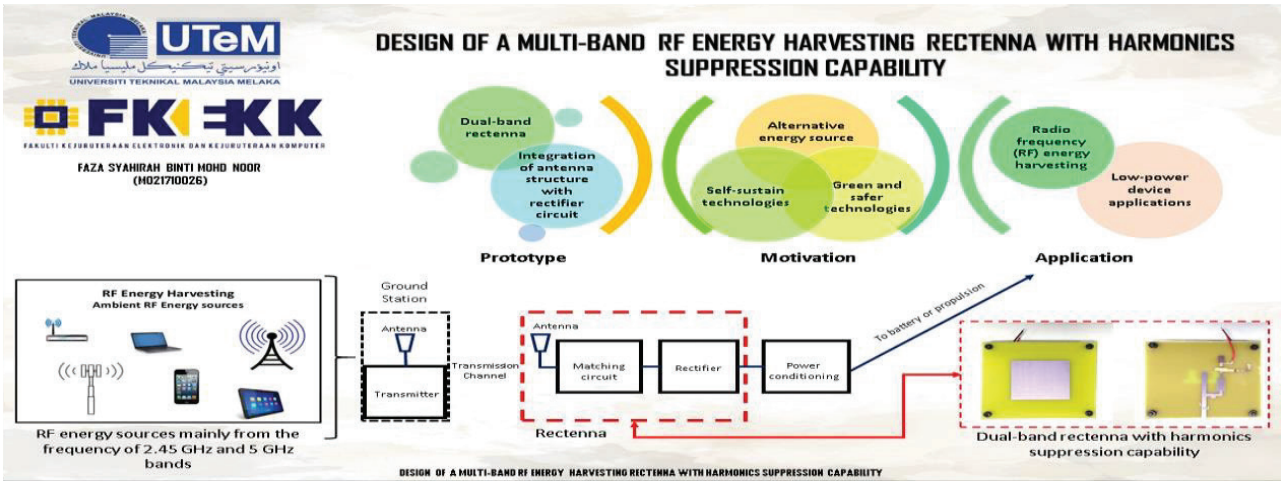
By: Faza Syahirah Binti Mohd Noor

Supervisor: Professor Dr. Zahriiladha Bin Zakaria

Co-Supervisor: Dr. Herwansyah Bin Lago

ABSTRACT

Rectenna with the ability of energy harvesting has been gaining tremendous interests by researchers. Constant availability of Radio Frequency (RF) signals at which it is being deployed both at indoor and outdoor environment favors these types of signals as the optimum choice of energy to be harvested considering its continuous operation. The design and development of RF energy harvesting is fit to describe wireless power transmission. RF signals which is in form of Alternating Current (AC) is being radiated through Electromagnetic (EM) waves into the environment and rectenna structure will capture the RF signals and therefore converts it into Direct Current (DC) signals. Rectenna which constructed upon the integration of both antenna and rectifier structures contribute to the creation of harmonics due to the non-linear behavior of active elements such as Schottky diode and capacitor at the rectifier circuit. This abstract presents a design of rectenna structure with multi-band characteristics and harmonics suppression capability. Multi-band characteristics of operating frequency at 2.45GHz and 5.80GHz are achieved using inverted π-shaped coupling slot while the ability of harmonics suppression is achieved through embedded U-slot and asymmetrical right-and-left-handed stubs at the antenna transmission feedline. To enhance the gain of antenna, aperture-coupled antenna is constructed using air gap technique. Meanwhile, the rectifier of double-diode configuration circuit of the rectenna is designed with rectifying element HSMS286B Schottky diodes and interdigital capacitor in the form of transmission line is applied to replicate the series-configuration active capacitor component. The development of the rectenna prototype is executed using FR-4 substrate material. The antenna is able to suppress third and higher-order harmonics ranging from 6.12GHz up to 10.00GHz and achieve the gain of 7.05dBi and 0.94dBi at the operating frequency 2.45GHz and 5.80GHz, respectively. The double-diode rectifier prototype can be operated at both 2.45GHz and 5.80GHz hence, maximum RF-to-DC conversion efficiency of 92.26% for frequency 2.45GHz and 30.14% for frequency 5.80GHz is achieved. The rectenna design proposed does not only possessed the characteristic of a multi-band, but also the harmonics suppression ability for the purpose of improving the RF-to-DC conversion efficiency thus makes it appropriate for the application of wireless power transmission.

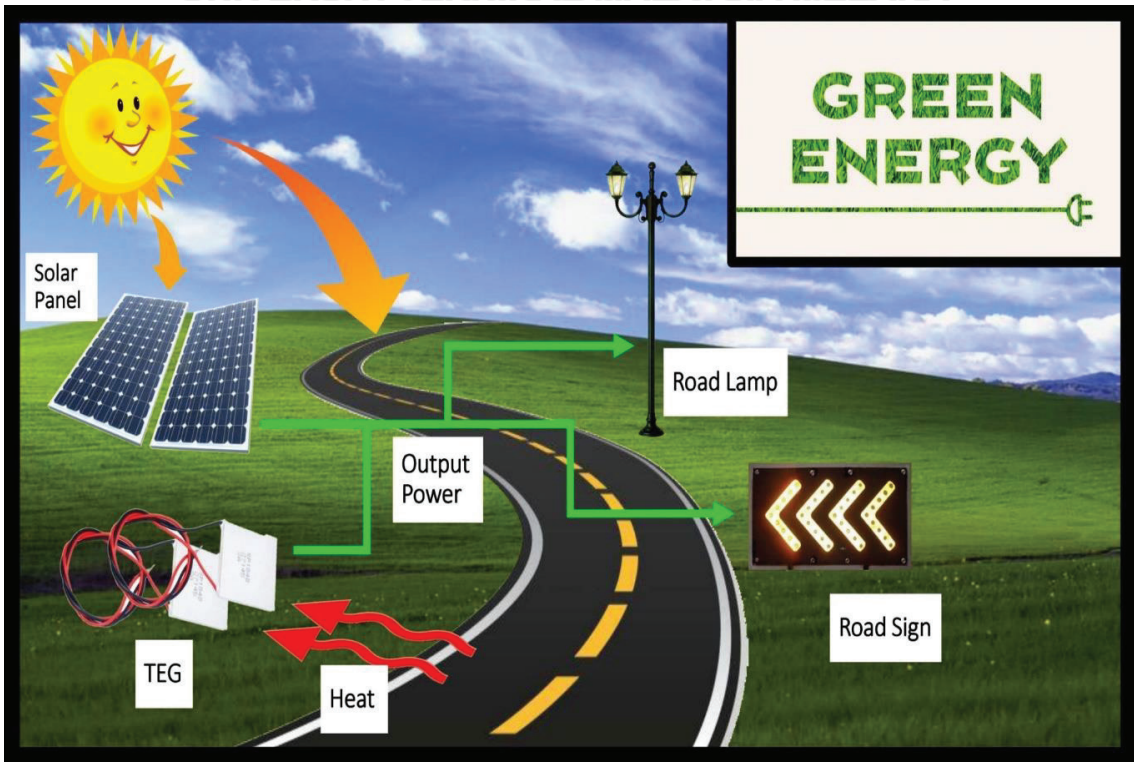


GREEN ENERGY

By: Muhammad Syadza Bin Sharuddin
Supervisor: Dr. Azdiana Binti Md. Yusop
Co-Supervisor: Dr. Ahmad Sadhiqin Bin Mohd Isira

ABSTRACT

The average road temperature in Malaysia can be as high as 70°C during the afternoon. The black colour of the road pavement, encouraging the heat absorption from the sun, because darker colour tends to absorb heat more efficiently compared to a whiter shade. Heat can be harvested and converted into electrical energy using a thermoelectric generator or TEG. TEG is an electronic device that generates power when there is a temperature difference between its hot and cold sides. The higher the temperature difference between the hot side and cold side, the higher the output power. So, rather than leaving the heat from road pavement being wasted to the environment, it can be used to generate electricity. In this project, the temperature of road pavement will be given to the hot side of TEG to produce electrical power. The focus will be to construct a prototype that can increase the temperature difference between the cold and hot sides of TEG by considering parameters that can affect TEG's performance. At the same time, solar energy which is available during daytime can also be harvested using a photovoltaic panel. Both power generators will be hybridized or combine to generate more power. The generated energy will be stored in a battery so that it can be used whenever needed. The stored energy can be utilized at the road itself to power up road signs, road lamps, or even traffic light. In comparison to conventional power generation methods such as fuel and coal burning which usually produce unwanted output such as smoke that can harm the environment, this project promotes clean and green energy, and it is also cost-effective because the sources of energy are renewable and available everywhere as long there is road pavement.

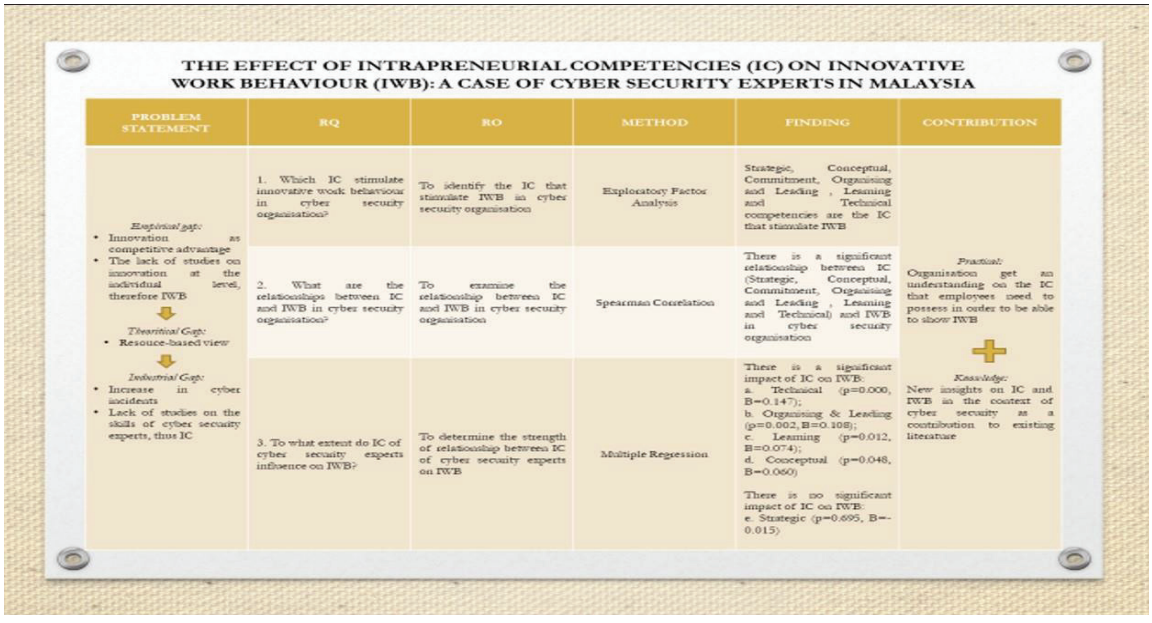


THE EFFECT OF INTRAPRENEURIAL COMPETENCIES ON INNOVATIVE WORK BEHAVIOUR: A CASE OF CYBER SECURITY EXPERTS IN MALAYSIA

By: Neerosha A/P Rajah
Supervisor: Dr. Amir Bin Aris
Co-Supervisor: Associate Professor. Dr. Haslinda Binti Musa

ABSTRACT

In today's world, there is increasing attention to innovation, which is a way to respond to the worldwide competition and pressures from the environment. Employees play a crucial role in the innovation process as they are the basis of all ideas. Therefore, innovative work behaviour is of interest when organisations aim on innovation, as is the case for critical information infrastructure, cyber security. As a result, this study is to investigate intrapreneurial competencies that foster innovative work behaviour of employees. Based on a literature study, an extended research model of entrepreneurial competencies was adapted, and it was expected that twelve intrapreneurial competencies would have a positive influence on innovative work behavior in cyber security domain. By administering a questionnaire among the experts of cyber security organization in Malaysia, which resulted in a response rate of 167 employees, the hypothesised relationships were assessed. The findings of factor analysis have identified only five influencing factors were well structured on the scale. Based on the regression analysis, it has shown that conceptual, organizing, and leading, learning, and technical competencies have a significant positive impact on innovative work behaviour, and the most significant factor was technical competency. However, strategic competency which did not reveal a direct effect towards innovative work behaviour. These study outcomes appear to extend the scope of the resource-based view, apart from enriching the existing intrapreneurial competency literature, particularly within the Malaysian context. Hence, it is recommended that the cyber security organisations should focus on maximizing the level of competencies among their workforce as a viable approach to decrease the effect of cyber vulnerabilities in an innovative manner. These investments will result in motivated and committed employees who show innovative work behavior. It is believed that this research paper will beneficial to the industry practitioners and academicians for future reference.



BUSINESS INTELLIGENCE INFORMATION FRAMEWORK FOR UNIVERSITY STRATEGIC PERFORMANCE MANAGEMENT

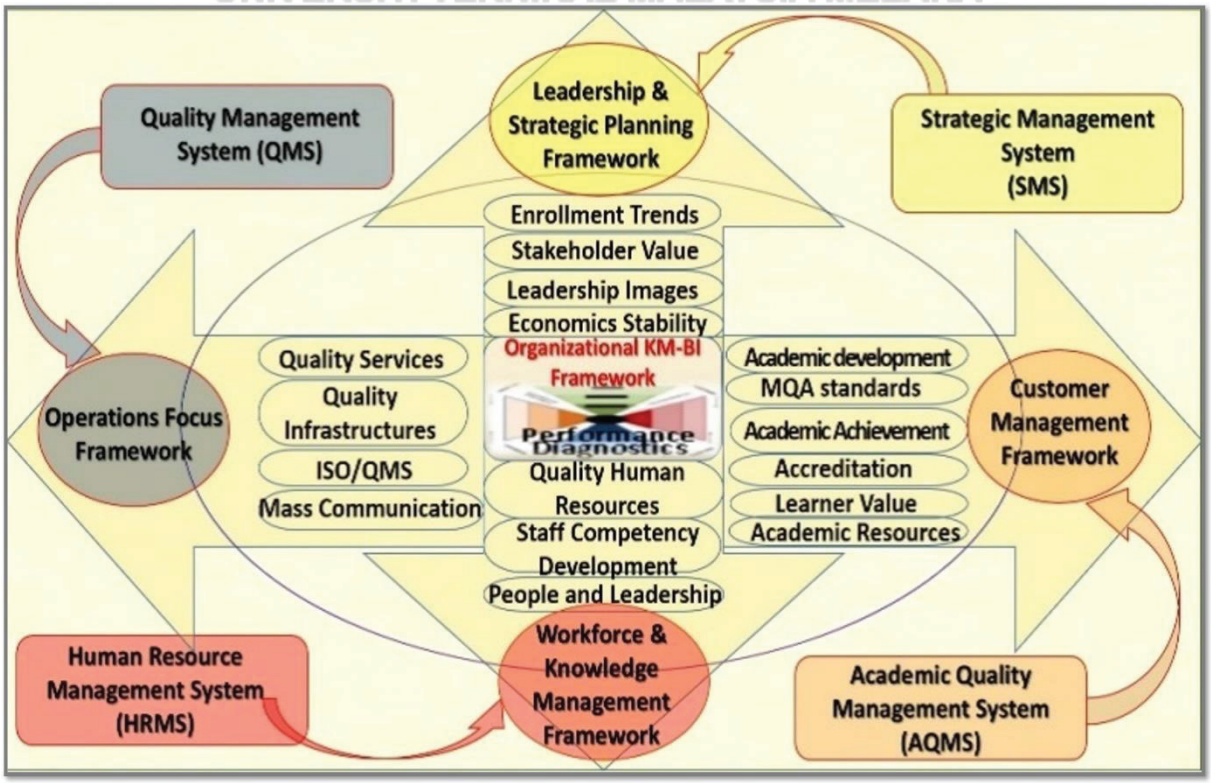
By: Ts. Mailasan A/L Jayakrishnan

Supervisor: Professor. Ts. Dr. Mokhtar Bin Mohd Yusof

Co-Supervisor: Ts. Dr. Abdul Karim Bin Mohamad

ABSTRACT

The contradictory pressures and features of holistic view in an organization that create data value on organizational strategic performance using Big Data Analytics (BDA) and Business Intelligence (BI) engine within different conceptual frameworks and their impact on strategy development and implementation for strategic performance management. The specific features of Knowledge Management (KM) and BI in this study have been outlined as a guideline for research in viewing the big picture in decision-making processes when implementing organizational performance diagnostics framework. Emerging knowledge from structuring big data and using BI together with observing MIT90s, McKinsey seven (7) S's framework are used to determine holistic perspective factors as the baseline information framework for the formulation and implementation of BI and BDA towards designing strategic performance management for an organization. The study showed the conceptual framework relates the current KM and BI stages in strategy implementation for displaying an organizational performance indicator. The research goal is to provide a comprehensive understanding of emerging knowledge from structuring KM and BI stages and their mashup characteristics in designing the organizational performance framework. The outcome will be a design of a strategic performance framework for a typical strategic performance application – the organizational diagnostics Business Intelligence Information (BII) framework.

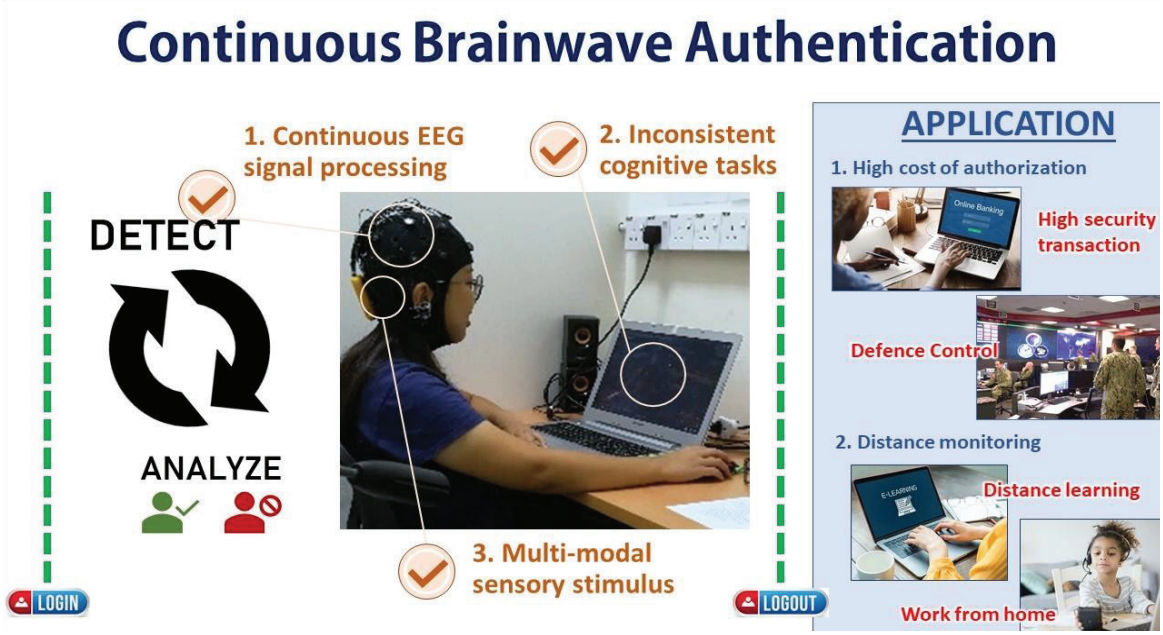


CONTINUOUS BRAINWAVE AUTHENTICATION

By: Wong Rui Zhen
Supervisor: Associate Professor. Ts. Dr. Choo Yun Huoy
Co-Supervisor: Associate Professor. Dr. Azah Kamilah Binti Draman @ Muda

ABSTRACT

Electroencephalogram (EEG) measured the electrical changes inside human brain has proven unique across individuals when response towards similar cognitive tasks. Like most of the security implementation, the common brainwaves based biometric authentication was allowed for Static Authentication (SA) only. In SA, user access will be grated for one-time only at the beginning of the session and unaware anymore in the upcoming session, thus provide chances for intrusion and spoofing attack. In such case, Continuous Authentication (CA) was believed to provide higher security awareness against imposters through repetitively verify the user identity during the entire log-in session. The excellent time resolution in EEG approved CA. However, current studies of EEG-based CA only available using consistent set of multi-modal sensory stimuluses where subjects were required to respond to the similar tasks which was less practical in the real-world. This research proposed an EEG continuous monitoring approach by inconsistent set of multi-modal sensory stimuluses that allowed for repetitive person authentication without the user's consciousness. The EEG signals data collected from 40 healthy subjects using head cap that follows 10-20 montage. During data acquisition, subjects were asked to operate a computer and perform various computer-related tasks (e.g.: mouse click, mouse scrolling, keyboard typing, browsing, reading, video watching, music listening, playing computer games, and etc.) as their preferences for 10 minutes, without interruption. Signal pre-processing include data segmentation to 10 seconds epoch, where features extracted from Welch's estimated Power Spectral Density in low-Beta band. The designed authentication approach computed intra- and inter-personal variability using Mahala Nobis distance to authenticate subjects. Based on preliminary results, data collected from inconsistent set of multi-modal stimuluses able to authenticate subjects with 7.29% EER. Future research will focus on the use of soft-computing technique such as Principal Component Analysis and Support Vector Machine for subject authentication.



INVESTIGATION OF WELD FORMATION FOR THIN MATERIAL USING FIXED SELF SUPPORT FRICTION STIR WELDING

By: Mohammad Khairul Azmi Bin Mohd Kassim
Supervisor: Dr. Mohammad Kamil Bin Sued
Co-Supervisor: Associate Professor. Dr. Nur Izan Syahriah Binti Hussein

ABSTRACT

Friction Stir Welding (FSW) is one of the solid-state welding using the combination of heat and pressure to obtain the joining. Compared to the fusion welding types, in FSW, heat is generated from the friction of the tool, mechanical rubbing between bobbin tool and the surface of the welded material. This technique is known as an energy efficient, environmentally friendly, and versatile process that followed the objective of green manufacturing. FSW have been evolve from Conventional Friction Stir Welding (CFSW) to Bobbin Friction Stir Welding (BFSW) or known as Self Support Friction Stir Welding. This joining process are suitable for aerospace, automotive and marine industries. Thin material is reported to be difficult to joint by BFSW because of the material is flexible, not rigid, and easily to be deformed when exposed directly to the higher temperature. Besides that, it is believed for welding thin material, lack of material availability between shoulders around the stirring zone cause an effect on the formation of the joint. There is no supported investigation by current researcher to explain the issue in detail for the BFSW. Commonly, researchers are involved on the studies of selected parameters for rotational and welding speed to improve the weld quality. Therefore, during this study, 4 type of signal will be recorded which are force, current, vibration and temperature. It is believed that good weld formation is related to material availability during the stirring. This study is significant for wider the application of the BFSW especially in joining the thin materials. The knowledge of the BFSW process through the result of vibration, force, and temperature help to identify the condition of weld formation during welding. The mechanical and microstructure properties of the weld can be identified with the influence of parameters used.

DEVELOPMENT OF EARLY SCREENING WRMD'S RISK ASSESSMENT MODEL FOR COMPUTER USERS WORKING IN OFFICE

By: Vinothini Padmanathan
Supervisor: Dr Isa Halim
Co-Supervisor: Dr Radin Zaid

ABSTRACT

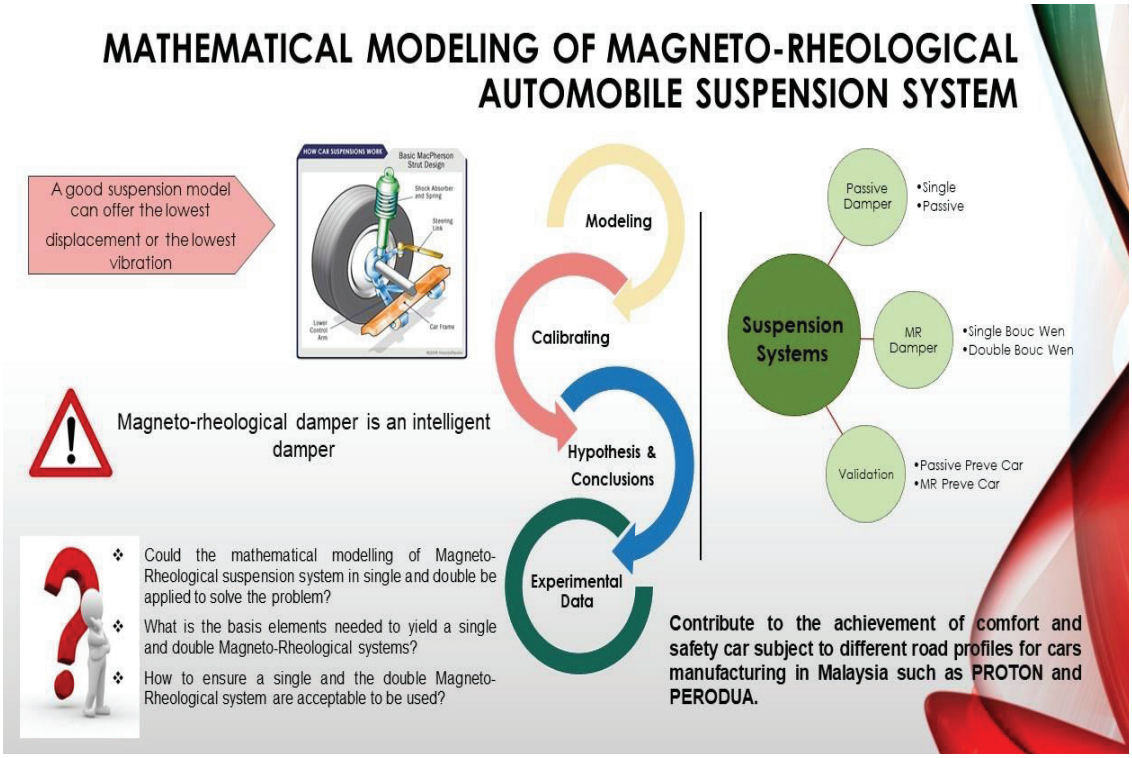
Work-related musculoskeletal disorders (WMSDs) such as pain in the back and neck regions are very common among computer users at the office and the cases are increasing rapidly every year which causes huge productivity loss to the organizations. The occurrence of WMSDs among computer users is multi factorials in nature (physical, individual, and psychosocial), however, the existing assessment models for detecting the WMSDs provide less emphasis on the association of individual and psychosocial risk factors. Therefore, a comprehensive assessment of the risk factors for WMSDs might not be able to be performed which can result in late detection of WMSDs among computer users. Hence, there is a clear need to initiate a fundamental study on the association of physical, individual, and psychosocial risk factors to develop a multifactorial risk assessment model for detecting WMSDs. The objective of the current research is to determine the risk factors associated with the development of WMSDs among computer users at the office. Additionally, the current research will be formulating and validating an early screening multifactorial risk assessment model that integrates physical, individual, and psychosocial risk factors for early detection of WMSDs among computer users. The statistical analysis tools will be used to formulate the multifactorial risk assessment model. The expected outcome of the present research is an early screening multifactorial risk assessment model that can be utilized for early detection of WMSDs among computer users at the office. In summary, by formulating an early screening multifactorial risk assessment model, the entire multifactorial risk factors that cause the WRMDs among computer users can be wholly assessed which might help the respective agencies or personnel to develop an effective program or policy to reduce the occurrence of WRMDs among the computer users working in office setup.

MATHEMATICAL MODELING OF MAGNETO-RHEOLOGICAL AUTOMOBILE SUSPENSION SYSTEMS

By: Siti Farizah Binti Yaakub
Supervisor: Dr. Saifudin Hafiz Bin Yahaya
Co-Supervisor: Professor. Ts. Dr. Noreffendy Bin Tamaldin

ABSTRACT

Currently, vehicles are using a passive suspension system that incorporates with hydraulic damper and mechanical spring. The passive dampers have a fixed setting during their lifetime, and hence they are not able to operate satisfactorily in a broad range of road states. This problem can be overcome by semi-active suspension systems like the MR damper. In this study, Magneto-Rheological (MR) dampers become a lens to be studied since its applicability of MR fluids to produce the controllable dampers and have a good stability. In recent year, the studied for MR damper basically focus on the MR damper to passive suspension. From the researcher review, there are no research with double MR damper in the suspension systems. Then to have the lowest vibrations and give the good stability to suspension systems, we will use the single and double MR damper to suspension model. The first and second order differential equations with an assistance of MATLAB software are used for utilized for the mechanical behaviour to measure Normal Mode, Frequency Mode and Transient Mode Analyses for a single and double MR suspension models. A good suspension model can offer the lowest displacement or the lowest vibration and therefore, MR will produce the lowest displacement when compared to a passive suspension model. The study will also validate a result between the modelling of MR and the data from experimental. This study will be a significant endeavour on the car builder such as PROTON and PERODUA for having a comfort and safety in their product.

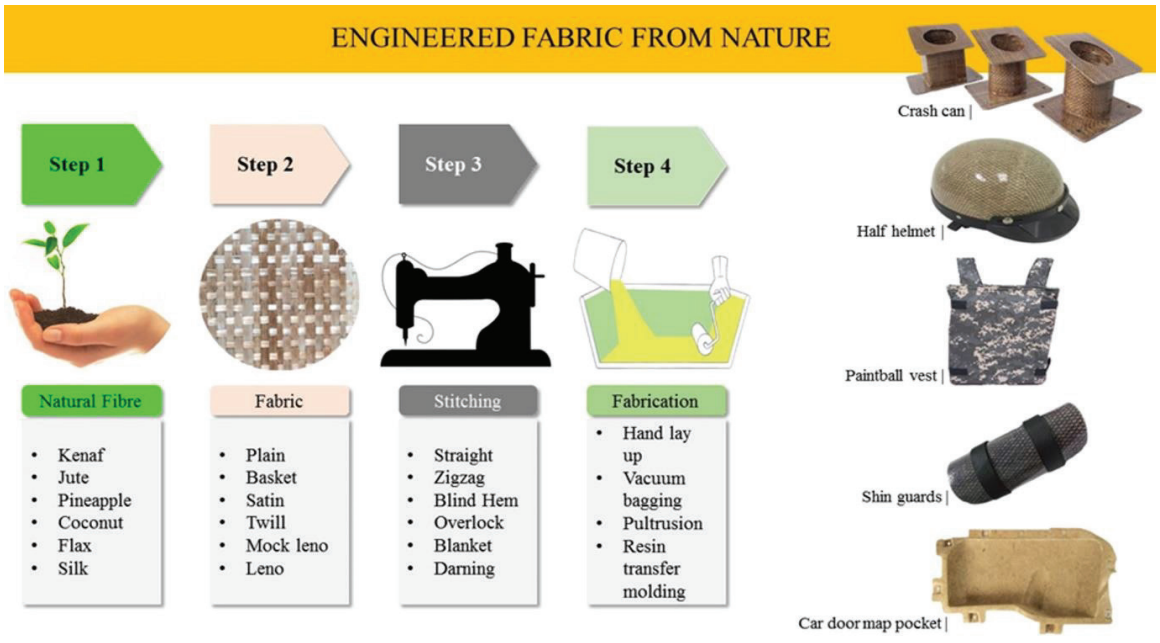


ENGINEERED FABRIC FROM NATURE

By: Mohd Amirhafizan Bin Haji Husin
Supervisor: Associate Professor. Ir. Ts. Dr. Mohd Yuhazri Bin Yaakob
Co-Supervisor: Professor Dato' Dr. Abu Bin Abdullah

ABSTRACT

Natural fibres, due to their eco-friendly nature and sustainability, receive attention from researchers and academics to be used in polymer composites. In this study, the stitching technique on woven kenaf fabric reinforced polymer (thermoset and thermoplastic) composites were analysed. The hand lay-up followed by a vacuum baggage technique was used for thermoset composite, while a hot-pressing technique was used for thermoplastic composites. The materials used were epoxy resin and polypropylene, which acted as a matrix and woven kenaf fibre as a reinforcement. The composites were made in different patterns of stitches which were divided into two categories, basic patterns which were stitched together by a single cross, including Vertical (V), Horizontal (H), Tilt 30° (T30) and Tilt 60° (T60). The other was a complex pattern, stitched with a double cross, including Box, Tilt 45°/90° (T45/90), Tilt 30°/30° (T30/30) and Tilt 60°/60° (T60/60). Tensile test, impact test and hemisphere test of the composites were evaluated in accordance with an ASTM standard. It was found that double stitch patterns show good agreement in improving the tensile and impact performance, either reinforced thermoset or thermoplastic composite. The results also show that the composite samples reinforced thermoset matrix have better specific strength performance, approximately 193.7% compared to the composite reinforced thermoplastic matrix. This is due to the thermosetting matrix is generally tougher and stronger than thermoplastics and has better dimensional stability. However, in impact performance, thermoplastic reinforced composite samples show higher impact strength, approximately 13.94% compared to thermoset composites due to excellent impact resistance and damage tolerance by reducing crack propagation and better stress distribution throughout the structure. The evidence from this study suggested that the stitching patterns and stitching angle gave significant effect to the performance of woven stitch kenaf composite compared to the unstitched ones. Implications of the results and future research direction were also presented.

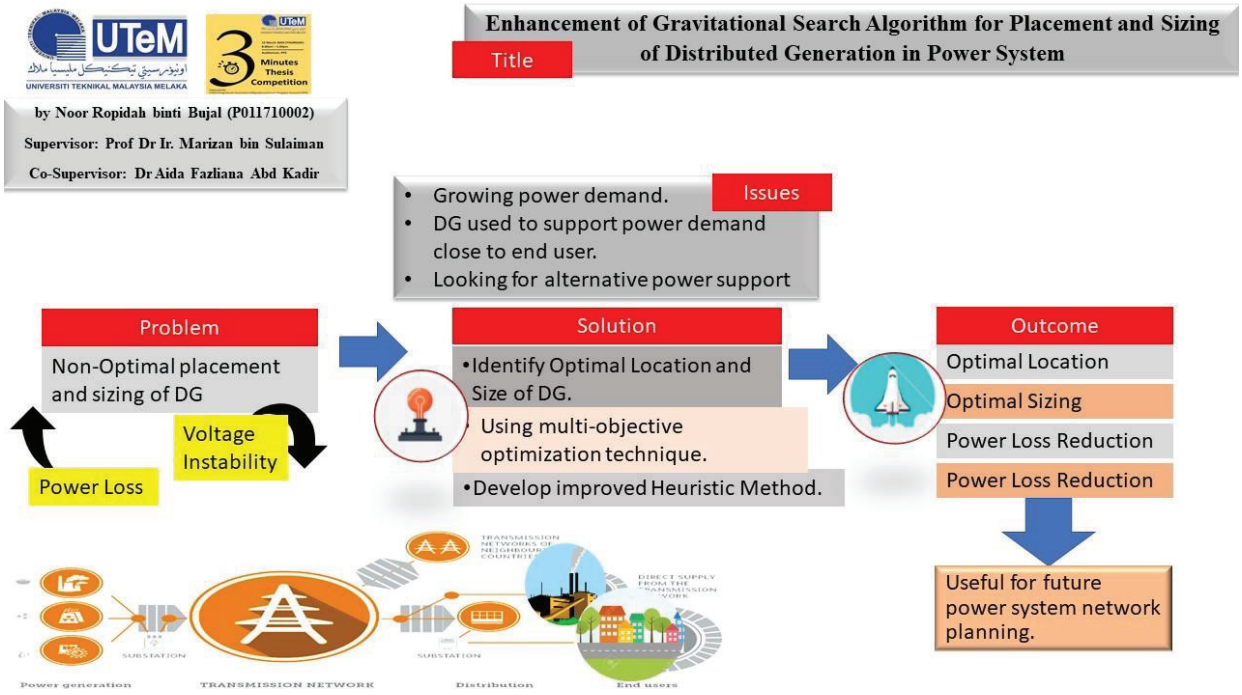


ENHANCEMENT OF GRAVITATIONAL SEARCH ALGORITHM FOR PLACEMENT AND SIZING OF DISTRIBUTED GENERATION IN POWER SYSTEM

By: Noor Ropidah Binti Bujal
Supervisor: Professor. Ir. Dr. Marizan Bin Sulaiman
Co-Supervisor: Dr. Aida Fazliana Abd Kadir

ABSTRACT

The growing power demand has increased the production of electrical energy close to its capacity limit. Yet, power utilities must maintain the reserve margins of existing power generation at a sufficient level. Distributed Generation (DG) has come up as alternative energy to support the power demand and to overcome power system deregulation and at the same time maintain the voltage at particular buses. The presence of DG in the distribution system gives several advantages such as voltage support, loss reduction, deferment of new transmission and distribution infrastructure and improve system reliability. However, non-optimal placement and sizing of DG may cause many problems such as increased power loss and voltages instability problems in the system. Voltage instability problems may cause damage to sensitive equipment and lead to voltage collapse. Therefore, this research proposes an improved effective heuristic optimization method Enhanced Gravitational Search Algorithm (EGSA) to determine the optimal DG placement and sizing of DG based on multi-objective function in order to minimize total power losses in a distribution system and maintain the voltage at particular buses using voltage stability index. There are previous numbers of studies on the DG allocation method of DG placement and sizing. However, there is room for improvement on the heuristic method and only several researches compare and identify which stability indices that most suitable to determine optimal placement and sizing of DG. The load flow algorithm from MATPOWER is integrated with the MATLAB environment to solve the multi-objective optimization problem on IEEE 14-bus, IEEE 30-bus, and IEEE 118-bus network.



ADAPTIVE AND ROBUST CONTROL DESIGN FOR AN ELECTROHYDRAULIC ACTUATOR SYSTEM

By: Chong Chee Soon
Supervisor: Associate Professor. Dr. Rozaimi Bin Ghazali
Co-Supervisor: Associate Professor. Dr. Chong Shin Horng

ABSTRACT

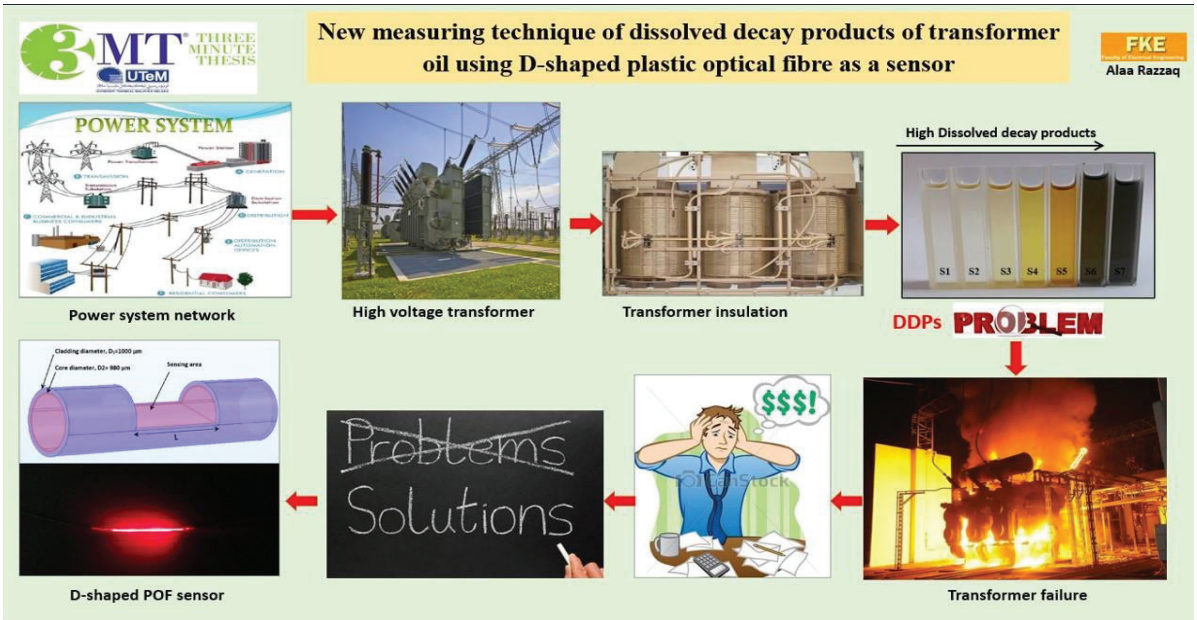
Recently, we have seen and heard a lot about the aircraft deadly crash incident in the new. One of the incidents happened to the familiar neighbour country, Indonesia and another one happened recently in Africa. The Lion Air, and the Ethiopian aircraft that took away all the life on board only few minutes after the take off. Various opinion and conjecture have been heard regarding these incidents. Some said that the sensor is malfunction, some said that the error occurs in the control system of the flight, and so forth and so on. The problem is, how do you overcome this incident if it is happened to you, or happened to the flight that you are on board? Of course, praying to the lord, and screaming for the help are what we can do, and the only thing that we can usually think of. I am a frequent customer to the airport. From Kuala Lumpur to Sarawak, from Sarawak to Kuala Lumpur. Sometime, only the small sliding due the high impact during the landing can freaked my soul out. So, I do think and concern, what if the crash happened to my flight? What if the pilot can manually control the flight by bypass all those sensors or computerised parts in case of the fatal error occurred? Therefore, my past research is related to the Electro-Hydraulic Actuator System, and the design of the control system that will improve the performance of the Hydraulic System. Do you know, the hydraulic system involved a lot in the aircraft parts? For example, the steering, the braking system, the wing, and the suspension of the aeroplane? Even in the past centuries, the aircraft accident is mostly due to the hydraulic failure. Therefore, assume that the manually control of the aircraft is well-developed, in case of any computerised error occurred in the aeroplane parts, at least we stand a chance to manually take over the aeroplane through the help of the hydraulic system, that might be save hundreds of life on board.

NEW MEASURING TECHNIQUE OF DISSOLVED DECAY PRODUCTS OF TRANSFORMER OIL USING D-SHAPED PLASTIC OPTICAL FIBRE AS A SENSOR

By: Alaa Razzaq (A. Razzaq)
Supervisor: Dr. Hidayat Zainuddin
Co-Supervisor: Dr. Farhan Hanaffi

ABSTRACT

High-voltage transformers are essential for power systems, particularly in the transmission and distribution sectors. The reliability of this equipment typically depends on the condition of the insulation. Thus, considerable attention must be accorded to the development of diagnostic and monitoring systems for predicting the condition of transformer insulation. Transformer oil is widely used in high-voltage transformers as a cooling and insulation medium. Electrical and thermal stresses expose transformer oil to degradation, which may produce Dissolved Decay Products (DDPs) that are partially adsorbed by the insulation paper and thus accelerate the degradation of oil and paper. An evanescent field Plastic Optical Fibre (POF) sensor was fabricated using chemical etching and polishing technique to detect DDPs in transformer oil. Three types of structures have been fabricated which are D-shaped and D-shaped U-bent and tapered POF sensor. The sensor performance was evaluated based on different sensing lengths. The D-shape sensing length was 5, 10 and 20mm while for U-bent just 5 and 10mm have been used. For tapered sensor, the sensing length was 15mm and the waist diameter was 0.7μm. Different measurements of transformer oil have been conducted namely moisture content, breakdown voltage test, Refractive Index (RI) and DDPs. Measurements were taken for two groups of oil i.e. artificially aged and on-site oil samples. From the analysis of results, there is a correlation between the refractive index RI of transformer oil sample, DDPs and output power of the POF sensor. The correlation was based on two parameters i.e. correlation factor (R) and p-value. The performance of the sensor has been analyzed based on the relation between the RI and output power of POF sensors. The comparison between the D-shape, D-shaped U-bent and tapered POF sensors has been studied. In term of sensitivity, the U-bent sensor recorded the highest of 47.86 μW/RIU. The comparative study shows that there is no significant change of sensitivity between D-shaped and tapered POF sensor.

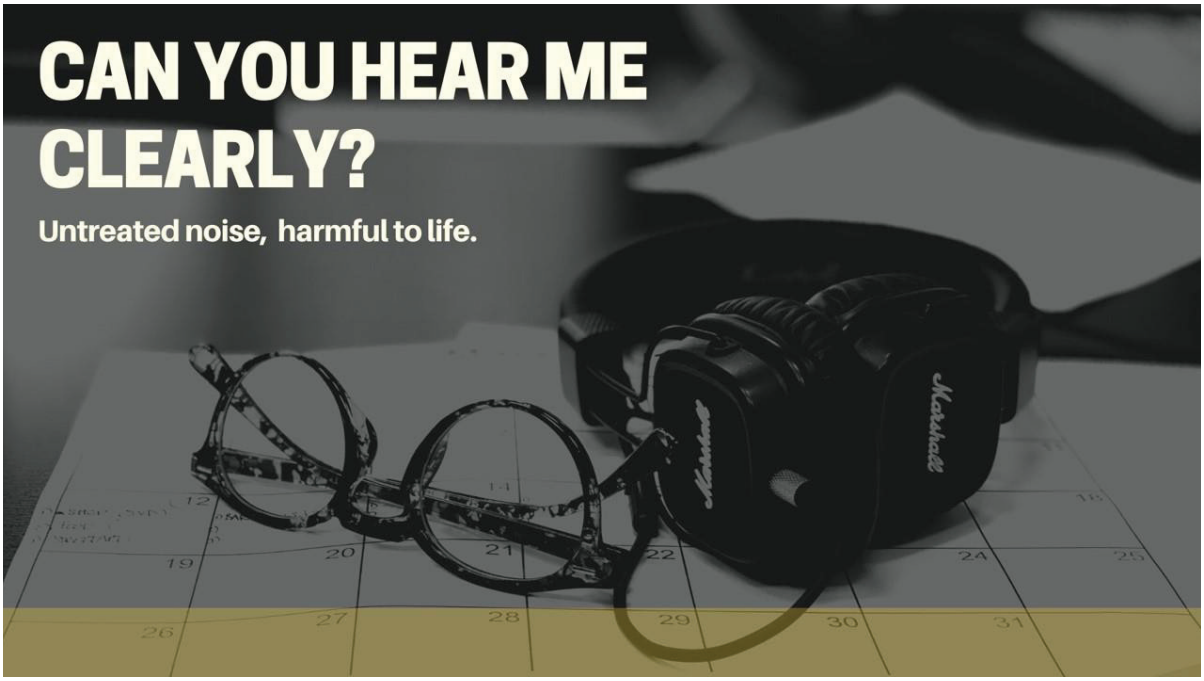


SOUND ABSORPTION OF MULTIPLE LAYER COIR AND KAPOK FIBRE

By: Dg Hafizah Binti Kassim
Supervisor: Associate Professor. Dr. Azma Putra
Co-Supervisor: Associate Professor. Dr. Roszaidi Bin Ramlan

ABSTRACT

Conventional acoustic absorbers are well known to be made from synthetic material, which will deteriorate through time causing health issue to human and polluted the environment during its production. Thus, replacing these materials to a sustainable and green material become a widely interest to acoustic researchers. Natural fibres are widely known as an alternative to the typical synthetic ones because it is found in abundant as a waste product from other process cycle, great thermal insulation properties and mostly not harmful to human and environment. Despite an extended research of natural fibre in sound absorption field, it still lacks establishment in multiple layering concept of different fibre. Therefore, it is aimed to explore the potential of the sound absorption of both coir and kapok fibre under normal sound incident and to utilise kapok fibre to enhance the sound absorption of coir fibre as multiple layer absorbers. Suitable models to predict the normal incidence sound absorption of a single layer and multiple layers of coir fibre and kapok fibre are obtained. The study is carried out by fabricating sample of coir and kapok fibre with different thickness and densities. The 33.3 mm diameter impedance tube testing is conducted according to ISO 10534-2 to obtain the sound absorption coefficient. The effect of fibre density, fibre thickness and introduction of air gap on sound absorption coefficient are explored. Kapok fibres were found to have better sound absorption coefficient performance than that of coir fibres. Measurement on multiple layer sample, it is found that thinner multiple layer absorber utilizing kapok fibre in coir fibre achieve similar or better sound absorption than thicker specimen having only coir fibres. Furthermore, air gap addition at the back of the sample will enhance the sound absorption to the lower frequency range.



THE DEVELOPMENT OF ENTERPRISE ARCHITECTURE TOWARD MODELING HIGH TECHNOLOGY HIGH VALUE MALAYSIA TRANSPORTATION INDUSTRY

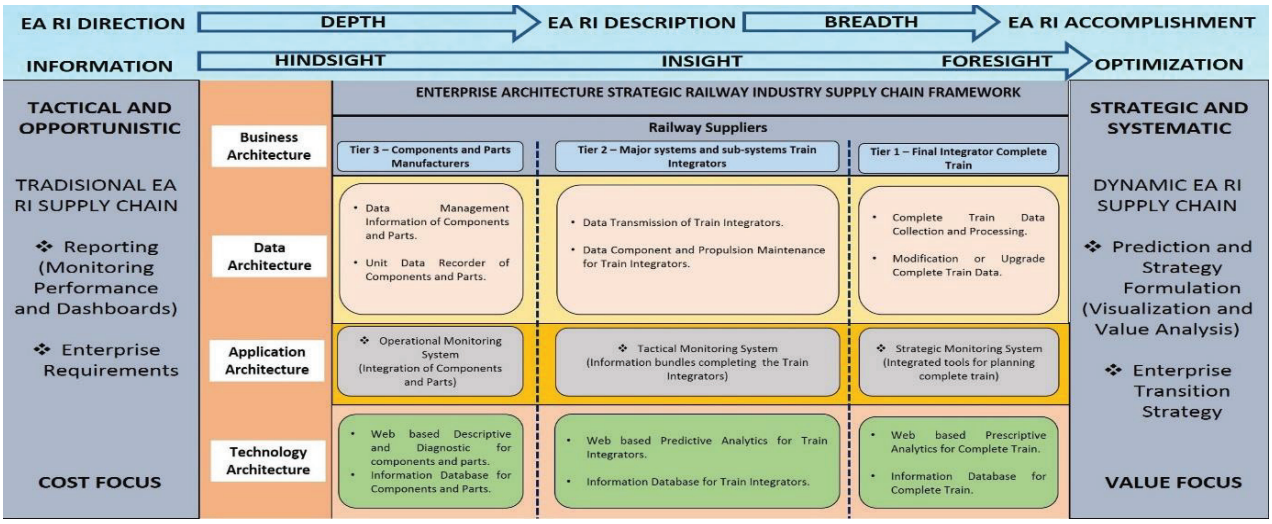
By: Ts. Mailasan A/L Jayakrishnan

Supervisor: Ts. Dr. Abdul Karim Bin Mohamad

Co-Supervisor: Professor Dato' Dr. Abu Bin Abdullah

ABSTRACT

Malaysia Transportation Industry (MTI) service in Malaysia possess below-average Enterprise Architecture (EA) skills and seldom use the EA for decision making at their operation level while they also find Information Technology (IT) adoption are difficult and thus MTI service in Malaysia are in the late majority in the adopter category. Recognizing the important role of EA to MTI in the economy, the government is committed to support and nurture the development of MTI to ensure their competitiveness and sustainability. EA framework is important because it established the digital industry, agile technology, who can strategize with easy to use and simple decision-making process. Most of these EA model to detect visual perception of performance in MTI are formal in nature and are not strategized to railway use and do not provide prescriptive feedback. The problem is no transition evolution and lack of industry capability to do the transition stages. This research focus on the technology factors affecting the adoption of EA to help managers, regulatory bodies and EA analysis further access the benefits of it continue and potential development in the Railway Industry (RI). RI in most developing countries like Malaysia still has been slow to adopt it although most MTI in Malaysia realize that EA is critical to the productivity and performance of their industry. This research is important to be implemented to study EA parameters for RI supply chain indicators for MTI which have not been fully researching in Malaysia context. This research has incorporated the theory of MIT90's framework to diagnosing management perception problems and the method of serious monitoring for RI supply chain indicators where this method has been researching separately and no comprehensive result was obtained. This study offers significance contribution to the MTI in RI not only in terms of the status of EA adoption but also the EA usage based on the international standard of four elements core EA parameters. The results of the research will be significant both theoretically and practically. Theoretically, this research is based on the MIT90's framework contributed to the academic in terms of new knowledge about the levels of EA adoption and RI supply chain indicators for MTI.



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