

List of Abstracts Accepted for Oral Presentation in EnCon2012 (Final as of 30 May 2012)

ID	TITLE	AUTHORS & AFFILIATION	ABSTRACT
6.	Green Buildings- Concepts, Materials, Rating Systems and Benefits	Lakshmi. K .Nandan Department of Civil Engineering, Student of Engineering, NSS College of Engineering. Palakkad-678008,, Kerala, India	<p>Building materials technologies and building practices have evolved through ages. Construction industry is the largest energy consuming sector. With increasing urbanization, natural resources are being utilized rapidly and erratically without any planning and equivalent replenishment. With increased degradation of environment because of increased energy consumption, environmental conscious buildings design has become urgent. Hence nature's basic rule is to be adopted, "Reduce, reuse and recycle"- The best way of following this basic rule in building industry is through green buildings. The green building concept is the construction of energy efficient buildings which result in reduced destruction of natural habitat and biodiversity, reduced air and water pollution, less water consumption, limited waste generation and increased user productivity. The awareness of green building has begun and with building industry poised for a major growth, green building industry would be a mantra of the building industry in future. Going green is a sustainable building technology for the environmentally harmonious cities. This paper discusses about the concepts, materials, rating systems and benefits of green building.</p>

7.	Ground Water Recharge Using Dams	Mehemed A Razzaghi Faculty of Engineering Al-Jabal Al-Gharbi University, Gharian, Libya	<p>Given the importance of rainwater in arid and semi-arid zones, where lack of a permanent rivers and limited groundwater resources, have necessitated the importance of runoff water management and conservation. Dams are clear example of advanced runoff water management and conservation technologies in the past and present. The major objectives of dams include flood protection, irrigation, provision of drinking water for human and animals, groundwater recharge and soil erosion control.</p> <p>A study was conducted on the impact of the dam of <i>Wadi El-Mejineen</i> on the water balance in the dam area. The dam is located south of the city of Tripoli by a distance of 75 km. Its storage capacity is 58 million m³. Climatic and hydrological data for the region were compiled for a period of 25 years (79/80 - 03/04). Through these data the annual average for elements of the budget equation (rainfall, runoff, evaporation and the amount of water drawn from the dam's lake) were calculated. Using these calculated data in the water balance equation the annual rate of groundwater recharge was identified during the study period. Results showed that the highest value of the infiltrated volume in the year 80/81 was 21673692.66 cubic meters / year. The same year received the highest rate of precipitation during the study period 491.4 mm / year. As well as the largest amount of runoff is 23770000 cubic meters / year.</p>
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9.	<p>Advantage of Changes Of Flow And Pressure Shock For Flushing To Give High Water Quality In The Distribution Systems And Reservoirs</p>	<p>Othman Jaafar, Hossein.Shamsaei Department of Civil and Structural Engineering University Kebangsaan Malaysia(UKM)</p>	<p>This study presents the result of investigation carried out on the causes of deterioration in the quality of water and the effects of flushing. The methods used to remove deposits from the water distribution systems are also discussed. It was observed that, flushing could succeed when velocity and turbidity come into high shear stress. High shear stress and turbidity easily lead to detachment of biofilms and soft deposits from the pipes surfaces. However biofilm detachment is not possible with laminar flow. Laminar flow is not effective in removing deposition from surfaces of pipes or even from the reservoirs. Pressure shocks cause to increase temporarily the amount of suspended material, turbidity and electrical conductivity. There is a relation between the numbers of pressure shocks with the pipe material. The number of pressure shocks in cast iron or iron is more than in PVC pipe and pressure shocks, back flow, turbulent flow and critical flow could help in flushing pipes.</p>
11.	<p>Building Safety and Health Model for Apartment Buildings in Malaysia</p>	<p>Azuin Binti Ramli, Zainal Abidin Bin Akasah Faculty of Civil and Environmental Engineering Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja - Batu Pahat</p>	<p>This paper will present the initial stage of an on going research. The main research is concerns with the development of safety and health model for apartment buildings in Malaysian. Current sustainable building, design and construction practices in Malaysia are primarily aimed at minimizing environmental and resource impacts and improving the safety, health, and productivity of a building's final occupants. Therefore, information concerning the safety and health performance of buildings must be always readily available. The aims of this study are to develop a building safety and health model(BSHM) focusing on the safety and health performance issues of apartment buildings in Malaysia. This study is divided into three phases, (i) the information gathering phase (ii) the model development phase and (ii) model analysis phase. First, previous studies on the current safety and health practices related to apartment buildings and facilities are briefly reviewed from journals, thesis and articles books in order to interpret the BSHM from global perspective. Second, a comprehensive BSHM will be developed to address the building attributes from the expert surveys. Third, the hypothesis relationships are subsequently tested using partial least squares (PLS) path modeling approach. Finally a model of building safety and health for apartment buildings will be developed.</p>

13.	Silver Based Nanoalloy as a High Temperature Die Attach Material	Vemal Raja Manikam, Khairunisak Abdul Razak, and Kuan Yew Cheong Energy Efficient & Sustainable Semiconductor Research Group, School of Materials and Mineral Resources Engineering, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal, Seberang Perai Selatan, Penang, Malaysia.	Die attach materials for high temperature use on power devices continues to gain much focus amongst researchers far and wide, especially for wide band gap semiconductors such as Silicon Carbide (SiC) and Gallium Nitride (GaN). Such devices can reach temperatures as high as 500°C or more. Most of the current die attach solutions do not possess the means to withstand harsh conditions and high temperatures for such applications as in avionics or military equipment. Nanoscale materials as high temperature die attach solutions have been studied previously with silver (Ag) showcasing promising results. In this work, Ag and aluminium (Al) nanopowders were formulated into a nanopaste using organic additives and sintered at 380°C. Al has the second best electrical conductivity value amongst the metals, good thermal conductivity and is relatively cheaper than both Au and Ag. Sintering enabled the organics in the nanopaste to burn off and promote fusion between the elements. Post-sintered Ag-Al nanopaste revealed the formation of Ag ₂ Al and Ag ₃ Al compounds. It also demonstrated electrical and thermal conductivity values of $2.25 \times 10^5 \text{ (ohm-cm)}^{-1}$ and 123 W/m-K respectively as well as porosity less than 20%. Micro-pores which can aid in the reduction of thermal mismatch strains and coefficient of thermal expansion (CTE) between the die-die attach material-substrate interfaces were also detected.
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14.	Flexural Strength and Deflection of Biomass Polyvinyl Chloride (PVC)-Reinforced Hollow Core Deck	Chai Teck Jung, Koh Heng Boon, Tang Hing Kwong, Lee Yee Loon Department of Civil Engineering, Politeknik Kuching Sarawak, Km 22, Jalan Matang, 93050 Kuching, Sarawak.	<p>The laboratory work was conducted to determine the flexural strength and deflection of biomass PVC-reinforced hollow core deck. The main objective of this study is to examine the effect of biomass aggregate and PVC pipe on the hollow core deck strength. A total of 36 PVC-reinforced hollow core deck samples (350 mm x 700 mm x 70mm thick) containing 0%, 30%, 60% and 100% biomass aggregate were prepared and tested at the age of 7, 14 and 28 days respectively. The Supracoat SP800 was added to increase the strength and to achieve the required workability. The result showed that higher percentage of biomass aggregate use tends to reduce the flexural strength of the hollow core deck. Among the specimens containing biomass aggregate, hollow core deck with 30% biomass aggregate gained the highest flexural strength (12 MPa). However, the flexural strength is still 14% lower than the control specimen without biomass aggregate. Meanwhile, the deflection of the deck performs a linear relationship with the load applied. The first crack was observed at the bottom of mid span at the load of 5 kN (C0), 4.5 kN (C30), 3 kN (C60) and 2.5 kN (C100). The density of the hollow core deck specimens was reduced by 10 % to 22% compared with control specimens. The test result indicated that replacement of 30 % biomass aggregate combine with PVC pipe and the use of superplasticizer perform high flexural strength with linear elastic between load and deflection relationship. However, more research needs to be conducted to verify it.</p>
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17.	Effect of Rainfall on Passenger Car Equivalent (PCE) used in Highway Capacity Loss Determination.	<p>Hashim Mohammed Alhassan, Johnnie Ben-Edigbe Faculty of Civil Engineering, Universiti Teknologi Malaysia, 81310, Skudai, Johor Bahru, Malaysia. Department of Civil Engineering, Bayero University, Gwarzo Road,700241, Kano,Nigeria</p>	<p>This study evaluated the capacities of road sections subjected to rainfall disturbances and examined the implications of traffic flow contractions due to PCE of vehicles. Data was generated using automatic traffic counters and the rainfall data came from nearby gauge stations. The results indicate speed reductions and capacity decreases for the rainy conditions. The speed reductions at site 1 are 4.51%, 7.54% and 9.43% for the light, moderate and heavy rain conditions. The capacity losses for site 1 are 6.91%, 10.48% and 16.62% respectively for the same conditions. The speed decreases are 6.36% and 10.29% for the light and the moderate rain conditions at site 2. The reduction in capacities are 6.01% for light rain and 30.61% for moderate rain. PCE values of LGVs'and HGVs' computed in this study are lower than the standard values used. They decrease with increase in rain intensity. In view of the large headways, free flow conditions , LGV's and HGV's do not displace the passenger car under rainfall.</p>
20.	Development of a Micro Energy Harvester	<p>C.J Tay, C Quan, C Lee and H Liu Department of Mechanical Engineering, Department of Electrical and & computing Engineering, Faculty of Engineering, National University of Singapore</p>	<p>In this work, we have proposed a MEMS piezoelectric energy harvester with a wide operating frequency range by incorporating a high-frequency piezoelectric cantilever and a metal base as the top and bottom stoppers with a low-frequency piezoelectric cantilever. Frequency up-conversion of the piezoelectric energy harvester is realized when the low-frequency piezoelectric cantilever impacts and scrapes pass a high-frequency piezoelectric cantilever. For an input acceleration of 0.6 g, with a top and bottom stopper distance of 0.75 mm and 1.1 mm, respectively, the operating frequency ranges from 33 Hz to 43 Hz. Output voltage and power up to 97 mV and 95 nW can be achieved.</p>

23.

The utilization of non conventional water resources to subsidize insufficient water balances: Case study for Santorini Island, Greece

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Water resources are often limited for the small and medium size Greek islands. Groundwater and rainwater have been used traditionally for water supply, while water importation from the mainland, during the hot months, has also been practiced. Nowadays, a number of affordable alternative processes for the production of water from seawater and wastewater are available. Desalinated seawater is readily potable, while reclaimed water can be primarily used for non-potable applications. However, unplanned implementation of seawater desalination and water reclamation from wastewater can lead to high costs because of high water conveyance cost, or overdesign of water production plants. The present work presents a mathematical model for integrated optimisation of water resources management, using mixed integer linear programming (MILP) techniques for the Greek Island of Santorini, highly touristic island of the Aegean Sea. The model takes into account the localised water needs (including water quality), the sustainably available groundwater and the local wastewater production. It also takes into account geographical information (e.g.: population distribution, topographical data) and cost of water management and conveyance facilities. Based on the above data, the model calculates the location and capacities of seawater desalination plants, water reclamation plants and wastewater treatment plants, and the appropriate water and wastewater conveyance infrastructure (pipelines, pipe sizes, pumping stations and capacities, storage tanks), so to minimize the total annualised cost, including capital and operational costs. Seasonal variations of water needs are also taken into account.

24.	Natural State Modeling of Singapore Geothermal Reservoir	Hendrik Tjiawi, Andrew C. Palmer, and Grahame J. H. Oliver Department of Civil and Environmental Engineering, Faculty of Engineering, National University of Singapore.	<p>The existence of hot springs coupled with the apparent anomalous high heat flow has sparked interest in the potential for geothermal development in Singapore. This geothermal resource may be potentially significant and could be exploited through Engineered Geothermal System (EGS) technology, i.e. a method to create artificial permeability at depth in granitic or sandstone formations as found under Singapore. The apparently ever-increasing fossil fuel price has made the cost of using the EGS technology more viable than it was in the past. Thus, to assess the resource, a numerical model for the geothermal reservoir has been constructed. Mass and heat flows in the system are simulated in 2D with AUTOUGH2.2, and the graphical interface processed through MULGRAPH2.2. Natural state calibration has been performed to match both the observed and the expected groundwater profile, and also to match the hot water upflow at the Sembawang hot spring. The simulation gives an encouraging preliminary result of 125 - 150 °C hot water at depth 1.25 – 2.25 km. Improvements to the model are in progress.</p>
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27.	Developing a Sustainability Framework for the Second Life of Palm Oil Clinker (POC)	<p>Chee-Ming Chan, Alina Shamsuddin and Eta Wahab Faculty of Civil and Environmental Engineering 2&3 Faculty of Technology Management, Business and Entrepreneurship Universiti Tun Hussein Onn Malaysia, Johor, Malaysia.</p>	<p>Palm oil constitutes a main agricultural commodity for the country, therefore the large quantity of palm oil clinker (POC) produced as a waste at the refineries is not unexpected. Upon the discovery of the rock-like but porous POC as being strong and robust enough as substitutes of aggregates, they have since become popular alternative materials in road pavement and concrete. However, POC is also potentially viable in other civil engineering applications for a second life, and this includes brick-making, soft soil stabilisation and greywater filtering. (i) Powdered POC was found to contribute to greater strength gain than cement in baked clay bricks, promising a cheaper yet more environmental-friendly building material. (ii) Admixed with soft clay soil, ground POC was found to effectively dry and strengthen the originally weak soil through induced cementation, similar to those achieved by using commercial binders, like cement and lime. (iii) Crushed POC replacing conventional sand in a greywater filter for domestic kitchen sink discharge showed evidence of effective cleansing, where the filtered water met the requirements of Standard B effluent suitable for release into public waterways. While the experimental results strongly suggest the huge potential of restoring POC to a useful second life in various civil engineering applications, encompassing the „rebirth“ from cradle-to-grave in a sustainable framework is essential as assessment and justification for its continued viability. By putting the materials and methods in a birth-to-death cycle, from production, application to end-of-life management, the relevant causes and impact are reviewed and examined. The inter-related societal, economic and environmental aspects are then incorporated in a holistic 2-pronged life cycle and functionality analysis. In short, the sustainability framework features not only technical soundness of the POC’s second life, but considers in detail the other consequential and accompanying factors throughout the „second“ life cycle of POC.</p>
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30.	The advantages of mass transit for future urban transportation	<p>Rosalind Sya Juo Ling, Wu Bi Hu, and Li Jiong Hua Centre of Recreation and Tourism Research (CRTR), College of Urban and Environment Science, Peking University, PR China.</p>	<p>The development of transportation system had created comfortable and easy accessibility in our daily life in term of time saving and speed but not space saving or environmental friendly. Traffic congestion, air pollution, noise pollution, increasing car ownership, rude drivers etc are the price we paid for urbanization and modern way of living. Therefore, we looked forward into the near future for mass transit to be popularized and upgraded to serve the urbanite as one of the greener, sustainable and smart urban transportation system. This paper would like to explore the advantages to use mass transit as part of urban transportation system. The author strongly recommend that mass transit should be integrated with walking and cycling to form an environmental friendly urban transportation system.</p>
33.	Control of Pollution Load of Hexavalent Chromium: A Green viable Solution	<p>Saima N., Uzaira R. and Saima J. Department of Environmental Sciences, Fatima Jinnah Women University The Mall, Rawalpindi Pakistan.</p>	<p>Hexavalent form of chromium is considered as group ‘A’ human carcinogen. The untreated effluents from industries released into the environment contain higher levels of chromium. The noxious effects caused by uncontrolled release and emergence of stringent environmental protection laws, have encouraged studies for removal of heavy metals. A number of treatment methods are investigated by different researchers. The present study is an attempt to devise a decontamination method that is efficient, safe and environment friendly, using vegetation waste materials that are widely available and capable of lowering transition metals ion concentration to ppb concentrations. For the present investigation vegetation waste was applied as adsorbents. Batch adsorption experiment for the removal of chromium was subjected to different physical and chemical modifications. Physical variables include pH, temperature, induced concentration, adsorbent mass and contact time. Each waste material was chemically altered with sulphuric acid and analysed for adsorption at optimum batch conditions. The results showed that carrot pulp was the best candidate for the removal of chromium. Chemical modification of carrot pulp, sawdust and used tea increased the adsorption efficiency by 20, 13 and 10 orders of magnitude, respectively. Removal is attributed to attachment of sulfate group through modification as confirmed by FT-IR studies.</p>

34.	Application of Bioenzymatic Soil Stabilization in comparison to Macadam in Construction of Transport Infrastructure	Uzaira R., Saima N. and Rabbiya N Department of Environmental Sciences, Fatima Jinnah Women University The Mall, Rawalpindi Pakistan.	Over ninety percent of roads and highways are paved with asphalt, as it is less expensive, flexible, easy to construct and repair than concrete. The increasing climatic changes and cost of construction material forced the researchers to consider environment friendly methods to build roads. One economically feasible solution for achieving these objectives is use of enzyme soil stabilization. Use of bioenzymes is known to improve the stability of aggregates and soil materials in the roadways and other pavement structures. The present study was designed to introduce environment friendly TerraZyme to increase engineering qualities of soil for road construction. Soil classification and earth work characteristics were analyzed for two soil types representing pulverized local and transported soil with and without TerraZyme. Results confirmed that treatment with TerraZyme increases engineering characteristics indicated by increase in CBR values from 10.47 to 16.28 with 55 % improvement, increase of 4.28 % and 2.20 % in dry density and decrease of 18.13 % and 6.17 % in moisture content for untreated and treated soil, respectively. TerraZyme constructed road concludes cost saving of 15-20 % and maintenance cost reduction of 60 % and compared to normal water bound Macadam road.
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36.	An algorithm for Evaluation of Water Reservoirs' Sustainability using Fuzzy Approach	Hamid Vahdat, Sara Nazif, Hamed Tavakoli School of Civil Engineering, Faculty of Engineering, University of Tehran, Tehran, Iran.	Sustainability is the basic matters affect decision making about different development projects in terms of economy, social and environment. Hence sustainability assessment is one of the fundamental challenges in different engineering fields. The main difficulty in dealing with sustainability of different systems is its quantification. Therefore indicators are introduced for sustainability measuring regarding factors affecting a system's sustainability. Because of the linguistic nature of some factors incorporated in the sustainability indices, they cannot be exactly measured and need especial approaches for dealing with. This study aims to introduce some indicators for quantification of water reservoirs' sustainability during their planned life cycle especially in environmental field. These indicators are selected with emphasis on environmental aspect. To overcome the difficulty in dealing with data with different natures and different ranges of variations, the fuzzy approach is used in sustainability indicators quantification. Furthermore, this approach will help to incorporate the data uncertainties in the sustainability analysis. Data of a dam located at the southern part of the Iran is used to explore the capabilities of the proposed approach in a real case study.
44.	Assessing the Green Building Index for Brownfield Redevelopment in Malaysia	Nurlaila Binti Ali, Robiah Suratman Department of Land Administration and Development, Faculty of Geoinformation and Real Estate, Universiti Teknologi Malaysia, Malaysia.	Redevelopment of Brownfield sites was highlighted as one of the key components in Malaysia Green Building Index, the rating scheme developed by Pertubuhan Arkitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia (ACEM) in 2009. The idea of redevelopment of Brownfield sites is to support sustainable site planning and management through innovation to the re-habilitation of existing buildings or land for re-use in innovative ways. Even though Brownfield redevelopment has the potential to be used as part of the criteria or parameter in the Green Building Index rating, there is a vacuum which needs to be studied in term of the implementation approach since Brownfield redevelopment is a relatively new idea in Malaysia and no comprehensive guidelines have been developed so far. This research therefore investigates the approach in order to identify the potential of Brownfield redevelopment towards sustainable sites and green development in Malaysia. The result will be used as a base to look further into Malaysia's situation, its implication and approach to be taken towards the stakeholders. It is a hope that this study will help to improve guideline for effective implementation of Brownfield Redevelopment in Malaysia.

46.	The Consideration of Rooftop Garden Element in Malaysia Green Building Index: A Literature Review	<p>Maryanti bt Mohd Raid and Khadijah Hussin Department of Land Administration and Development, Faculty of Geoinformation and Real Estate, Universiti Teknologi Malaysia, Johor, Malaysia</p>	<p>Rooftop garden is a modification of modern landscape which has the potential in contributing towards sustainable development. In addition, rooftop garden is a sustainable landscape for green building. In other countries, this landscape is seen as one of the key elements that can contribute to green building rating system such as in Green Mark (Singapore), LEED (United States), CASBEE (Japan), BREEAM (United Kingdom), BEAM (Hong Kong) and GRIHA (India). Although this development is growing especially in the urban areas such as Damansara, the contributions of this development is only seen as an additional landscape for the provision of open spaces involving a small scale of narrow development area (Town and Country Planning Peninsular Malaysia, 2005). Therefore, this article attempts to answer the question as to what extent does the role and contribution of rooftop garden in Malaysia. Does it also can assist to score in Malaysia Green Building Index (GBI) or only as an additional landscape to give visual impact to the occupant? Thus, this article will review the ecological benefit of rooftop garden that can possibly contribute to Malaysia's Green Building Index based on the previous studies and to identifying the score that can be credited in Green Building Index based on the ecological benefit that have been discussed. The outcome of the study hopefully can be use to highlight the potential of this landscape to assist the achievement of sustainable urban development in Malaysia.</p>
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49.	The Effect Of Board Density On The Properties Of Kenaf Core Fiber Urea Formaldehyde Particle Board	<p>Tay Chen Chiang, Saad A, Mutasher, Nazim Mir-Nasiri School of Engineering Computing and Sciences Swinburne University of Technology (Sarawak Campus) Jalan Simpang Tiga, 93350, Kuching, Sarawak, Malaysia</p>	<p>The research in this paper is focused on kenaf core fibre with adhesive of low emission urea formaldehyde (UF) resin 51.6% solid content. The fabrication and testing method are based on <i>Japanese Industrial Standard A 5908</i> standard. Production of single-layer particleboard by using the kenaf core has been established at two targeted density levels: 500kg/m^3 and 600kg/m^3. Fibre weight fractions of 90%, 85%, 80%, 75% and 70% for both types of densities were used in the fabrication of kenaf UF composite boards. Different tests were carried out on each type of density with the selected fibre weight fractions to find out the properties of fabricated board. The results of the test demonstrates that the samples with higher density yields the higher value of modulus of rupture, modulus of elasticity, tensile strength, Young's modulus, screw test, impact test and internal bonding. The findings also demonstrate that the level of density affects the performance of a board, where the board with low density will result in low mechanical strength as compared to the boards with higher density. At the next stage of the research the comparison between kenaf fiber board and wood particleboard will be carried out to identify the feasibility of these materials in the industrial application.</p>
50.	The uncertainty analysis of model inputs and parameters in qualitative simulation of surface flows	<p>Mona Shojaie, Sara Nazif, Reza Kerachian School of Civil Engineering, Faculty of Engineering, University of Tehran, Tehran, Iran</p>	<p>Water quality is a main issue in planning and management of water resources especially surface water systems due to different point and distributed pollution sources which are discharged into these systems. Therefore, in the past decades, numerous simulation models have been developed for evaluation of water quality variations in water resources systems such as rivers. A main concern in application of the results of these simulation models is about different sources of uncertainty which can significantly affect the results. In this study, an algorithm is proposed for the simultaneous evaluation of existing uncertainties in inputs of river water quality simulation models. The Copula method is utilized due to its flexibility and efficiency in simultaneous uncertainty analysis of different variables. The algorithm is applied to the Jajrood River located near the Tehran metropolitan area in Iran. The Jajrood River is one of the main sources of domestic water supply of the Tehran city, the capital of Iran. The results of this study would help decision makers and experts in analyzing the results of the water quality simulation models and developing better strategies for sustainable water quantity and quality management in the study area.</p>

54.	Streamflow Forecasting for Gauged and Ungauged Sites of a River Basin Using Neural Network	<p>Ponselvi Jeevaragagam , Slobodan P. Simonovic</p> <p>Senior Lecturer, ITUCE, Faculty of Civil Engineering, Universiti Teknologi Mal;aysia.</p> <p>Department of Civil and Environmental Engineering, University of Western Ontario, Spencer Engineering Building, London, Ontario N6A 5B9, Canada.</p>	<p>This is the investigation of streamflow forecasting methodology with lead-times up to three days for gauged and ungauged locations in the Upper Thames River basin, Ontario, Canada. The methodology is utilizing as the main inputs, streamflow and precipitation (rainfall and snowmelt) data. The other available meteorological variables are also used in order to improve the accuracy of the streamflow predictions, especially for longer lead-times. The Bayesian regularization neural network approach is used to provide accurate streamflow simulations for a wide range of streamflow hydrographs pertinent to the hydrometeorological environment. It is demonstrated that a well-generalized network with given input and output datasets can be developed.</p>
57	Non-Destructive Evaluation of Road Pavement using Spectral Analysis of Surface Waves (SASW)	<p>M. A. Ismail, K. A. M. Nayan, A. R. Samsudin, & A. B. Rafek</p> <p>Waste and Environmental Division, Malaysian Nuclear Agency, Bangi, 43000 Kajang, Selangor, Malaysia</p> <p>Department of Civil & Structural Engineering, Faculty of Engineering, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia</p> <p>Department Geology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia</p>	<p>The Spectral Analysis of Surface Waves (SASW) method is an in-situ seismic technique for the evaluation and assessment of road pavement. The method is based on the theory of stress waves propagating in elastic media with the key elements being the generation and detection of Rayleigh wave motion. A set of transient impact source with a range of frequencies is used to generate the Rayleigh wave energy that is able to propagate along the surface layer of the pavement. Through two vertical accelerometers, the motion of the wave for each range of frequency is recorded and calculated using a dynamic signal analyzer. A dispersion curve is then constructed from the cross-power spectrum of the FFT that results in the phase velocity versus wavelength plot. An iterative inversion is then carried out to obtain the shear wave velocity profile with depth and the corresponding dynamic modulus of each pavement units. This paper presents a case study carried out on a new road pavement construction site. It was found that the profile of the dynamic shear and Young's modulus versus depth obtained from SASW method was able to detect each layer of the pavement units. This finding would be useful in the assessment of the pavement integrity.</p>

58.	<p>Bending Characteristics of the Multirow Arrangements of Laterally Loaded Passive Piles in Sand for Landslide Countermeasure</p>	<p>Donovan Mujah, Fauziah Ahmad, Hemanta Hazarika and Naoto Watanabe</p> <p>School of Civil Engineering, Universiti Sains Malaysia, Malaysia.</p> <p>Department of Civil and Structural Engineering, Kyushu University, Japan.</p> <p>KFC Ltd, Time 24 Bldg. 2-45 Aomi, Koto-ku, Tokyo 135-8073, Japan.</p>	<p>Currently, vertically installed single row arrangement of cast in-situ concrete passive piles is widely used as landslide countermeasure to which the corresponding excessive lateral earth movement induced by landslide is undesirable from slope stability perspective. In this experimental investigation, attempts have been made to study the effect of introducing multiple rows arrangement of small diameter steel piles (SDSP) in sand at varying ground densities ($D_r=30\%$ and $D_r=80\%$). Similarly, parametric study focusing on the effect of the reinforcing rods cross sections (10 mm x 10 mm square and 3 mm in diameter piles) was also considered. Shearing resistance in different pile cross sections is found to be significantly influenced by the variation of SDSP arrangement. However, irrespective of the piles arrangements, failure mode of a densely compacted ground is mainly governed by soil's shearing resistance mobilized at a higher strain, while bending stiffness (EI) of the reinforcing material is more dominant in loose ground.</p>
60	<p>Monitoring of Groundwater Flow by Using Colloidal Borescope System (CBS)- Case Studies</p>	<p>Kamarudin Samuding, Mohd Tadza Abdul Rahman, Ismail Abustan, Mohd Muzamil Mohd Hassan</p> <p>Environmental Tracer Application Group, Malaysian Nuclear Agency, Bangi, 43000 Kajang, Selangor, MALAYSIA.</p> <p>School of Civil Engineering, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang, MALAYSIA.</p>	<p>This paper presents the application of colloidal borescope system (CBS) in monitoring the groundwater movement. In this study, single well method was used to determine the groundwater flow direction and velocity. The colloidal borescope system consists of two CCD (Charged-couple Device) cameras, a digital compass, an optical magnification lens, an illumination source and stainless steel housing. The colloidal borescope was inserted into the well at certain depth and the movement of the suspended particle was observed by miniature video cameras. Data from the colloidal borescope is transferred to the camera control unit (CCU) at surface by high strength electrical cable. This CCU is connected to the laptop and AquaLITE Software is used for analysis and interpretation purposes. Groundwater flow movement measured by the colloidal borescope is used to validate the results obtained by conventional methods. This method has been used to study the distribution of groundwater contamination within the landfill area, riverbank infiltration study as well as to determine groundwater resources. The application of this technique not only to confirm the results obtained by classical hydrological methods but as an alternative to provide more information and immediate answers to some hydrological problems.</p>

61	<p>Rainfall Forecasting Using Fourier series</p>	<p>N. Rostam Afshar , H. Fahmi</p> <p>Faculty of Engineering, Universiti Malaysia Sarawak</p> <p>Senior Research Officer , Ministry of Energy , Tehran</p>	<p>This Paper presents a mathematical approach for rainfall forecasting for Iran on monthly basic. The model is trained for monthly rainfall forecasting and tested to evaluate the performance of the model. The result shows reasonably good accuracy for monthly rainfall forecasting.</p>
63.	<p>Study of Groundwater Contamination Flow Path Using Electrical Resistivity Imaging Technique at Taiping Landfill Site, Perak</p>	<p>Nor Dalila Desa, Lakam Mejus, Mohd Tadza Abd Rahman, Kamarudin Samuding, Roslanzairi Mostapa & Jeremy Andy Dominic.</p> <p>Environmental Tracer Application Group (e-Tag), Malaysian Nuclear Agency, Bangi, 43000 Kajang Selangor</p>	<p>Groundwater system contamination is one of the major problems in open-dumping landfill site. This study focuses on the effect of the leachate to the surface and groundwater pollution at Taiping landfill site. The site was previously used for tin ore and other alluvial ore minerals mining. Consequently, the soil stratification of the area was extensively disturbed by tin mining activities in the past. Geologically, the area consists of mainly recent alluvium of Quaternary in aged. A 2-D electrical resistivity imaging technique is used in mapping the pollution distribution in the form of leachate plumes. Results shows that groundwater at depth of 5 – 15m was contaminated by the leachate from the dumping site as indicated by resistivity values less than 10 Ohm-m in the pseudo sections. In addition, leachate plumes appeared to have seeped to about 30-50m in depth. Resistivity of the backfill surface covering material is found greater than 100 Ohm-m. The study has led to the delineation of the groundwater contamination zones within the study area as well as the distribution of the pollutant in the soil strata at depth less than 30m. This implies that the 2-D electrical resistivity imaging technique is an effective tool in detecting contaminated groundwater zones or layers.</p>

64.	Influence of Various Metal Dopants on Malaysian Dolomite Catalyst for Oil Palm Frond Gasification to Enhance Hydrogen Production	A.R. Nur Faizal, Y. H. Taufiq-Yap, and M. Z. Hussein Center of Excellence for Catalysis Science and Technology, Department of Chemistry, Faculty of Science, Universiti Putra Malaysia.	<p>Conversion of biomasses to hydrogen becomes more and more important in terms of the utilization of renewable sources. One of the conventional methods for the production of synthesis gas from biomass is non-catalytic gasification with air. However, high reaction temperature is necessary for the decrease of tar content in the product gas. The use of dolomite as catalysts in the biomass gasification system is an effective approach to reduce the tar content. However, the catalyst may suffer from deactivation due to coke deposition which can be one of the serious problems. In this study, we introduced various types of dopants such as alkali metals, Fe, Co and Ni on Malaysian dolomite for gasification. The catalysts were prepared via impregnation method conducted under reflux system. Premixed finely ground of oil palm frond selected as biomass and modified dolomites was gasified using temperature programmed gasification technique (TPG). TPG was carried out under a flow of 5% oxygen (balance in He) from ambient to 900°C at a heating rate of 10°C/min and hold at this temperature for 1 h. The gases products were monitored by an online mass spectrometer. Significant promotion was observed on the production of syngas. The incorporations between metal dopants with dolomite played a vital role to enhance the activity and selectivity during the gasification.</p>
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65.	Commercialisation of R&D: A Critical Review Regarding Factors Affecting Success of Commercialising Research Findings in Local Universities	<p>Ir.Dr. Shakor Ramat Bin A. Badaruddin</p> <p>Managing Director, Elcorp Technology Sdn Bhd I-59, Jalan 8/35, Tmn Seri Bangi, Seksyen 8, Bandar Baru Bangi, 43650 Selangor</p>	<p>The R&D industry in Malaysia has grown exponentially and gained momentum over the past three decades thanks to adept economic planning and pro-active policies towards R&D by the government. However, to sustain this momentum requires tremendous efforts and attention since R&D is a niche activity, carried out by players who require support, as well as economic returns. As with other activities in industry, the critical element of their success and dynamic growth is the proper understanding of the economics which govern that particular activity. Thus in R&D, apart from finding keenly interested individuals, and largesse of funds, what is required is a system of management covering micro and macro economic factors that will facilitate research, reward researchers, meet market demand, and have reliability in its approach. This paper is written as an approach to synergize these factors and suggests means to make research successful, sustainable and most of all profitable to all parties involved in R&D.</p>
66.	The Use of Rubberised Fibre Mixtures to Reduce Noise Highways	<p>Ir Dr Shakor Ramat Bin A. Badaruddin</p> <p>Managing Director, Elcorp Technology Sdn Bhd I-59, Jalan 8/35, Tmn Seri Bangi, Seksyen 8, Bandar Baru Bangi, 43650 Selangor</p>	<p>Noise from road surfaces due to tyre-pavement interaction can be annoying, and prolonged exposure could be very stressful. This is particularly so for elevated highways that cut through residential areas, that were once very quiet and serene. One such highway, constructed in 2001 was the Kerinchi Link connecting traffic entering the Federal Highway L to Damansara in near Bangsar, as part of a traffic dispersal scheme and congestion reduction. The requirement by the authorities was a new road surface that would reduce noise by 2 dB per vehicle, when driving on the road surface, compared to normal road. Thus a new mix with crumb rubber and fiber was developed by the author and used on the road surface successfully, which reduced noise by 4 dB per vehicle more than fulfilling the set requirements. This new mix was approved and laid on the Kerinchi Link in 2002, and is still standing over 80% of the area a full 10 years since construction. This paper gives detail aspects of the mix design, construction, and performance with site photos showing excellent road riding conditions.</p>

67.	Assessing the evidence of climate change in South Australia (SA) from 1950 to 2010	<p>M. Kamruzzaman, S. Beecham and A.V. Metcalfe</p> <p>Centre for Water Management and Reuse, School of Natural and Built Environments, University of South Australia</p> <p>School of Mathematical Sciences, University of Adelaide, Australia</p>	<p>The aim of this study is to use a range of multivariate statistical methods to assess hydrological time series such as daily rainfall, temperature, wind speed, solar radiation, and evapotranspiration in South Australia over a 60-year period. This represents a 15 variable time series over 20,000 time points. The data are examined for trends or shifts in level using multivariate statistical quality control techniques. These include the regression, the CUSUM method, and the Holt-Winters model. The Holt-Winters forecasting procedure is used to identify the underlying level, trend and seasonal effects. Optimum smoothing parameters of 0.07 for rainfall, 0.06 for temperature and 0.1 for evaporation, wind speed and solar radiation were selected by iteration procedures.</p>
70.	A Simulation-Based Expert Advisory System for Mobility Management Scheme	<p>Resdiansyah Mansyur, Riza Atiq O.K Rahmat, and Amiruddin Ismail</p> <p>Department of Civil Engineering, School of Civil Engineering, Linton University College, Malaysia.</p>	<p>It is increasingly becoming accepted that unrestrained travel by private car within cities cannot be accommodated. This is due to a combination of financial constraints and concerns about the adverse impact of traffic on local communities and their environment. Allowing traffic to grow to levels at which there is extensive and regular congestion is economically inefficient. Although the construction of additional road capacity can alleviate some of the effects of congestion, the benefits may be counterbalanced unless growth in traffic volumes can be restrained. Therefore, another alternative is by implementing Mobility Management Scheme (MMS), which is to ensure that people still travel but at the same time reducing the private car usage. However, the implementation of MMS requires an expert. The problem is experts are not always available, nor do they always have the time to consult all possible references, review available data. This paper presents the development of a Simulation-Based Expert Advisory System for Mobility Management Scheme (ES-MMS) in order to fill up the gap on the availability of the MMS expert. The process of organizing the available knowledge of MMS strategies, as well as the process leading to the selection of one or more strategy advice, is encoded in the knowledge based expert system shell developed for the purpose by using shell expert system Kappa-PC version 2.4 which was adopted object-oriented programming and high resolution graphical user interface. The advice given from the working system was verified, validated and evaluated by comparing the output of the system against the recommendations made by transportation professionals. The evaluations indicate favorable results for the system. The expert advisory system on MMS can be used as a decision support system as well as a teaching tool for junior</p>

			transportation engineers, planners, private developers, and government officials.
71.	Extraction of Nipah Palm Fiber for Composites Materials	<p>D. Tracy and MS. Osman School of Mechanical Engineering, International College of Advanced Technology Sarawak, Malaysia</p> <p>Department of Mechanical & Manufacturing Engineering, Faculty of Engineering, Universiti Malaysia Sarawak, Malaysia.</p>	<p>Nipah Palm (<i>Nyipa Fruticans</i>) is a new plant studied for its fibre potential as reinforcement in natural fibre composites materials. Nipah palm is abundant along the river bank of Sarawak. This palm is trunkless, made up only of the roots, fronds, flower and fruits. The part of the palm that is of the interest in this research is the fronds. The fronds of this palm are collected from the river banks of Sungai Kuap. The objective of this paper is to investigate the best method to extract the fibre from nipah fronds. Two extraction methods were tested; they are the dry and wet method. The dry method is where the fronds are dried under hot sun and the wet method is where the fronds were soaked in water prior to extraction. The extraction process found that nipah palm has two types of potential fibre suitable for reinforcement, coarse and fine fibre. Both extraction methods are able to produce these two fibres. Both methods are discussed extensively in this paper.</p>
73.	A Novel Approach for the Prediction of Thermal Distribution in Automotive Brake Rotor	<p>A. Abdulmumin, M. A. Maleque and A. S. Ahmed Department of Manufacturing and Materials Engineering, Faculty of Engineering International Islamic University Malaysia 53100, Kuala Lumpur</p> <p>Department of Mechanical and Manufacturing Engineering, Faculty of Engineering University Malaysia Sarawak, Kuching, Malaysia</p>	<p>High temperature prediction on the brake rotor-pad interface of automotive brake rotor system was investigated using infrared (IR) thermograph camera and finite element method. Solid brake rotors made from aluminium matrix composite (AMC) and the conventional cast iron were employed in this investigation. The high speed IR camera was connected to a Proton Wira 1.3 brake system rig set up to predict the thermal distribution of the rotors. From the thermographic contour images, it was observed that the material properties of both rotors influenced the maximum temperature reach on the contact surface and the temperature distribution produced. The result obtained from the experimental test was compared with the simulation analysis using ANSYS/LSDYNA FE model, the obtained maximum operating temperature distribution showed a very close outcome. The aluminium composite rotor showed better thermal behaviour during the braking process as far as the maximum temperature and temperature distribution are concerned. In can be concluded from the study that material properties of the rotor brake influences the predictable operational thermal condition during braking.</p>

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Biodiesel Production from Macroalgae and Its Fuel Properties

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The petroleum fuel reserves are limited and depleting day by day as the consumption is increasing very rapidly. Moreover, the production and use of petroleum fuel is alarming the environmental pollution problems to the society. Biodiesel is one of the best environment friendly renewable fuel to fulfil the energy demand of the world. Biodiesel, fatty acid methyl esters (FAME) of long-chain fatty acids produced from renewable resources like plant oils or animal fats through transesterification. Macroalgae are one of the inexpensive sources of oil feedstock for biodiesel production. This research was conducted to study the oil extraction from six species (*L. Epiphytic*, *Cladophora*, *Agardhiella*, *Gracilaria*, *Spirogyra* and *Bryopsis Pennata*) of macroalgae, conversion of algae oil to biodiesel and characterization of biodiesel. *Agardhiella* had highest 0.89 % lipid content in fresh and 6.60% in dry basis. The measured Free Fatty Acid (FFA) in extracted oil was below 4%. The highest biodiesel yield was found 92 % at methanol to oil ratio 4:1, catalyst 1.0 wt% (KOH) in heating with stirring. The fuel properties and FTIR spectrum of algae oil biodiesel were similar to petroleum diesel.

78	Role of IBS Technology in Reducing Waste in Construction Industry	<p>Azman M.N.A., Ahamad M.S.S., Majid T.A., and Hanafi M.H.</p> <p>School of Civil Engineering, USM</p>	<p>Appropriate technology and global standardization has changed the past practices of the construction industry. The Construction Industry Development Board (CIDB) of Malaysia has been actively promoting the use of industrialised building system (IBS) in the local construction industry since 1998 as a way to overcome one of the major problems in Malaysia i.e. construction waste. This has affected the land resources, social environment and local skills to cater for the demand for various types of homes. Thus the implementation of major infrastructure projects and commercial buildings in Malaysia has contributed to a negative impact on the environment. IBS is the term to represent the prefabrication and construction industrialisation concept in Malaysia. IBS is a construction technique in which components are manufactured in a controlled environment (on or off site), transported, positioned and installed into a structure with minimal additional site works. The CIDB has introduced the concept and educate the contractors to function as “assemblers of components” instead of “builders”. The prefabrication technology (IBS technology) have several benefits viz. shortened construction time, lower overall construction cost, improved quality, enhanced durability, better architectural appearance, enhanced occupational health and safety, material conservation, less construction site waste, less environmental emissions, and reduction of energy and water consumption. Likewise, the conventional method for construction work cannot be environmental friendly because of the poor quality control at the construction site and the uncontrolled waste production. This has contributed to pollution problems to the environment in the form of air and water pollution, and construction waste. The IBS technology will be the best option in order to overcome the present problems.</p>
79	Anti Smog as an Innovation Centre in Architectural Technology in Sustainable Development	<p>Asmaa Abdel Gawad El Sebaey</p> <p>Department of interior design and furniture, Faculty of Applied Arts, Helwan University, Cairo, Egypt</p>	<p>There are a new ideas, aware of the emergency to reduce our fuel consumption and the necessity to modify our behavior facing the climatic changes. Looking for a positive energetic assessment, the contemporary city aims within fifteen years at producing cleanly and intensively more energy than it consumes. It develops energy by biomass, photovoltaic cells, green walls, green roofs and other renewable energies. The architecture has to be in the service of this new green issues and approaches environment.</p>

80	Incorporating Floodplain Inundation as Flood Mitigation Plan	<p>DYS Mah, RA Bustami, FJ Putuhena Department of Civil Engineering, Faculty of Engineering, Universiti Malaysia Sarawak</p>	<p>This paper is promoting the awareness that nature and engineering structure can co-exist together. Natural floodplain inundation is usually restrained to separate floodplain lands for human uses. In contrary to conventional flood control systems, a vision of restoring floodplain inundation in Kuching Bypass Floodway is presented as a flood mitigation plan. Modelling of the approach indicates a reduction of flooded areas up to 61%. By means of modelling, portions of floodplains are virtually preserved in their natural states and functions, a role that often has been undervalued. Floodplain permits storage and conveyance of floodwaters. At the same time, it provides replenishment of the adjoining wetlands. The strategy proves beneficial to both human and natural systems. It also calls for a systemic change in flood management that we can live with the natural forces instead of forbidding them.</p>
81	Compressive and Flexural Strength of Recycled Glass Aggregate Concrete	<p>Mohammad Amirulkhairi b Zubir, Aizat b Alias, Khairul Anuar b Shahid and Azlina bt Ismail Universiti Malaysia Pahang</p>	<p>Concrete mix designs are frequently developed to solve problems due to the concrete itself or other. In preservation of environment, new concrete mix component are being develop to help reducing negative human activities effect on the environment. This study includes investigation of concrete strength properties using Malaysian recycled glass as fine aggregate replacement. Based on the British Standard and former research design method, a series of compression cubes and beam flexural tests were carried on two type of concrete using recycled glass to replace sand with percentage of 30% glass powder and 15% glass powder mix with 15% crushed glass. The test result shows there is an increase of compressive strength for the concrete with recycled glass at later ages of 90 days compared normal concrete. However, the flexural test results show that, concrete with recycled glass had less ability to be fully functioning as a reinforced concrete by exhibiting only 91.25% flexural strength for the first sample and 83.5% for the second sample from theories flexural strength.</p>

82	Cement and Fiber Stabilization of Indian Fly Ashes	Shanbaga R Kaniraj, V Gayathri, VG Havanagi Universiti Malaysia Sarawak	<p>Experimental studies were carried out on fly ashes from two Indian thermal power plants, namely Rajghat and Dadri, with the aim of improving the utilization of fly ash in geotechnical engineering applications. It was attempted to improve the engineering performance of fly ash by several means such as by mixing fly ash with soils, cement, and polyester fibers. The research program included the study of: a) physical properties, chemical composition and morphology of the fly ashes; b) compaction, strength, and permeability characteristics of the fly ashes and fly ash-soil mixtures; c) compaction and strength characteristics of fly ash-soil mixtures stabilized with fibers alone, with cement alone, and with both cement and fibers. Results showed that addition of fly ash to soils would result in lighter and stronger fills. Fiber inclusions increased the strength of fly ash-soil specimens significantly and altered their behaviour from brittle to ductile. Even small cement contents increased the strength of the fly ash-soil mixtures significantly. With higher cement contents of up to 18% it was possible to prepare fly ash-cement design mixes that satisfied the strength criteria for pavement base courses.</p>
83	Parametric Distribution Selection in Wind Energy Potential Analysis	E. A. Azrulhisham, K. P. Zakaria, M. B. M. Juhari, A. Samizee and H. M. Fairus Electrical and Electronics Section, Malaysia France Institute, Universiti Kuala Lumpur, Selangor, Malaysia	<p>Wind energy is considered as one of the solution to the worldwide depletion of fossil fuel resources as well as the economic alternatives in protecting the atmosphere from the adverse consequences of global warming. Nevertheless wind power is often criticized because the output from wind farms is variable and on occasion will be small or even zero during periods of high demand. Potential analysis on introduction of wind machine at particular site therefore requires the knowledge of the distribution of the wind speed. Parametric distributions such as Weibull and Rayleigh have predominantly been used in fitting the measured wind speed data. However these conventional distributions are generally based on the mean-variance analysis that is not always fully captured by the first two moments of the distribution. The work presented in this paper considers the possibility of using various statistical moments in the wind speed distribution approximation. Applying the first to fourth statistical moments, the density function approximation was obtained using the Pearson system. Considering the frequency curve of various conventional distributions it is found that the generalized Beta distribution provides reputable density approximation. Application of various statistical moments has the advantage in estimating the potential of wind power system in view of dynamic changes of skewness and</p>

			kurtosis coefficients of the wind speed distribution.
84	Improvement of the Load Carrying Capacity of Southern Peninsular Malaysia Soft Clay Soil by Electro Osmotic Consolidation	Khairul Nizar MY and Ismail B UTHM	<p>Soft clay soil is one of the problematic soils for civil construction works. This is due to its natural states where the soft clay presents low in strength and stiffness, and high in moisture contents. At presence, there are numerous methods to strengthen these types of problematic soil. There are several modification types for improvement, such as physical, chemical, mechanical and structural. In this study, the approach is lies within physical or known as hydraulic modification which is the application of electrical treatment where certain of direct current with applied voltage are passed through the soil to increase the stiffness and to reduce the moisture contents. This study encompasses the determination of undrained shear strength and Atterberg's limits of soft clay soil taken less than 0.5 m at University Tun Hussein Onn Malaysia (UTHM) areas by applying copper and aluminium with applied voltage of 2.5 Volts, 4.0 Volts and 5.0 Volts. The results show that the undrained shear strength of soil is increase and water content is decrease at the positive terminal (anode). Natural moisture content, w_c value are in range of 59% to 68%, the average value of undrained shear strength, c_u for soil sample without treatment is 30 kPa. While the final value of water content after treatment is at the range of 29.46% to 50.70% for aluminium, and 25.78% to 47.07% for copper. Also, the final undrained shear strength are in range 34.40 kPa to 37.20 kPa for aluminium, and 35.60 kPa to 38.40 kPa for copper. The factors of decrease in water content and increase in undrained shear strength in the anode section can be indirect that the effect of evaporation of pore water by means temperature increase and pore water flow to cathode is due to electro osmosis under direct current electric field condition.</p>

87	Quantitative Tool in Measuring Course Outcomes: A Model Study in Engineering Education at UNIMAS	Shahidul MI, Wan Hashim Wan Ibrahim Universiti Malaysia Sarawak	Aim of this research is to estimate course outcomes of an engineering subject by the aid of statistical quantitative techniques. This work is a cross sectional study conducted with a course offered by Faculty of Engineering, Univesiti Malaysia Sarawak in Semester 2, school year 2010-2011. Results of the 67 students have been analyzed with SPSS software. Most commonly used statistical indicators such as : Process capability index (Cp), Performance of process capability (P), Upper control limit (UCL), and lower control limit(LCL), and other have been employed to evaluate the four predetermined course outcomes of the studied subject. The findings have shown that Cp~1 with performance 0.85 of CO1 with 100 percent within UCL and LCL; Cp>1 with performance 0.8 of CO2 with 98 percent within UCL and LCL limit; Cp >2 with performance 0.71 of CO3 with 86 percent within UCL and LCL limit; and Cp=2 with performance 0.75 of CO4 with 96 percent within UCL and LCL limit. The quantitative measurement method and techniques have used in estimating course outcomes could be a useful tool in engineering education management; and would greatly contribute to designing course plan including delivery and assessment system.
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89	Energy Audit for Sustainable Use of Energy in Centre for Environmental Studies, Anna University, India – A Case Study	<p>V Vandhana Devi, R Nagendran, MS Haji Sheik Mohammed</p> <p>Dept of Civil Engineering, BS Abdur Rahman University, Chennai</p>	<p>Climate change and global warming, ever increasing energy price, acute energy shortage and forever widening supply gap necessitates implementation of energy efficiency and conservation measures in the recent years. This paper investigates the importance of energy auditing to enhance the efficiency level in the Centre for Environmental Studies, Anna University, Chennai, India. A complete survey of power consumption pattern were carried out for common facilities such as lighting, fans, computers, air conditioners and laboratory equipments. Based on the present energy consumption pattern, suitable energy conservation measures were suggested for effective power consumption. Energy consumption for air conditioners, computers and lightning were identified as potential areas for conservation. It was concluded that by adopting suitable energy conservation measures, there is a possibility of 22.65 % reduction in energy consumption which results in reduction in Co₂ emission up to 27.66 tones. It was also found that the investment required for energy conservation measures was paid back in 9 months time with the savings in energy cost. Since energy saved is energy produced, conducting energy audit in the potential educational institutions and research organizations leads to major reduction in Co₂ emission and global warming.</p>
90	Performance of Recycled Aggregate Concrete Containing Various Pozzolanic Materials in Terms of Strength	<p>Suraya Hani Adnan, Noraini Mohd Azha, Nur Shuhadah Azman, Noor Asyikin Abd Rahman</p> <p>Faculty of Civil and Environmental Engineering, UTHM</p>	<p>Recycled Aggregate Concrete (RAC) has been recognized as concrete with lower strength compared to Natural Aggregate Concrete (NAC). Thus to improving the strength of RAC, various of pozzolans namely Micronised Biomass Silica (MBS), Palm Oil Fuel Ash (POFA), Silica Fume and Fly Ash has been used as pozzolanic material. In this study, various percentages of MBS, POFA, Silica Fume and Fly Ash have been used as cement replacement material for producing RAC. The results shows that compressive strength for 28 days of fully utilization of Recycled Aggregate in concrete with MBS, POFA, silica fume and fly ash are 35.40 MPa, 27.10 MPa, 31.00 MPa and 26.50 MPa, respectively.</p>

92	Progress in the Energy Efficient Home Cooling System Design	<p>TYE John, WAWZ Abidin, A Baharun, AK Othman, T Masri</p> <p>Universiti Malaysia Sarawak</p>	<p>Buildings nowadays mostly are cooled by passive systems through the utilization of several natural heat sinks such as the ambient air, the upper atmosphere, water, and the undersurface soil. Each of these cooling sources can be utilized in various ways, resulting in different systems. The various passive cooling systems are such as comfort ventilation, nocturnal ventilative cooling, radiant cooling, evaporative cooling and outdoor space cooling. Over the past few years, concern towards energy efficiency and cooling system in houses or buildings has increased. The average households have spent more especially in cooling costs and electricity bills. The commonly used cooling system such as air conditioning system is costly and consumes more power. Therefore, a low-cost cooling system has to be developed and the application of renewable energy has to be utilized to ensure that the energy is efficiently used and to deal with the increase of fuel and electricity tariff. In this paper, the main objective is to review the progress in the energy efficient home cooling system design which consists of different cooling techniques such like active and passive cooling.</p>
93	Adaptive Solar Energy System for Low-Cost Home Cooling System: Conceptual Design	<p>TYE John, WAWZ Abidin, A Baharun, AK Othman, T Masri</p> <p>Universiti Malaysia Sarawak</p>	<p>Over the past few years, concern towards energy efficiency and cooling system in houses or buildings has increased. The average households have spent more especially in cooling costs and electricity bills. The commonly used cooling system such as air conditioning system is costly and consumes more power. Apart from that, the renewable energy application like solar energy also has not yet been fully utilized. Due to the increase in fuel and electricity tariff, the time has come to utilize a better use of solar energy potential. In this research, the main objective is to produce a home cooling system which is low-cost and affordable. The cooling system conceptual design that consists of both active and passive cooling system will be presented. The system also utilizes Graphical User Interface (GUI) as means to monitor the house thermal comfort level. The designed cooling system will be powered by solar energy system as main energy source.</p>

94	Recent Progress and Development of Vehicle Monitoring System for Accident Prevention	<p>NP Chai, WAWZ Abidin, AK Othman, H Zen, K Hong Peng</p> <p>Universiti Malaysia Sarawak</p>	<p>The Malaysian Institute of Road Safety Research (MIROS) statistic showed that road accidents in Malaysia have been increasing since year 1998. Vehicle monitoring system is thus very important to reduce the number of road accidents. This paper reviews the recent progress and development of vehicle monitoring system for accident prevention. Nowadays, most of the vehicles monitoring systems are developed based on Global Positioning System (GPS) and Geographical Information System (GIS) to track the location of the vehicles. These systems are integrated with wireless communication technologies such as Global System for Mobile (GSM) and General Packet Radio Service (GPRS) as transmission medium. In this paper, the technologies used in recent vehicle monitoring system are reviewed and presented.</p>
95	Real-time Heavy Vehicle Monitoring Using Positioning Technologies: Conceptual Design	<p>NP Chai, WAWZ Abidin, AK Othman, H Zen, K Hong Peng</p> <p>Universiti Malaysia Sarawak</p>	<p>Heavy vehicles are prone towards road accidents due to its gigantic size and great weight. They have greater momentum and inertia which make them harder to control. The accidents that involve heavy vehicles are usually more serious than any other light vehicles. Therefore, heavy vehicle should be monitored to make sure that the vehicles are always in good conditions and the drivers always alert when driving. This paper presents conceptual design of real-time heavy vehicle monitoring system. The heavy vehicle monitoring system normally comprises vehicle terminal, communication link and monitoring centre. At the vehicle terminal, positioning technologies such as Global Positioning Satellite (GPS) are integrated with sensor system to track the location of vehicle and to monitor the conditions of vehicles as well as drivers. The communication between vehicle terminal and monitoring centre can be established through Global System for Mobile (GSM) and General Packet Radio Signal (GPRS). Geographical Information System (GIS) is integrated in Graphical User Interface (GUI) at the monitoring centre for monitoring purposes.</p>

97	Online Process Monitoring of Hard Turning using Statistical Parameters of Acoustic Emission Signal	J Bhaskaran, M Murugan Faculty of Mechanical Eng, BS Abdur Rahman University, Chennai	Hard turning, as a manufacturing process is slowly gaining industrial acceptance. Over the last four decades, the process has been stabilized and appropriate machine tools, cutting conditions, tool materials and tool geometry have evolved. High wear rates of the cutting tool, deterioration in the surface finish due to excessive tool wear and white layer formation are some of the major problems hindering wider industrial acceptance. Most of these issues can be satisfactorily addressed by having a reliable and robust monitoring system in place. AE monitoring using the statistical parameters of the root mean square of AE (AE_{RMS}) distribution have gained prominence in monitoring conventional metal cutting processes. This experimental study of hard turning, had demonstrated the possibility of using the distribution parameters like skew and kurtosis of the AE_{RMS} distribution for effective monitoring of hard turning.
98	Bricks Produced from Calcium Carbide Waste	Teo DCL, Tiong IS, Ling IH and Ng CK Universiti Malaysia Sarawak	This paper presents a study on the utilization of calcium carbide waste (CCW) as partial replacement for Ordinary Portland cement (OPC) in cement bricks. A control mix without CCW substitution was first prepared. Five mixes having CCW replacement of 10%, 20%, 30%, 40%, and 50% were then prepared, tested, and compared with the control mix. The samples were tested for fresh and hardened properties. The properties tested included the workability, water absorption, and compressive strength. Results showed that the presence of CCW caused the reduction in workability and compressive strength when compared with the control mix. The addition of CCW also caused an increase in water absorption of the mortar mixes. However, it was determined that the compressive strength of all CCW bricks managed to meet the minimum requirement of 7 N/mm^2 as stipulated by MS76: 1972 for Class 1 load bearing bricks. This study showed the potential use of recycled materials as an alternative in the construction industry.

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Locally Available Palm Oil Fuel Ash (POFA) as Cement Replacement in Concrete

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Due to the rapid depletion of natural resources, many researchers have studied the use of agriculture waste as constituents for building materials. These wastes contain high amounts of silica which could act as a pozzolanic material. The main objective of this research is to investigate the engineering properties of concrete by using locally available palm oil fuel ash (POFA) as replacement for ordinary Portland cement (OPC). Five different mix proportions were prepared. Sample A acts as control sample (without POFA replacement) while sample B, C, D and E have POFA replacement of 10%, 20%, 30% and 40% respectively. The samples were tested for fresh concrete property namely slump, while the hardened concrete properties tested were compressive strength, flexural strength, and tensile strength. Results showed that the increase in POFA replacement has caused a decrease in workability. It was found that the increase of POFA replacement decreases the strength development of concrete. Sample B (10% POFA) had the highest strength as compared to the other concretes containing POFA replacement. In addition, at 3, 7 and 28 days, the compressive strength, flexural strength and tensile strength for Sample B were higher compared to the control sample.

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Climate Change Impacts on Groundwater Resources: A Case Study

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Climate change impacts in recent years have resulted in significant changes in the availability of freshwater all over the world due to changes in precipitation and temperature. In this paper, the climate change impacts on the groundwater resources in Rafsanjan plain located at the central part of Iran are evaluated. The water supply in agriculture, industrial and domestic sectors in this region is highly dependent to groundwater and therefore it is important to project future changes in groundwater level and develop water resources planning and management schemes according it.

In order to assess the climate change impacts on the groundwater level, the outputs of general circulation models (GCM) are used. Due to low resolution of GCM outputs, the LARS model is utilized to downscale the GCM climatic outputs including temperature and rainfall. The downscaled data are used to determine future recharge and discharge of the aquifer and simulate variations in groundwater level. Aquifer model is developed using PMWIN groundwater simulation model and calibrated using historical data. The results of climate change impacts on groundwater assessment in the study region show a decreasing trend of water level of the aquifer. The management strategies should be examined in order to mitigate the climate change impacts on groundwater resources in this region.

101	Traffic Management Systems Used in Tunnel	<p>Ali Ghasemzadeh Khoshkroudi, Mahmoud Saffarzadeh Islamic Azad University, Tehran Dept of Civil Eng, Trabiati Modares University, Tehran</p>	<p>Transportation is very important and is part of all discussions on climate change, safety, sustainable cities, inter-city transportation. And so suddenly this concern about road safety is becoming something important which is going to be probably addressed in a much better way than it was before, because it was more marginalised before increasing traffic congestion in urban areas and growing land values in the world make underground structures increasingly attractive for highways and transit compared to other options. A tunnel can preserve the land above for parks, buildings, homes, and other uses while providing an efficient, cost-effective underground corridor to move people and goods. Unfortunately, only limited national guidelines, standards, or specifications are available for tunnel design, construction, safety inspection, traffic and incident management, maintenance, security and protection against natural or manmade disasters. Incident Management System include provisions to initiate predetermined traffic control plans to facilitate access of rescue and emergency service response teams into the tunnel. The goal of this paper is to identify devices and equipment currently being used with Incident Management Systems in tunnels to provide a safe environment for motorists.</p>
102	Surface Modification for Green Tribology – Anodizing of Aluminium for Cylinder Liner Application	<p>R Rajendran, T Venkatesan, Antony Muthu Balan School of Mechanical and Building Sciences, BS Abdur Rahman University, Chennai</p>	<p>The earth is facing various environmental problems such as global warming and environmental pollution which have been progressing constantly. The main objective of this paper is how to deal with these problems using tribology and how tribology can provide a solution. As societies aim to become sustainable, green tribology needs to be involved and contribute to the solution more than ever before. Surface coating provides the solution for green tribology. In this study anodizing an environmental friendly process is done on aluminium for cylinder liner application. Cylinder components contribute to around 30% of total friction in an engine. Generally cast iron is used for cylinder components which exhibit outstanding wear characteristics, high strength properties even at high temperatures, but the disadvantages are high weight and excess fuel consumption. Aluminium alloys replace them as they are light weight but the wear resistance against the piston and piston ring is poor. Anodizing minimizes the friction and wear of the aluminium components and makes it a suitable candidate for the cylinder liner application.</p>

103	Laser Sintered Materials Machinability Analysis with Finite Element Method	<p>Ahmad Shahir b Jamaludin, Abdullah b Yassin</p> <p>Dept of Mech Eng, Universiti Malaysia Sarawak</p>	<p>The term machinability of workpiece materials relates to the easiness of a metal to be machined to an adequate surface finish. This paper clarified the analysis of laser sintered material machinability with mean of predicted cutting force and temperature distribution. 2D orthogonal cutting was employed on edge design tools with updated Lagrangian coupled thermo mechanical plane strain model. Adaptive meshing, tool edge radius and various types of friction models were assigned to obtain precise cutting results. Cutting force and cutting-edge temperature estimated by FE analysis are validated against corresponding experimental values by previous researchers. From the study, cutting force increases when radial depth increases and lowest error acquired when the shear friction factor of 0.8 was applied. Machining simulation for laser sintered materials estimated lower cutting force compared to mild steel AISI1055 due to lower Young modulus. Higher cutting temperature estimated for machining simulation laser sintered material compared to machining simulation mild steel AISI1055 due to its low thermal conductivity.</p>
105	The Migration of Toluene and PCE in Porous Medium using Mini Geotechnical Centrifuge Technique	<p>Wan Zuhairi WY and Muchlis</p> <p>Geology Program, School of Environmental Science and Natural Resources, Faculty of Science and Technology, Universiti Kebangsaan Malaysia</p>	<p>This study was conducted using a mini geotechnical centrifuge that was successfully fabricated in Geology Programme, Universiti Kebangsaan Malaysia. This 0.5m radius beam type mini geotechnical centrifuge provides a complex model of natural system in a controlled laboratory environment. This paper discusses the application of this mini geotechnical centrifuge for modeling the NAPL (toluene and PCE) migration in porous geologic medium. The experiments were carried out at different g-forces; 25-g and 50-g force. The results showed that the contaminant (NAPL) movement in unsaturated soil was retarded upon reaching soils with smaller pore size and migrated laterally. In a case for LNAPL (toluene), the movement of LNAPL was observed to be lateral upon reaching capillary fringe and tended to float on the top of water table. DNAPL (PCE) was observed to migrate vertically through the water table down to the bottom of the model. The NAPL movement at 50g was dominated by vertical movement compare at 25g.</p>

106	Wear Improvement of Austenitic Stainless Steel by Gas Nitriding for Piston Ring Application	<p>T Antony Muthu Balan, R Rajendran, T Venkatesan</p> <p>School of Mechanical and Building Sciences, BS Abdur Rahman University, Chennai</p>	<p>Nitriding is a case hardening process that is commonly used for increasing the wear life of automotive piston rings. However, special alloy steels are required to achieve high surface hardness and nitrided case depth values required by the automotive industry. The cost of such alloy steels is one of the major components of the total cost of the nitrided piston ring. To address this issue, efforts have been directed towards development of cheaper raw materials as substitutes for nitridable steels. In this study, an attempt has been made to increase the surface hardness stainless steel by Nitriding SS 1 and Nitrided SS 2. Nitriding is a surface-hardening heat treatment that introduces nitrogen into the surface of steel at a temperature range (500 to 550°C), while it is in the ferrite condition. Thus, nitriding is similar to carburizing in that surface composition is altered, but different in that nitrogen is added into ferrite instead of austenite. Because nitriding does not involve heating into the austenite phase field and a subsequent quench to form martensite, nitriding can be accomplished with a minimum of distortion and with excellent dimensional control.</p>
108	Initial Design and Development of a Small Industrial Cooling Water Power Generator	<p>Tian Chuan Min, Mohd Narzam Jaffar, Iskandar Jobli, Abu Saleh Ahmed, Mohammad Omar Abdullah</p> <p>Universiti Malaysia Sarawak</p>	<p>Sejingtak Power Corporation Sdn Bhd is a base load power plant located near river mouth. It pumps water from the river mouth to cool its coal-fired power generators. The cooling water is then discharged back to the river mouth. However, at the discharge weirs, the cooling water is observed to have a drop, forming an artificial waterfall. The waterfall has the potential for waste energy recovery. This project attempts to recover the waste energy by design, develop and install a small cooling water power generator, which is in some ways similar yet very different from other existing micro hydro schemes. The surrounding variables and the marine environment are among the challenges that has made this project a unique case.</p>

109	Initial Evaluation of a Chip Fryer	YJ Jong, MO Abdullah Universiti Malaysia Sarawak	Fryer is an extremely popular kitchen appliance used in about 85% of food service establishments. There are many types of fryers such as pressure fryer, open deep-fat fryer, specialty fryer, heat and control batch fryer and so on. The objective of the project is to further design and build a new and more efficient fryer. The volume or size of the fryer is in moderate size so that it is neither too bulky nor too small. The heating element is designed so that the surface area of the heating element is covered with oil and as surface area increases, more heat is transferred to the oil. The fryer is designed using ANSYS to simulate heat transfer. Waste oil is reused as biodiesel or biofuel for the burner. After the experiment, the heat up time was 1 hour and 30 minutes. Modeling and heat simulation were done by using ANSYS, which was initial evaluation for this project. It showed that from the bottom of the fryer, the heat flowed from the center of the fryer and to the top after 1 hour and 16 minutes. Although ANSYS has been used for simulation, FLUENT is the first option for simulating external and internal heat flow
110	Preliminary Study of a Heat-Driven Adsorption Air-Conditioning System using Biomass-based Activated Carbon-Methanol with Computer Aided System	HR Ramji, IAW Tan, MO Abdullah Universiti Malaysia Sarawak	In human daily routines, air conditioning is a necessity for improving the indoor air quality. As for that reason, air conditioning is a fundamental system in every vehicle design. Through the application, it is vital that the system works in perfect harmony with the car. Air conditioning system is basically comprises of heater and refrigerant circuit. This arrangement is utterly simple and practical. Its self governing capability allows the generation of the desired indoor air conditions, which is entirely independent of the outside conditions. In spite of this, with the release of the new environmental regulation (Montreal protocol in 1987) development of this system is obliged. The concerning issues stated in the regulation is regarding the ozone layer depletion as a consequence of chlorofluorocarbons (CFCs) as well as hydro-chlorofluorocarbons (HCFCs) discharge. Recently, demands on more environmental friendly space cooling are at large. That brings us to the current interest of air conditioning technology, the adsorption cooling system. The advantages of adsorption cooling system discovered so far are its endurance, minimal sound produced and low cost maintenance. Its properties which utilize non polluting refrigerant and the capability to reduce harmful discharges are great in conserving the environment. The highlighted idea is that the vehicle would not be burden by this installation and it wouldn't overuse the vehicle's power. In other words, the main focus in

			<p>this study is to produce an air conditioning system for vehicle that can be operated with free energy via waste heat and adsorption cooling system.</p>
111	<p>Eco-Friendly Corrosion Protection System for Steel Rebars in Concrete</p>	<p>MS Haji Sheik Mohammad, GM Samuel Knight, R Srinivasa Raghavan BS Abdur Rahman University, Chennai</p>	<p>Early distress in structures and subsequent deterioration due to corrosion of steel in concrete is a globally accepted multi-billion dollar problem. This investigation analyses the performance of eco-friendly corrosion protection system involving application of simple cement polymer anticorrosive coating to rebar and incorporation of nitrite based inhibitor in concrete. The performance evaluation tests include macrocell corrosion test, potential-time behaviour studies and impressed voltage test. The type of specimens tested comprises of uncoated bar in control concrete, coated bar in control and inhibitor admixed concrete, and coated bar (1% damage) in control and inhibitor admixed concrete. The type of rebar considered for study is Cold twisted deformed (CTD) bars and Thermo mechanically treated(TMT) bars. It was concluded that Uncoated CTD and TMT bars offer minimal protection against corrosion when exposed to severe chloride environment. There is a remarkable reduction in macrocell current density, total integrated current and corrosion rate for cement polymer anticorrosive coated bars as compared to uncoated bars which indicate an improved corrosion resistance. Potential-time behaviour studies revealed a low corrosion risk for cement polymer anticorrosive coated bars irrespective of coating damage, type of rebar and inhibitor modification in concrete. Impressed voltage test results showed a significantly increased crack resistance time and reduced current density for cement polymer anticorrosive coated bars. It was found that surface coating damage of 1% did not contribute any significant impact on the corrosion resistance properties and addition of corrosion inhibitor in concrete appreciably improves the performance of cement polymer anticorrosive coated bars. Holistically, TMT rebars performed appreciably well as compared to CTD rebars irrespective of coating and inhibitor modification in concrete.</p>

112	Current Practice of OSH in Malaysia - Incentives	<p>Wei Kwang Quay, Sim Nee Ting</p> <p>Faculty of Engineering, Universiti Malaysia Sarawak</p>	<p>As part of the Occupational Safety and Health (OSH) research, this segment of the project paper seeks to investigate incentives as a means to ameliorate OSH levels in Malaysia. This paper aims to discuss and review issues related to current practice of OSH in Malaysia in terms of usage and provision of incentives. The current standard of OSH is investigated and the different methods to implement incentives are explored. Their benefits are weighed between the past and current incentives both from governmental and corporate level. Possible and future trend of incentive application is then suggested based on status quo in Malaysia.</p>
114	Level of Occupational Safety and Health Practices on Construction Site using SHASSIC Method	<p>Rohaida Affandi, Aziruddin Ressang, Azhaili Baharun, Ting Sim Nee</p> <p>Faculty of Engineering, Universiti Malaysia Sarawak</p>	<p>Construction industry is part of national economic catalysts, however the problems to the nation is inevitable. It concurrently contributes to high amount of industrial accident. Even though Occupational Safety and Health Act of 1994 has established the guidelines for occupational safety and health (OSH) but it seems ineffective due to contractor's reluctantly to provide important elements in mitigating the accident in construction site. In 2008, CIS 10:2008 Safety and Health Assessment System in Construction (SHASSIC) introduced by Construction Industry Development Board (CIDB) Malaysia as a method for contractors to assess their safety and health performance on site. The study aims to assess the current level of OSH practices on construction sites. The data obtained through document checking, workplace inspection, and interview which are based on SHASSIC standard guideline. The results identified weaknesses area of OSH management implementation on the six sites selected within Universiti Teknologi Malaysia Skudai compound and those sites are ranked according to the SHASSIC standard. Three items of weaknesses identified in documentation, seven items in workplace and category of employees contribute to the lowest level of compliance to the safety and health requirement were identified.</p>

117	Dynamic Response of Group of 3 Pile in Series and Parallel Arrangement	<p>KB Ladhane, VA Sawant, NK Samadhiya</p> <p>Department of Civil Engineering, Indian Institute of Technology, Roorkee, India</p>	<p>In the present study, dynamic analysis of laterally loaded pile groups is carried out by keeping in the mind the three dimensional nature of the soil-pile system. Piles and soil are modelled using three-dimensional finite element techniques treating them as linear elastic. The interface of soil and pile under the lateral load has been accounted for by incorporating interface elements. The special type of transmitting boundary using Kelvin element is used to transfer the propagating waves from near field to the far field. The 3-piles in series and parallel configuration have been considered for the pile group analysis. Individual piles in a group are assumed to be rigidly connected together at the pile head. Parametric studies have been performed to examine the effects of pile spacing and soil modulus on the response of pile group. It is observed that piles in parallel arrangement offer stiffer behaviour than those in series arrangement.</p>
118	Dynamic Response of Single Pile Using Finite Difference Method	<p>Vishnu S Kumar, KB Ladhane, VA Sawant, NK Samadhiya</p> <p>Department of Civil Engineering, Indian Institute of Technology, Roorkee, India</p>	<p>In the present study, dynamic analysis of laterally loaded pile is carried out by solving governing differential equation of pile for dynamic loading. The soil is modelled using spring-dashpot system. Pile is considered as vertical beam supported by horizontal springs. The displacements at each time step are evaluated by applying Wilson-Theta method. Parametric studies have been performed to examine the effects of soil modulus and damping on the response of pile. It is observed that with increase in soil modulus and damping, the amplitudes are decreasing.</p>

119	Optimization of Bacterial Cellulose Production from Pineapple Waste: Effect of Temperature, pH and Concentration	Junaidi Zakaria, Muhammad Azlan Nazeri Faculty of Chemical & Natural Resources Eng Universiti Malaysia Pahang	<p>Bacterial cellulose is a type of biopolymer produced by <i>Acetobacter xylinum</i> in high purity, high water holding capacity, good mechanical strength, elasticity and high crystallinity. In this research, pineapple waste is used as the carbon sources for the synthesis of bacterial cellulose. The objective of this study is to investigate the effect of temperature, pH and concentration of pineapple waste in the production of bacterial cellulose by <i>Acetobacter xylinum</i>. Parameters investigated are varied from 40% to 100% for the concentration, while the temperature is between 28°C to 32°C and pH of 4.5 to 8.5. Besides, this study also aims to optimize the production of bacterial cellulose from pineapple waste by using response surface methodology (RSM) based on the central composite design (CCD). The known value of the parameters is estimated earlier based on one factor at that time (OFAT). The results obtained from the OFAT showed the optimum condition is at pH 5.50, temperature 30°C and concentration of pineapple waste is 80 %, where the amount of bacterial cellulose dry weight is 3.3948g. According to the RSM result, the optimal conditions for bacterial cellulose were pH 5.15, temperature 30.51°C and concentration of pineapple waste is 83.32%. By using these optimal conditions, 3.4368g of bacterial cellulose is produced. The existence of bacterial cellulose is proven by Fourier Transform Infrared (FT-IR) Spectroscopy analysis based on the appearance of absorbance peak which are C-C bonding, C-O bonding, C-OH bonding and C-O-C bonding. In short, the data presented in this paper showed that pineapple waste has a great potential to use as the carbon source in production of bacterial cellulose.</p>
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121	Treatment of Palm Oil Mill Effluent using Membrane Bioreactor (MBR)	<p>Nurul Ayu Sha'ary, Ab Aziz Abdul Latiff, Zulkifli Ahmad, Zawawi Daud</p> <p>Faculty of Civil & Environmental Eng, UTHM</p>	<p>Palm oil mill effluent (POME) is the largest pollutant discharged into the rivers of Malaysia. POME is a brownish liquid waste and has high turbidity, colour, chemical oxygen demand, oil and grease resulting from high organic matter content and suspended solids. The performance of a membrane bioreactor (MBR) for treating palm oil mill effluent (POME) has been studied. The objective of this study was to observe and evaluate the performance of MBR for POME treatment related to variable of concentration biomass growth mixed liquor suspended solid (MLSS). Organic loading rate of 5.5 kg COD/m³.d was fed into an aerobic MBR. The MBR was operated with constant flux 15 LMH. The reactor was operated at a concentration mixed liquor suspended solid (MLSS) and multi liquor volatile suspended solid (MLVSS) are ranging 4375 mg/l to 9125 mg/l and 2725 mg/l to 6150 mg/l respectively. The average MLVSS/MLSS ratio during this experiment was 0.66. The performance of aerobic MBR system showed that the COD, SS, AN, TP and TN removal efficiency were achieved 90%, 95%, 92%, 83% and 66% respectively when the concentration of MLSS are ranging 5000 mg/l to 7000 mg/l. In conclusion, with the aerobic MBR was found to be able to degrade POME significantly and high quality effluent could be reused for various other applications.</p>
122	Gross Pollutants Analysis in Urban Residential Area for a Tropical Climate Country	<p>Hidayah B, Lariyah MS, Anita A, Roseli ZA, Salmia B, Shuhairy N, Nasir MN, Herdayati K</p> <p>Universiti Tenaga Nasional</p>	<p>Gross pollutants are the primary targeted pollutants in urban catchment management for urban water quality improvement as well as mitigation of flood. Apart from aesthetically unattractive because of its visibility, gross pollutants also contributes to degradation of river water quality and loss of aquatic habitat as it carries harmful pollutants such as oxygen demanding material, hydrocarbons and heavy metals. This study analyzed trend of gross pollutant generated from two urban residential areas located in Selangor, Malaysia. The median value of gross pollutant load obtained from the Amanah Apartment and Bandar Botanic are 347.41 kg/ha/year and 32.46 kg/ha/year respectively. Relationship between gross pollutant wet load with rainfall depths was derived using regression equation. A significant trend of increasing gross pollutant wet load into drainage system with increasing rainfall depth was observed. The behavior of pollutant load is related to the one observed in Australia.</p>

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Green Roof as an Option of Green Technology for Urban Stormwater Management Controls

Kah Hoong K, Lariyah MS, Mohamed Roseli ZA, Hidayah B, Salmia B, Shuhairy N, Herdayati K

Universiti Tenaga Nasional

Green Building index (GBI) has become a hot issue in Malaysia especially in the field of construction and infrastructure works. Government has promoted this index intensively by launching city developments projects which emphasis on environmental friendly buildings and infrastructures. Green Building Index is Malaysian first comprehensive rating system for evaluating the environment design and performance of Malaysian buildings. Green roof system is one of the assessment criteria of this rating system which is under the category of sustainable site planning and management. Green roof also serves as one of the components of application of MSMA and Water Sensitive Urban Design (WSUD) in Humid Tropic Center (HTC). This paper portrays evaluations of the preliminary performance of extensive green roof at Humid Tropic Center (HTC) on reducing peak discharge and thermal performance of vegetated rooftop in reducing temperature of the building which enables the building consumes less energy. On-site experiments would be carried out to determine the ability of water retention of green roof in HTC by measuring the runoff produced by the green roof. The temperature of the building was measured by a thermometer which was attached to the inner wall of the building. Indoor temperature was recorded every 15 minutes daily. Mean maximum temperature recorded before and after installation of green roof was compared. The results indicate that green roof at HTC can reduce peak discharge up to 44% and it is able to induce cooler indoor environment.

124	Development of Probable Maximum Flood (PMF) for Sultan Abu Bakar Dam	Lariyah MS, Faizah CR, Mohd Noh A, Rahsidi SM, Azwin Zailti AR, Mohd Nor MD, Hidayah B, Intan Shafilah AA Universiti Tenaga Nasional	<p>The Probable Maximum Flood (PMF) is defined as the flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions. PMF also has physical meanings which provide an upper limit of the interval within the engineer must operate and design. The PMF is generated using the input values of Probable Maximum Precipitation (PMP) in this study area. Hydrologic Engineering Center-Hydrological Modelling System (HEC-HMS) software has been chosen to simulate the rainfall-runoff routing process through a dam spillway, the inflow discharge, and also the maximum storage of Cameron Highlands Dam due to extreme rainfall event. This software is a single based event and is suitable for Cameron Highlands catchment case study. The study area is Sultan Abu Bakar dam which is located in the upper catchment of Cameron. The results for PMF found out to correspond to PMP values, and yielded a peak discharge of 4259.7m³/s, 1661.0m³/s and 1264.4m³/s for 1 day PMP, 3 days PMP and 5 days PMP respectively. The values from PMF hydrograph will be used in MIKE 11 as an inflow hydrograph in the model to predict the dam breach outflow hydrograph at Sultan Abu Bakar Dam. Discharge generated from frequency storm method will be invaluable for future flood hazard and risk assessment studies.</p>
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125	Prediction of Daily Precipitation of Kuching on Global Climate Change Projections using Statistical Downscaling Approach	<p>Kueh Sze Miang, Kuok King Kuok, Anatoli Vakhguelt</p> <p>Swinburne University of Technology Sarawak Campus</p>	<p>Global Circulation Models (GCMs) has been continuously used by researchers around the world as a tool to forecast future climate scenarios. However, applying GCMs directly did not produce coherent results because the resolution of GCMs are too coarse. One widely accepted method is to downscale GCM outputs into finer scale through the use of statistical correlations between the observed local data with lage scale GCM data. This paper will attempt to downscale GCM outputs from Hadley Centre by using Statistical Downscaling Model (SDSM). Future climate changes were simulated using Hadley Centre predictors based on A2a and B2a scenarios imposed by the Intergovernmental Panel on Climate Change (IPCC). The result of the simulations showed that future precipitation will decrease as a result of higher carbon emission. The simulations showed that the future mean precipitation will increase for the 2020s and 2050s. However, the Northeast monsoon season will experience decreased precipitation; whereas the Southwest monsoon season shows higher precipitation. Furthermore, the simulation of future scenarios revealed that during the 2080s, precipitaion is susceptible to high volatility and rapid changes of precipitation volume.</p>
126	Used Engine Oil as a Green Concrete Admixtures	<p>Salmia , Shafiq N, Nuruddin MF, Kamal NM, Lariyah MS, Hidayah B</p> <p>Universiti Tenaga Nasional</p>	<p>Excellent flowability is one of the important characteristics of concrete for easier handling and placing and it facilitates the removal of undesirable air voids. This can be achieved by introducing water reducing admixture or superplasticizer (SP). It was reported that used engine oil (UEO) resulted in a greater resistance to freezing and thawing and improved some concrete properties therefore this can lead to counter problems of higher SP cost and UEO disposal. The principal aim of this research was to identify the effects of UEO as water reducing admixture on various types of concrete namely, OPC, MIRHA and SF and compared with SP. Thirty one mixes were analyzed for this purpose. Investigation of fresh properties i.e. slump and air content of concrete was made in order to determine early indication of concrete quality. The incorporation of both UEO and SP were found to improve the slump values for all types of concrete. Furthermore, UEO increase the air content while SP reduced the air content of all types of concrete.</p>

129	Pelletisation of Empty Fruit Bunch with Sago as Binding Agent for Power Generation	<p>MF Atan, N Abdul Rahman, CM Low, R Baini, NF Che Mat and SF Salleh</p> <p>Universiti Malaysia Sarawak</p>	<p>The main aim of this study is to pelletise oil palm empty fruit bunch (EFB) with binding agent at low compression pressure for power generation purposes. As such, this study attempts pelletisation of pulverised EFB and a mixture of pulverised EFB and Mesocarp Fibre with soiled sago starch in order to improve pellet physical characteristics. The pellets are tested for bulk density, moisture content, amount of fines and calorific value. This study has proven that pelletisation of pulverised EFB and pulverised EFB + mesocarp fibre with sago starch reduce the breakage and fibrous loose as well as the amount of fines for EFB pellets at low compression pressure. Pellets bulk density is also increased. Due to sago starch higher moisture content, the produced pellets moisture content is found to be slightly higher than the pellets without the addition of sago starch. Consequently, the calorific value of the produced pellets is lower and the ash content is also found to be slightly higher. Therefore, sago starch addition improves the physical characteristics of the EFB pellets but optimisation of the sago starch addition proportion need to be performed accordingly as excessive addition of sago starch degrade combustion characteristics of the pellet.</p>
130	Potential of Agricultural Wastes as Fuel for Power Generation in Sarawak	<p>N Abdul Rahman, P Igam, MF Atan, R Baini, NF Che Mat and SF Salleh</p> <p>Universiti Malaysia Sarawak</p>	<p>Agricultural wastes could contribute to serious environment pollution if proper disposal methods are not implemented. Subsequently, it has been suggested that agricultural wastes should be sustainably disposed and preferably, this disposal method generate addition income to the agricultural industry such as fuel for power generation. This solution is in lined to the urgent needs of finding the alternative for depleting fossil fuels such as petroleum and natural gas. For Sarawak, the availability of hydropower potential in the state is enormous that the exploitation of other energy resources such as biomass from agricultural industries is practically unknown. Therefore, the main aim of this study is to investigate the biomass potential in Sarawak especially from agricultural industry. The study estimates that Sarawak power generation potential from four selected plantation crops in 2010 is 5.09 GW in which this is more than 3 times the current installed capacity in Sarawak. The study also identifies that Mukah, Miri and Bintulu division are the best locations for development of biomass power generation as the power potential for these divisions in 2010 are 2,130.97MW, 869.65 MW and 551.21MW respectively. As, if all available biomass is used as substitution fuel for coal power plant, Sarawak could save about 40.1 Mtonnes of CO₂ emission in 2010.</p>

131	Sustainable Utilization of Biomass Wastes for Power Generation from Sago Processing Industry	<p>N Abdul Rahman, MA Awang, MF Atan, R Baini, NF Che Mat and SF Salleh</p> <p>Universiti Malaysia Sarawak</p>	<p>As the largest exporter of sago starch in the world, Sarawak has the biggest well organized sago plantations especially in Mukah Division. Currently, all sago trunks are processed mainly for the production of starch in which sago bark, hampas and wastewater are produced as by-products wastes during the processing phase. Due to the immensity of the wastes produced, these biomass wastes impose significant problems to this industry especially in term of sustainable disposal. As such, the main of this study is to investigate the feasibility of utilising these wastes as fuel for power generation. Subsequently, a case study is conducted in the form of interview and questionnaire in order to obtain the required information especially on the current disposal method of the biomass wastes produced. The study found that biomass wastes from sago processing industry are feasible to be utilised as fuel for power generation. The calorific value of both sago bark and hampas at 16,146 and 13,172 kJ/kg respectively are comparable to other biomass wastes commonly used as fuel for power generation. It is estimated that each sago mill could produce 440 to 712 TJ of energy from biomass waste it generates per year in which corresponding to 20 to 33 MW of power potential.</p>
132	Improving the Combustion Efficiency of a Coal Fired Boiler: Determination of Coal Flow Imbalance in Pulverized Coal Pipes using Acoustic Measurement	<p>NH Shuaib, NAW Mohd Noor, H Hashim, H Hassan, MH Boosroh</p> <p>Generation Division, TNB Research Sdn Bhd Selangor</p>	<p>The current work is part of a project to improve the efficiency of a tangential fired boiler at a power plant in East Malaysia. The paper presents an analysis and evaluation of the coal flow distribution in Pulverized Coal pipes (PC pipes) for the tangential fired coal boiler. Methods of analysis include two phase flow equation to determine pressure drop in PC pipes and acoustic measurements to obtain sound data representing the coal flow. Results of data analyzed show that the pressure drop in each pipe is not similar, which indicates that the coal flow distributions for all pipes are not uniform. The recorded sounds at locations before the burner for all mills are generally lower than after pulverizer location. Based on the results, it is expected that improvement on the coal flow imbalance and thus boiler efficiency can be achieved by maintaining the practice of air purging during mill shutdown and startup and retuning the pulverizers to obtain uniform coal distribution in the affected pipes.</p>

133	Feasibility Study of Coal-Petcoke-Biomass Blend Gasification Test in Building Fluidized Bed Gasifier	<p>N Muda, MH Boosroh, WAWA Aziz</p> <p>TNB Research Sdn Bhd, Selangor</p>	<p>Various gasification technologies have been developed in the world to enhance clean energy utilization and reduce greenhouse gases. One of the advantages of gasification technology is that energy sources other than coal can be used as feedstock. Experiments involving the co-gasification of sub-bituminous coal, petcoke and biomass blends were performed in a 30 kWth laboratory scale bubbling fluidized gasifier unit working at atmospheric pressure (ABFG). 3 blends of coal-petcoke-biomass, which were at ratio of 80:10:10, 80:15:5 and 80:5:15 were used in this study. 100% Adaro coal was gasified as references. Proximate and ultimate analysis show that the substitution of petcoke and biomass in the fuel blends varied the moisture content, volatile matter, fixed carbon and ash content of the fuel blends according to the percentage of petcoke and biomass in the sample. Experimental tests were carried out using air as gasifying agent at of 700 - 750°C gasification temperature and the equivalence ratio (ER) value was maintained at 0.31. The gas composition and carbon conversion efficiency were determined at the end of each experiment. Producer gas composition (hydrogen content) and low heating value were determined and compared. The lower heating values is 1.72 MJ/Nm³ for 100% coal whereas for coal: petcoke: biomass blends, the heating values observed are 1.33 MJ/Nm³ for 80:10:10, 0.62MJ/Nm³ for 80:15:5 and 0.34 MJ/Nm³ for 80:5:15. It has also been observed that, the producer gas composition (H₂ content) and the low heating value reduce when petcoke and coal introduced in the fuel blend. However at fuel blend of 80:10:10, the hydrogen content and low heating values do not differ that much from the control sample. From this study, it shows that there is great potential of exploiting blended fuel of coal, petcoke and biomass in the gasification system.</p>
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134	Awareness and Level of Usage for Park and Ride Facilities in Putrajaya, Malaysia	<p>Shuhairy Norhisham, Lariyah Mohd Sidek, Salmia Beddu, Fathoni Usman, Hidayah Basri, Herda Yati Katman</p> <p>Universiti Tenaga Nasional</p>	<p>The definition of Park and Ride (P&R) was as combines travel by car and public transport. This system facility consists of car parks connected with public transportation. Public user or visitors usually travel into city or destination and leave their vehicles in a provided car park. P&R system had been implemented in others country in the world such as United State, United Kingdom, Scotland, Korea and Singapore. In Malaysia, the P&R system was first introduce in collaboration with start of facilities for KL Sentral in 16 April 2001. In KL Sentral, P&R system provides integrated facilities for buses and trains such as PUTRA LRT, KTM Komuter, KL Monorail ERL and cities buses. Putrajaya had start implement bus-based P&R from 1 September 2006. And for rail-based, P&R system was connected with a high speed rail link called KLIA Transit in 2002, which links Putrajaya to both Kuala Lumpur and KL International Airport in Sepang. The objectives of this case study were to determine the users' awareness of Park and Rides in Putrajaya, to assess the level of usage of the Park & Ride facilities at Putrajaya and to identify the quality of service for Park and Ride facilities at Putrajaya. As a summary of the outcomes, only 58% of Putrajaya citizen know about P&R and only 17% use the facilities every day. Meanwhile 11% of the citizen never use the facilities. The average quality of services for P&R facilities in Precinct 1 Putrajaya is LOS D. But in others hand, the users think the quality is in LOS B.</p>
135	Effect of Compaction Energy on Engineering Characteristics of Compacted Soil	<p>DS Awg Ismail, SNL Taib, CW Keong</p> <p>Universiti Malaysia Sarawak</p>	<p>Compaction is known as one of conventional method of soil stabilization. The compaction would improve the soil properties including increase the shear strength of the soil. Nevertheless, this method is not fully efficient in order to improve or stabilize unsuitable soil of construction due to time consuming and difficult to acquire optimum moisture content (OMC). In this study, maximum dry density (MDD) and optimum moisture content (OMC) were investigated with regards to the effect of compaction energy. Soil samples are limited to fine-grained soils which the samples were taken from Kota Samarahan area. Two compaction methods (Standard Proctor and Modified Proctor) had been used in this study whereby the engineering characteristics of different samples obtained from these two methods which had been compared accordingly to the energy produced. Besides, comparison also had been made by performing a series number of blows for both methods in order to investigate the role of blows in compaction. The comparisons showed that high energy of compaction is capable</p>

			of producing better engineering characteristics of soil.
136	Application of Fuzzy-FMEA Methodology on Risk Assessment for Rajang River Infrastructure	Chua Kim Eng, Ron Aldrino Chan @ Ron Buning Universiti Malaysia Sarawak	This study focuses on applying Fuzzy Failure Mode and Effect Analysis (FMEA) methodology to conduct risk assessment through preliminary development of the three scale tables comprising severity, occurrence and detect. It permits risk analysts to assess the risks associated with the failure modes directly using linguistic terms. The developed river infrastructure risk assessment scale tables are capable of assessing the risks at component level, subsystem level, and system level. Seven major components of the river infrastructures have been analyzed using the developed scale tables. The outcomes of the risk assessment are represented in two formats, Risk Priority Number (RPN) and risk ranking, which provide very useful risk information to river infrastructure designers, operators, engineers, and maintainers. The results indicate that by using these scale tables and method, risks associated with the river infrastructure components can be assessed effectively and efficiently.
137	Post-Construction Evaluation of Road Safety Audit: Case Study of BDC Kenyalang Interchange	Imelda Jelani, Ron Aldrino Chan @ Ron Buning Universiti Malaysia Sarawak	Road Safety Audit is relatively new in Sarawak. Unlike in West Malaysia, where RSA has been introduced in the 90's, there is only a handful of road projects in Sarawak include RSA as part of its design requirements. In this study, the BDC Kenyalang Interchange will be used as case study and scrutinized in term of its safety to road users by conducting qualitative study on safety performance examination similar to RSA Stage 5 procedures and the collection of information through series of interviews with experts from government agencies and private sectors. RSA was conducted to identify the problems such as wear and tear due to environment maturity. The feedbacks obtain from the interviews are used to assess the level of RSA awareness and its practices in implementation of public road project. This study is essential and may provide a handy reference to the road authorities and planner. Being proactive in nature, the outcome of this study can be used in value engineering evaluation if required by interested party.

138	Durability of Nanosilica-based Cement Mortar	<p>N Mohamed Sutan, I Yakub, MW Ong Universiti Malaysia Sarawak</p>	<p>This study compared the effectiveness of incorporating nanomaterial namely Nanosilica (Nano-SiO₂) on reducing the water absorption of Ordinary Portland Cement (OPC) mortar with water to cement ratio of 0.5. All dried cured mixes were tested on day 7, 14, 21 and 28 after demoulding. The two main tests performed on all mixes were water absorption test and compressive strength test. Results clearly showed that water absorption were inversely proportional to the percentage of Nano-SiO₂. Mixes with 2%, 5% and 7% addition of Nano-SiO₂ absorbed less water than the control mortar mixes. Based on the results of this study, the addition of Nano-SiO₂ decreases the water absorption of mortar hence implies the improvement of the durability of mortar.</p>
139	Development of Temporal Rainfall Pattern for Southern Region of Sarawak	<p>Rosmina A Buatami, Nor Azalina Rosli, Jethro Henry Adam, Kuan Pei Li Universiti Malaysia Sarawak</p>	<p>In the process of a design rainfall, information on rainfall duration, average rainfall intensity and temporal rainfall pattern is important. This study focuses on developing a temporal rainfall pattern for the Southern region of Sarawak since temporal pattern for Sarawak is yet to be available in the Malaysian Urban Storm Water Management Manual (MSMA), which publishes temporal pattern for design storms only for Peninsular Malaysia. The recommended technique by the Australian Rainfall and Runoff (AR&R) known as the 'Average Variability Method' and method in Hydrological Procedure No.1-1982 are used to derive design rainfall temporal pattern for the study. Rainfall data of 5 minutes interval from year 1998 to year 2006 for 7 selected rainfall stations in the selected region is obtained from Department of Irrigation and Drainage (DID). The temporal rainfall patterns developed are for 10 minutes, 15 minutes, 30 minutes, 60 minutes, 120 minutes, 180 minutes and 360 minutes duration. The results show that Southern region of Sarawak has an exclusive rainfall pattern, which is different from the pattern developed for Peninsular Malaysia.</p>

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HDDs with Better Heat Dissipation Systems Designed for Search Engines Servers

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The usage of search engines such as *Google*, *Yahoo* and *Bing* for information seeking is inevitable and important for our daily lives. *Google* claims that users conduct over a billion searches a day, not including numerous downloads and queries. These search engines have hard disk drives (HDDs) as their core part for data storage. HDDs operating on average of 7,200 rotation per minute (rpm) are the norm. However, high-end HDDs meant for fast responses and feedbacks require higher rotational speed and higher track density. These type of HDDs simultaneously need smart countermeasures for excessive heat rise; HDDs' flow-induced vibration (FIV) such as arm vibrations and disk flutters, without increasing its power consumptions. Gigantic search engines or even cloud computing servers used in nowadays smart computing actually involve numerous HDDs to store these data and information for our convenience. By decreasing the heat generated by these vital core parts of the servers; the HDDs, the authors aim at a lesser energy consumption HDD. Out of the total energy consumed by these servers, only 40 to 45 percent are being used for operation. The remaining energy is consumed for cooling the server and database systems. In this paper, the authors propose a new actuator arm with a better window that will improve the heat dissipation of the HDDs system. The HDD's actuator arm is designed using *AutoDesk* and exported to *Comsol Multiphysics* for numerical simulation. Each arm has a large windowed area for a better dissipation of heat generated due to air frictions. Another improvement that the authors proposed is by designing a novel S-shaped arm to promote better air flow. This will eventually lead to less heat generating HDDs meant for search engines servers of the internet.

141	Performance Optimization for Networks-on-Chip Architectures using Multi-Level Network Partitioning	A Lit, MN Marsono, NL Yew Universiti Malaysia Sarawak	Among the most challenging problems in Network-on-Chip (NoC) is to customize the topological structure such as application mapping to provide the best performance at the optimal cost. This paper presents a performance optimization for NoC architecture by utilizing the Multi-Level Network Partitioning method. The NoC-based system's performance is enhanced by employing this technique by partitioning the large networks into smaller levels of partitions. The proposed technique assigns heavy inter-communication cores into the same partition which result the minimal average inter-core distance. For verification, the proposed technique has been experimented on multimedia System-on-Chip (SoC) namely Video Object Plan Decoder (VOPD) as a case study. This technique results in the timing enhancement of <i>16%</i> of average queue size, <i>8%</i> from packet loss and <i>18%</i> of latency.
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