

IConGDM

5th International Conference On
Green Design And Manufacture

IConGEET

1st International Conference On
Green Environmental Engineering
And Technology

19'



Mainly Organized by :



UNIVERSITI
MALAYSIA
PERLIS

CEGeoGTech



Universiti Malaysia Perlis

Green Design & Manufacture Research Group, UniMAP
Centre of Excellence Geopolymer and Green Technology
School of Manufacturing Engineering, UniMAP
School of Environmental Engineering, UniMAP
School of Materials Engineering, UniMAP

Co - Organized by :



UniKL
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KUALA LUMPUR



University of Makassar

Universiti Kuala Lumpur, Malaysia

Technical University of Iasi (TUIASI), Romania.

National Institute for Research and Development in Environmental Protection

**ABSTRACT BOOK &
CONFERENCE
PROGRAM GUIDE**

Aston Tropicana Hotel, Bandung Indonesia
29 - 30 April 2019

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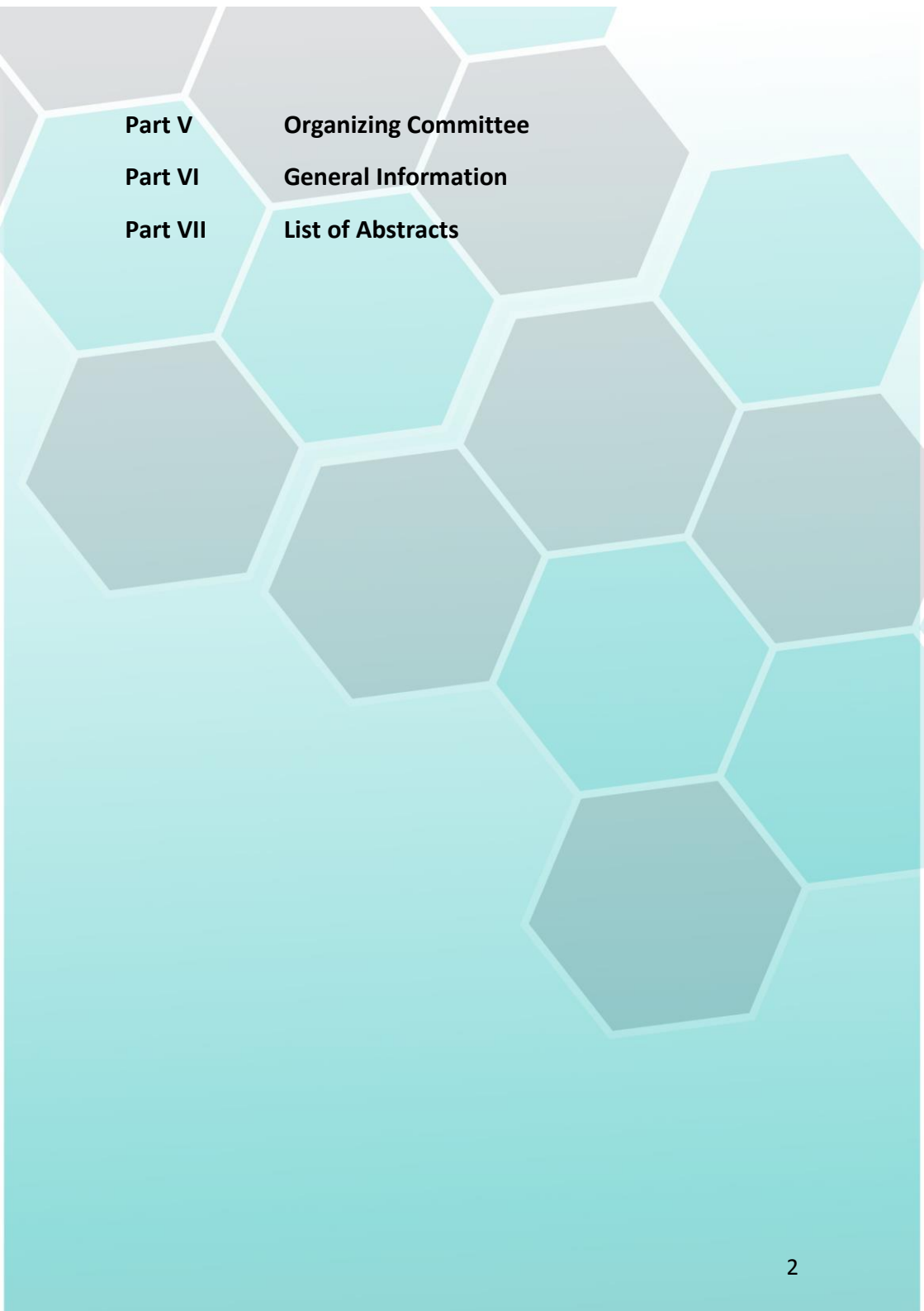
Keynote Speaker 1: **Professor Dr. Adam Rylski**
Lodz University of Technology,
Faculty of Mechanical
Engineering, Lodz, **POLAND**

Keynote Speaker 2: **Professor Dr. Safian Sharif**
School of Mechanical
Engineering,
Universiti Teknologi Malaysia,
Johor, **MALAYSIA**

Keynote Speaker 3: **Professor Ahmad Shukri Yahya**
School of Civil Engineering
Universiti Sains Malaysia (USM)
Penang, **MALAYSIA**

Keynote Speaker 4: **Eng. DEAK Gyorgy Ph. D. Habil.**
Politechnica University of
Bucharest, **ROMANIA**

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Part I

WELCOMING REMARKS

DIRECTOR OF CEGeoGTech



Bismillahirrahmanirrahim

Assalamualaikum Warahamatullahi Wabarakatuh

I would like to extend a warm welcome to all guests, speakers and participants to the 5th International Conference of Green Design and Manufacturing and 1st International Conference on Green Environmental Engineering and Technology which jointly organized by **Center of Excellence Geopolymer and Green Technology (CEGeoGTech)**, Universiti Malaysia Perlis (UniMAP) with World Invention Intellectual Property Associations (WIIPA), Gheorge Asachi Technical University of Iasi Romania, Universiti Kuala Lumpur – British Malaysian Institute and Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Indonesia.

IConGDM and IGonGEET aims to bring together technologist, researchers and professionals from the academic, industrial and public sectors in the context of multi and inter-disciplinary forum and discussions. This symposium will provide an excellent opportunity of knowledge sharing and research ideas exchange in the field of engineering, science, and technology especially regarding updated technology for a better quality of life to meet future challenges.

It is hoped that this conference will be the benchmark for us to build a strong networking between researchers, academic staff and industry.

Finally, congratulations to the working committee and everybody who have supported our efforts in realizing this symposium. For participants from all over the world, I wish you a memorable stay in Bandung.

Datuk Professor Emeritus Dr. Kamarudin Hussin
Director
Center of Excellence Geopolymer and Green Technology
(CEGeoGTech)

Part II

Conference Schedule

April 29th, 2019

Time	Activity	Venue
0800	Registration	Main Hall, Aston Tropicana Hotel Bandung, Indonesia
0900	Arrival of Guest	
0900	Opening Remarks by Emcee	
0915 – 1115	KEYNOTE SPEECH	
	Speaker 1: Dr. Adam Rylski - Faculty of Mechanical Engineering Lodz University of Technology, POLAND	
	Speaker 2: Professor Dr. Safian Sharif – School of Mechanical Engineering, Universiti Teknologi Malaysia (UTM), MALAYSIA	
	Speaker 3: Professor Ahmad Shukri Yahya - Professor at School of Civil Engineering, Universiti Sains Malaysia (USM), MALAYSIA	
1115 - 1145	Speaker 4: Eng. DEÁK György, Ph.D. Habil. - General Manager National Institute for Research and Development in Environmental Protection Bucharest (INCDPM) ROMANIA	
	Tea Break	

5th International Conference on Green Design and Manufacture 2019 (IconGDM 2019)

Time	Activity	Venue
1145 - 1315	INVITED SPEAKER Speaker 1: Associate Prof. Dr Saiful Bahri Mohamed - Universiti Sultan Zainal Abidin (UniSZA) Speaker 2: Dr Ming Fai Chow - Universiti Tenaga Nasional (UNITEN) Speaker 3: Dr. Zuhanis Mansor - Universiti Kuala Lumpur – British Malaysian Institute Speaker 4: Assoc. Prof. Dr. Acep Purqon - Institute of Technology Bandung (ITB) Speaker 5: Ts. Dr. Izanoordina Ahmad - Universiti Kuala Lumpur – British Malaysian Institute Speaker 6: Dr. Siti Marwangi Maharum - Universiti Kuala Lumpur – British Malaysian Institute	Room 1, Aston Tropicana Hotel Bandung, Indonesia
1315 - 1400	Break & Lunch	
1400 – 1600	Oral Session 1	
1600 - 1630	Tea Break	
1630 - 1800	Oral Session 2	
1800	End	

1st International Conference on Green Environmental Engineering and Technology (IconGEET 2019)

Time	Activity	Venue
1145 - 1315	INVITED SPEAKER Speaker 1: Drs. Subaer, M.Phil, Ph.D - Universitas Negeri Makassar (UNM) Speaker 2: Professor Dr. Fauziah Ahmad - Universiti Sains Malaysia (USM) Speaker 3: Ts. Dr. Norazian Mohamed Noor - Universiti Malaysia Perlis (UniMAP) Speaker 4: Dr. Ridho Bayuaji - Institut Teknologi Sepuluh Nopember (ITS) Speaker 5: Aissa Bouaissi - University of Plymouth (UoP) Speaker 6: Assoc. Prof. Dr. Mohd Remy Rozainy Mohd Arif Zainol - Universiti Sains Malaysia (USM)	Room 2, Aston Tropicana Hotel Bandung, Indonesia
1315 - 1400	Break & Lunch	
1400 - 1600	INVITED SPEAKER Speaker 7: Dr. Mohd Hafiz Zawawi - Universiti Tenaga Nasional (UNITEN) Speaker 8: Andrie Harmaji, S.T., M.T. - Institut Teknologi dan Sains Bandung SPECIAL ORAL SESSION 1. Impact Of Temporary Loss Of Connectivity In The Epurasu Branch And Its Effects On The Composition And Distribution Of Ihtiofauna - <i>Adrian-Ştefan Zamfir, György Deák, Tiberius Marcel Dănălache, Puiu Lucian Georgescu, Marius Constantin Raischi, Alexandru Cristea, Lucian Oprea and Lucian Gheorghe Lumînăroiu</i>	

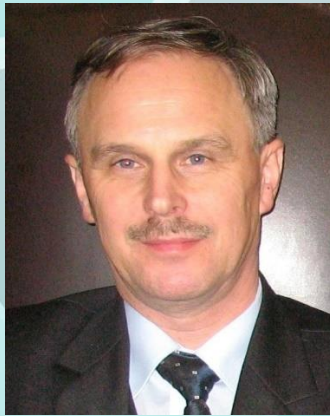
	2. Studies Regarding The State Of <i>Alosa Immaculata</i> (Bennet, 1983) Migrating Population Into The Lower Danube River – <u>Tiberius Danalache</u>, Deák György, Elena Holban, Marius Raischi, Ștefan Zamfir, Madalina Boboc, Monica Matei, Cosmin Pârlog, Diana Fronesco, Alexandru Cristea and Carmen Georgeta Nicolae 3. Assessment Of Water Quality In Chilia – Bastroe Area As Part Of A Model, Designed For Wetland Protection - Deák György, Florina Diana Dumitru, Florica Marinescu, Mădălina Boboc, Silviu Stanciu, Lucian Laslo, Monica Matei, Ana-Maria Panait, Mihaela Andreea Moncea, <u>Elena Holban</u> 4. Extreme Events In Romania Associated With Large-Scale Atmospheric Circulation - <u>Monica Matei</u>, György Deák, Nicu Ciobotaru, Lucian Laslo, Mădălina Boboc, Theodor Lupei 5. Analysis Of Satellite Vegetation Indicators, Meteorological And Water Use Data For Sustainable Management Of Irrigations In Romania - Lucian Laslo, <u>Monica Matei</u>, Nicu Ciobotaru, György Deák, Mădălina Boboc	Room 2, Aston Tropicana Hotel Bandung, Indonesia
1600 - 1630	Tea Break	
1630 - 1800	Oral Session 2	
1800	End	

Part III

KEYNOTE SPEAKER 1

Dr. Adam Rylski

Lodz University of Technology, Poland



Hypoeutectic AlSiMg silumins of high plasticity

Hypoeutectic silumins AlSiMg are characteristic of high mechanical and casting properties. Mechanical properties can be still improved by modification of their structure and by heat treatment. AlSi7Mg0,6 silumin alloy during its semi-continuous casting was modified with strontium and AlTi5B1 master alloy. In result of quick cooling during its modification and crystallization several advantages have been achieved: refining of solid solution, transformation of faceted eutectic into nonfaceted one as well as a decrease of

the interphase spacing in the eutectic. An analysis of mechanical properties of the primary structure of the cast alloy was conducted on the basis of quality coefficient of the alloy and its propable yield strenght. As a result a 20% of the elongation A5 of the AlSi7Mg0,6 alloy was achivied without any decrease of the high strenght of the alloy.

KEYNOTE SPEAKER 2

Professor Dr. Safian Sharif

Universiti Teknologi Malaysia (UTM), Malaysia



High Speed End Milling of Cobalt Chromium Molybdenum Alloy using Solid Carbide Cutting Tool

Cobalt chrome molybdenum (CoCrMo) alloys had attracted great attention in the application of biomedical devices due to its excellence properties and biocompatibility. With respect to machining, CoCrMo alloys are categorized as biomedical materials which are considered difficult to cut materials due to its combination of high strength, high toughness, high wear resistance, and poor thermal conductivity. In this study, high speed end milling was performed experimentally to access the machinability of CoCrMo alloys at different cutting speeds of 125, 140 and 155 m/min using uncoated and PVD TiSi coated carbide solid cutting tools. Other cutting conditions include

radial depth of cut (a_e) of 1.5 mm, an axial depth of cut (a_p) of 4 mm and feed per tooth of 0.02 mm/tooth. Machinability investigation of the CoCrMo alloys were conducted under dry and minimum quantity lubrication (MQL). Tool wear, tool life and tool wear mechanism were evaluated as the machinability responses. Results showed that end milling at higher cutting speed significantly reduces the tool life due to rapid tool wear of both uncoated and coated tools. In general TiSi coated carbide tool performed better than uncoated carbide tool in term of tool life and tool wear. It was also observed that at most cutting conditions, adhesive, abrasion and brittle failure such as chipping and cracks are the major wear mechanisms operating when high speed end milling of this type of biomedical material.

KEYNOTE SPEAKER 3

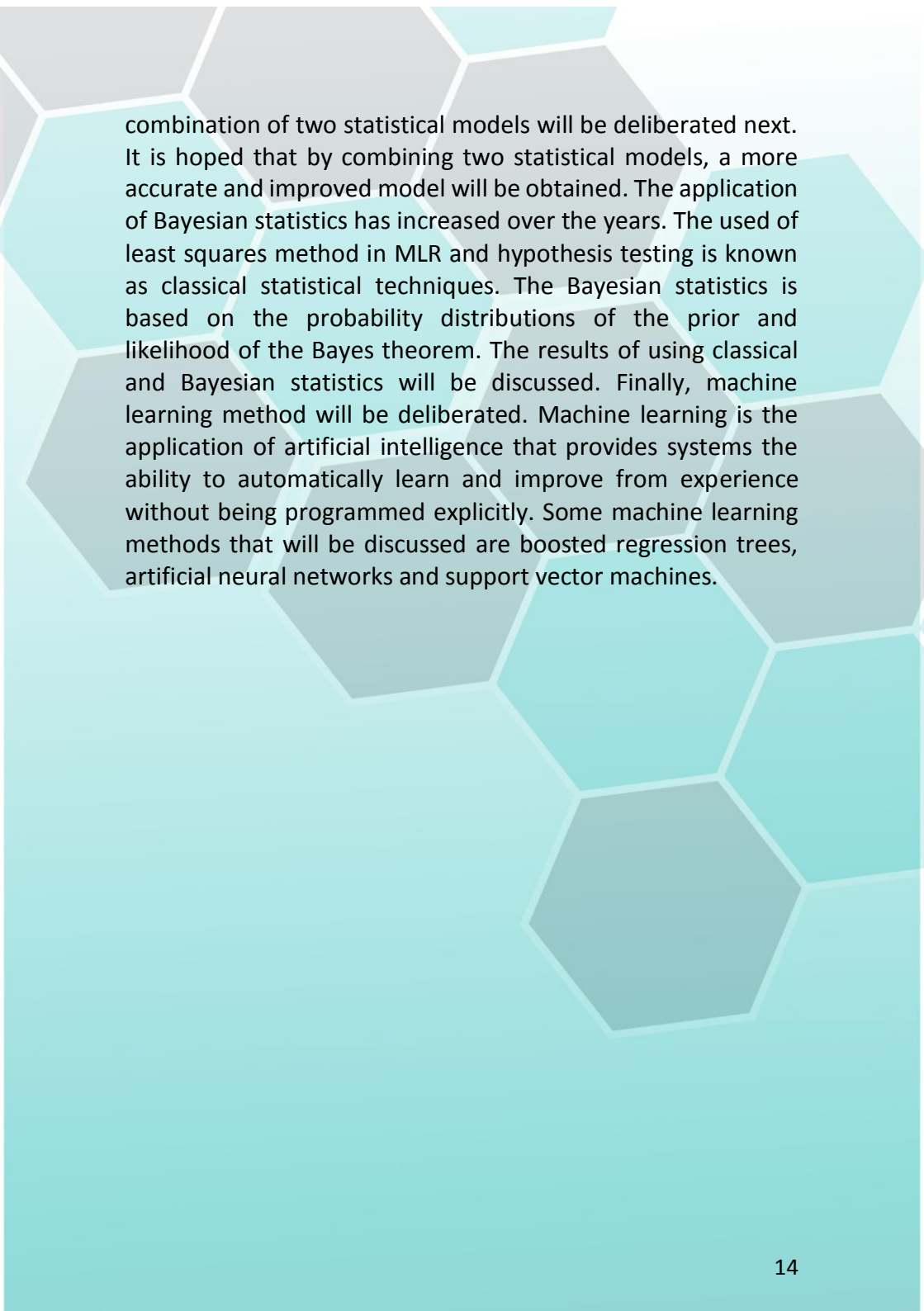
Professor Ahmad Shukri Yahya

School of Civil Engineering, Universiti Sains Malaysia (USM),
MALAYSIA



Application of Statistical Methods on Environmental Engineering

The aim of statistical modeling is to predict with good accuracy the variable of interest and sometimes to determine the contribution of the independent variables towards the dependent variable. Over the years, researches have always tried to produce better models in order to increase the accuracy of their predictions. This paper will discuss some statistical techniques that were used frequently in environmental research as well as recent techniques and advances in statistical techniques. The first technique that will be discussed is obtaining statistical distributions that best fit the variable of interest. This will enable the researcher to predict the return period of an event. Next the multiple linear regression (MLR) models will be discussed. Some other regression models will also be given. Hybrid models that are the



combination of two statistical models will be deliberated next. It is hoped that by combining two statistical models, a more accurate and improved model will be obtained. The application of Bayesian statistics has increased over the years. The use of least squares method in MLR and hypothesis testing is known as classical statistical techniques. The Bayesian statistics is based on the probability distributions of the prior and likelihood of the Bayes theorem. The results of using classical and Bayesian statistics will be discussed. Finally, machine learning method will be deliberated. Machine learning is the application of artificial intelligence that provides systems the ability to automatically learn and improve from experience without being programmed explicitly. Some machine learning methods that will be discussed are boosted regression trees, artificial neural networks and support vector machines.

KEYNOTE SPEAKER 4

Eng. DEAK Gyorgy Ph. D. Habil.

National Institute for Research and Development in
Environmental Protection (INCDPM), ROMANIA



Addressing Environmental Issues in Romania Using the Most Appropriate Methods and Techniques

As part of the European Union since 2007, Romania has significantly improved its environmental performance by addressing implementation on the ground challenges and enhancing the coordination of its administrative mechanisms. Still, the lack of planning, coordination and appropriate funding accessions remains a problem, which can be tackled by involving relevant institutions in environmental protection field in solving issues. For this, the National Institute for Research and Development in Environmental Protection (INCDPM), has approached over the years various research topics whose results have had a significant impact either at national or international level. One of the most important results are referring to developing methods, techniques and monitoring



actions regarding the sturgeon migration on Lower part of the Danube River, which is Europe's second longest river. On this topic, INCDPM has obtained an unique database at international level, on over 8 years of sturgeon monitoring. Considering that sturgeons are critically endangered fish species, being included on the International Union for Conservation of Nature (IUCN) Red list, and are sensitive to environmental pressures and therefore valuable indicators for healthy ecosystems, monitoring actions are necessary in order to implement socio-economic measures in support of their protection and conservation. Another aspects analyzed in detail by INCDPM are referring to developing methodologies for mapping and assessment of the wetland ecosystems in Romania, together with identification of their contribution to the economic sectors, aspects which are in accordance with the requirements of the European Union related to maintenance and restauration of species and habitats. Also, our institute has conducted studies regarding the monitoring of pedological drought phenomenon by using in-situ measurements, observational data, climate model data and satellite products.

Part IV

INVITED SPEAKER



Associate Prof. Dr Saiful Bahri Mohamed

Universiti Sultan Zainal Abidin (UniSZA) , Malaysia

Integrated Interface System for STEP File and PC Based CNC Controller.

STEP file is a CAD file which stands for Standard for the Exchange of Product model data is the next generation of data model between CAD/CAM and CNC system. It contains three-dimensional data in ISO 10303-21 format that can be recognized by most of CNC programs. However, not all data available in the STEP file are suitable for CNC G-Code programming. This paper describes the design, development and testing of an Integrated Interface System which aims to provide support for machining operation in term of tool path generation according ISO 6983 data format. The system provides function of reading and extracting the relevant information associated with the machining data from STEP file, which eventually write the Geometric Code (G-Code) file format as an output file. The sample of machined block is design from 3D CAD modeler that consisted of features need to be machined from a blank work piece and saved in the STEP file format. The validation process uses the simulation in the Mach3 software and physical machining using 3-axis CNC milling machine installed with PC based CNC controller.



Dr Ming Fai Chow

Universiti Teknologi Nasional (UNITEN), Malaysia

Analysis of The Particle Size Distribution Of Sediment Runoff Transported From Water Hyacinth Fiber Mat

The uses of natural fibre mat for soil erosion control is increasingly popular due to the present-day need of alternate sustainable materials. This study is aimed to analyze the particle size distribution of sediment runoff transported from water hyacinth fiber mat under artificial rainfall. The natural fiber mat used in the study was made from the stem of water hyacinth with opening size of 30mm x 30mm. The potential of water hyacinth fibre mat (WHFM) was evaluated in laboratory experiment for 30° slope under two types of rainfall intensities. The results showed that the mass of soil loss had reduced by averagely 83% when covered by WHFM compared to bare soil for both types of rainfall intensities. It can be seen that the sediments collected at 5, 10, 15 and 20 minutes during the simulated rainfall period were mainly soil particle that passed through the 0.30 mm sieve compared to sediments collected at 25 and 30 minutes that passing through 0.063mm sieve. WHFM was successfully proved that can be implemented as soil erosion control for hilly slope condition.

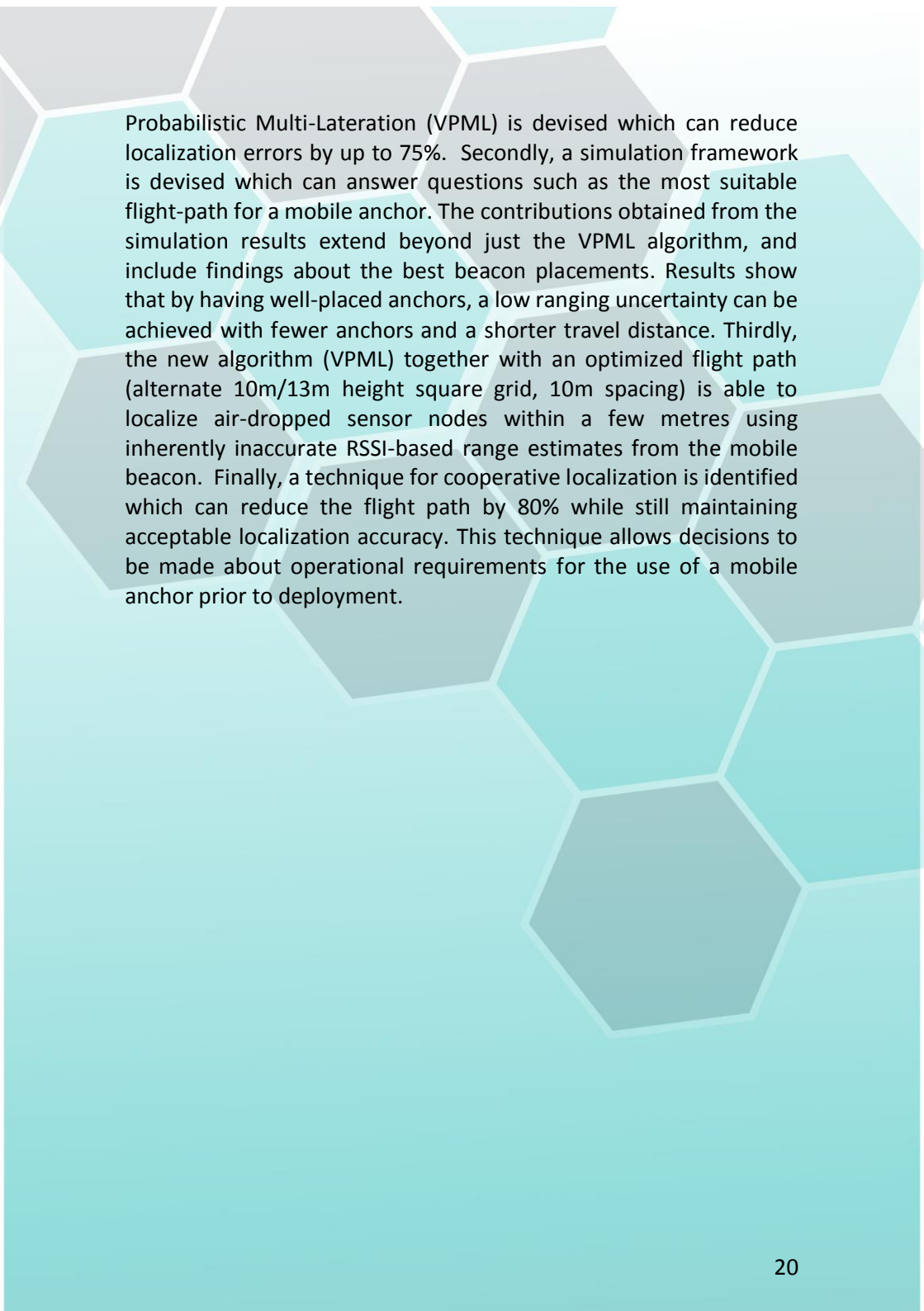


Dr. Zuhanis Mansor

Universiti Kuala Lumpur – British Malaysian Institute, Malaysia

MIMO Exploitation of 3D Multipath Statistics in a Heterogeneous LTE-Advanced Network.

Wireless sensor networks (WSNs) are an important class of pervasive computing environments. WSNs have been described as a new instrument for gathering data about the natural world, extending the reach of our human senses. Its applications are dominated by constrained resources such as energy, computing power, storage and communications bandwidth. An important aspect of WSN operation is the geolocation of all the sensor nodes. Automatically determining sensor position after deployment will improve the reporting of the origin of events in indoor and outdoor applications, in areas such as environmental monitoring, target tracking and disaster relief operations. This research explores the use of a mobile anchor moving through a sensor field to localize the nodes in an outdoor setting. The scope of possible experiments with mobile anchor nodes for localization is almost endless. A motivating scenario of air-dropped sensors, and an airborne mobile anchor node will be used to define a focussed set of experiments that have a real application outcome while still providing useful information for other scenarios. However, little attention has been paid in the research on how many beacon packets need to be sent by the mobile anchor node, what type of localization algorithm gives the best performance, what path the mobile anchor node should take, what are the geometric parameters of the path, and whether adding range-estimates between blind nodes is beneficial. Thus, a new algorithm called Volume-based



Probabilistic Multi-Lateration (VPML) is devised which can reduce localization errors by up to 75%. Secondly, a simulation framework is devised which can answer questions such as the most suitable flight-path for a mobile anchor. The contributions obtained from the simulation results extend beyond just the VPML algorithm, and include findings about the best beacon placements. Results show that by having well-placed anchors, a low ranging uncertainty can be achieved with fewer anchors and a shorter travel distance. Thirdly, the new algorithm (VPML) together with an optimized flight path (alternate 10m/13m height square grid, 10m spacing) is able to localize air-dropped sensor nodes within a few metres using inherently inaccurate RSSI-based range estimates from the mobile beacon. Finally, a technique for cooperative localization is identified which can reduce the flight path by 80% while still maintaining acceptable localization accuracy. This technique allows decisions to be made about operational requirements for the use of a mobile anchor prior to deployment.



Assoc. Prof. Dr. Acep Purqon

Institute of Technology Bandung (ITB), Indonesia

The Effects of Codoping Rare-Earth Molecules in GaN on Electric and Magnetic Properties using DFT for Applied Nanosensor and Energy Saving

Electronic structure of Rare Earth (Er:Tm) codoped GaN have been investigated. The calculation of wurtzite GaN codoped with RE is based on DFT theory using GGA approximation. The stability of GaN structure can be seen from the difference parameter about 1% compared to other calculations and experimental results. The structure of pure wurtzite GaN has direct energy gap (E_g) about 2.6 eV with slightly difference from experimental result. Substitution two Ga atoms with two RE (Er:Tm) atoms change its bond length of 11% longer. Is result in, impurities energy (E_i), which is relative to conduction (C_b) and valence band (V_b). The width of will E_i affect E_g because of electron number in the 4f sub shell. Codoping with two RE (Er: Tm) atoms produce cyan colors with a range of wavelength between Er and Tm, 588.7 nm. Therefore, RE atoms codoped GaN potentially produce wide range of LED colors.



Ts. Dr. Izanoordina Ahmad

Universiti Kuala Lumpur – British Malaysian Institute, Malaysia

Localization of Wireless Sensor Networks using Mobile Anchor Nodes.

Wireless sensor networks (WSNs) are an important class of pervasive computing environments. WSNs have been described as a new instrument for gathering data about the natural world, extending the reach of our human senses. Its applications are dominated by constrained resources such as energy, computing power, storage and communications bandwidth. An important aspect of WSN operation is the geolocation of all the sensor nodes. Automatically determining sensor position after deployment will improve the reporting of the origin of events in indoor and outdoor applications, in areas such as environmental monitoring, target tracking and disaster relief operations. This research explores the use of a mobile anchor moving through a sensor field to localize the nodes in an outdoor setting. The scope of possible experiments with mobile anchor nodes for localization is almost endless. A motivating scenario of air-dropped sensors, and an airborne mobile anchor node will be used to define a focussed set of experiments that have a real application outcome while still providing useful information for other scenarios. However, little attention has been paid in the research on how many beacon packets need to be sent by the mobile anchor node, what type of localization algorithm gives the best performance, what path the mobile anchor node should take, what are the geometric parameters of the path, and whether adding range-estimates between blind nodes is beneficial. Thus, a new algorithm called



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Dr. Siti Marwangi Maharum

Universiti Kuala Lumpur – British Malaysian Institute, Malaysia

Dynamic Spectrum Assignment for 4G Downlink Heterogeneous Networks

Through LTE-Advanced, network service providers could accomplish high users' data rates transmissions and large network capacity support via Heterogeneous Networks (HetNets) deployment. However, concurrent operations of macrocell and femtocell within the HetNets may create inter-cell interference. The principal objective of this research is to mitigate inter-cell interference in single and multiple HetNets topologies in order to enhance system bandwidth efficiency and maximize system throughput, while at the same time, ensuring low users outage percentage. Specifically, Demand Based Spectrum Orthogonalization (DeBaSO) is developed to mitigate the inter-cell interference in single HetNets. This centralized scheme requires information exchange between central controller and base station to perform dynamic spectrum partitioning and spectrum reuse among the overlapping macrocell and femtocell in accordance with the respective networks spectrum requirements. Then, an enhancement of DeBaSO called enhanced DeBaSO (e-DeBaSO) is developed by integrating Fractional Frequency Reuse (FFR) to mitigate the inter-cell interference in multiple HetNets. The proposed feature of dynamic spectrum partitioning configuration in e-DeBaSO provides a scheme which is capable of redistributing the system bandwidth among multiple HetNets based

upon the network variations of different HetNets. Performance of DeBaSO in single HetNets shows that DeBaSO has enhanced the system bandwidth efficiency by an increment factor of 3.25, 1.70 and 1.27 with respect to Fixed Spectrum Allocation (FSA), Dynamic Frequency Reuse (DyFR), and Dynamic Frequency Resource Management (DFRM) schemes. DeBaSO also reduced the user's outage and enhanced the system throughput with respect to DFRM. Performance of e-DeBaSO in multiple HetNets showed that its total interference indices and users outage lower than Fair Throughput Based (FTB) scheme. Consequently, e-DeBaSO has enhanced the system bandwidth efficiency by an increment factor of 8.70 and attained almost fivefold increment in system throughput with respect to FTB at the cost of high complexity that is due to the massive backhaul signalling between central controller and base station. Overall, the proposed DeBaSO and e-DeBaSO schemes are proven to achieve high downlink bandwidth efficiency and system throughput with low user's outage percentage by mitigating the inter-cell interference. Besides contributing towards realizing self-organized network, the proposed schemes can be also applied in future Fifth Generation (5G) technology for dynamic spectrum distribution among coexisting wireless integrated solutions.



Drs. Subaer, M.Phil, Ph.D

Universitas Negeri Makassar (UNM), Indonesia

**The Progress of UNM Geopolymer Research 2006 –
2019 From Simple Bricks to Concrete Prototype, From Self-
Cleaning/Anti-Bacterial to Supercapacitor Based-
Geopolymers**

Research on geopolymer and related materials at Physics Department, Universitas Negeri Makassar (UNM) was initiated in 2006 and has been successfully accomplished and reported. The research was executed based on a well-planned geopolymer road map for a period of 15 years and its achievement is encouraging. The first period of the research was conducted by using available aluminosilicate minerals such as metakaolin, red clay (laterite), fly ash, and rice husk ash (RHA) in the production of geopolymer bricks, refractory and concrete prototypes. The second period was focused on studying the nature of heavy metal solidification/ encapsulation as well as their leaching kinetics from the network of fly ash-based geopolymer. The improvement of flexural strength of geopolymer was investigated by the inclusion of natural fibers such as coconut trunk fiber, pineapple leaves fiber or synthetic fiber such as carbon fibers. The heat and fire resistance of geopolymer were also intensively studied in this period. The properties of geopolymers as functional materials were started in the third period. The use of geopolymer as encapsulator of Fiber Bragg Grating (FBG) temperature sensor was successfully produced and characterized. The inclusion of nanoparticles (NPs) based on metal oxides such as



ZnO, TiO₂, Ag, and CuO into geopolymer network was investigated for self-cleaning and anti-bacterial materials. Hybrid-composite geopolymer was studied by cross-linking between organic polymers such as hydroxyapatite (HAp), or chitosan with geopolymer for bioceramics applications. At the end of this period, the research was attempted to investigate the nanocomposite of geopolymer-rGO for possible application as a supercapacitor. The basic physico-chemistry of geopolymer will be presented followed by the microstructural, mechanics as well as thermal properties of geopolymer. It was believed that geopolymer will eventually emerge as one of the best advanced materials for wide range-applications.



Professor Dr. Fauziah Ahmad

School of Civil Engineering, Universiti Sains Malaysia (USM),
Malaysia

Slope Stabilization Technique Using Sustainable Mat System

Slope stabilization technique had become an important thing around the world. Currently, there are a number of landslide occurrences around the world. Because of that, so many types of slope reinforcement were been produced lately. Among these, scrap tyre had been showing some desired properties for slope stabilization technique in term of it durability, strength and deformation. The amount of generated tyre exceeded the amount of scrap tyre recycled annually. The use of tyre for slope stability will help in recycling the annually generated scrap tyre. This paper presents the construction and the monitoring results of the 8 Rubber (8R) mat system that had been constructed for sustainability in soil erosion and slope protection. Before the construction was carried out, scrap tyres were collected from local tyre shop and been produced into 8 shaped tyre by using a simple steps and procedures. The scrap tyres had undergone a lab test to determine their tensile strength. A non-woven geotextile was use as a separator between the backfill and the 8R mat system. To evaluate the performance of the system, three parameters was monitored which are earth pressure, lateral movement and settlement. It was found that the earth pressure did not influence by the rainwater since the system has high permeability. The normalized lateral movement obtain were



slightly lower by using this 8 shape tyres. Lastly, small total cumulative settlement was found since crusher run was use as the structure foundation.



Ts. Dr. Norazian Mohamed Noor

School of Environmental Engineering, Universiti Malaysia
Perlis (UniMAP), Malaysia

Modelling of Ambient PM₁₀ Concentration within an Urban-Industrial Environment in the Peninsular Malaysia

Urban areas with dense population and vehicles congestion coupled with industrial activities will definitely had impacted the ambient air quality. Particulate matter (PM₁₀) is the main pollutant in the ambient air of urban-industrial areas. Hence, the aim of this research is to provide an overview on the variation of PM₁₀ concentration and to model the ambient concentration of PM₁₀ in the urban-industrial areas. Hourly concentration of PM₁₀, other traces gases (NO₂, SO₂, CO and NmHC) and meteorological parameters (temperature, relative humidity and wind speed) from 2008-2013 at selected location i.e. Shah Alam, Kuala Terengganu and Melaka were used. Two models were applied (multiple linear regression and artificial neural network) to predict the concentration of PM₁₀ for the next three consecutive days. The performances of the models were compared by using several performance measures including mean absolute error (MAE), normalised absolute error (NAE), root mean squared error (RMSE), prediction accuracy (PA), coefficients of determination (R²) and index of agreement (IA). Kuala Terengganu recorded the highest number of exceedances day compared to all other stations. Two peaks were observed from monthly variation that was recorded during the southwest monsoon (Jun to September) and



during the end of northeast monsoon (Jan to March). Significant correlation was observed between NmHC and PM10 concentration in Shah Alam while in Kuala Terengganu and Melaka, PM10 concentration was strongly correlated with carbon monoxide concentration. The most fitted model for predicting PM10 concentration in the urban-industrial area in Peninsular Malaysia was found out to be artificial neural network.



Dr. Ridho Bayuaji

Institut Teknologi Sepuluh Nopember (ITS), Indonesia

The Behavior of Geopolymer Concrete Based High Calcium Fly Ash as Beam Structural in the Marine Environment

Indonesia, a country that is in the archipelago has challenges to the problems of the durability of its infrastructure. On the other hand, workability is a significant challenge for geopolymer concrete made from type F fly ash, mainly used as structural elements. This paper presents the behavior of geopolymer concrete beam structures using high calcium fly ash in the marine environment. The effects of the marine environment, destructive and non-destructive testing were carried out to determine the mechanical properties of geopolymer concrete, the flexural and shear performance of geopolymer concrete beam elements. The results of this study inform the excellent potential of the production of geopolymer concrete beam elements made from type F fly ash in the seawater environment according to the ACI standard.



Aissa Bouaissi

University of Plymouth, United Kingdom

Mix Design Of GGBFS With Class F Fly Ash As Binder Suitable For Marine Applications Cured At Ambient Conditions

Recently many studies have been done in geopolymer technology as a new alternative construction material of Ordinary Portland cement OPC. Fly ash, ground granulated blast-furnace slag and metakaolin are the most raw materials used for geopolymer synthesis. The use of alkaline solutions to activate such as materials lead to achieving high mechanical characteristics, physical and chemical properties. This work aims to determine the optimum mix design of geopolymer cured at a room temperature, which could be suitable for marine applications. Series of experimental tests are carried out to investigate various mechanical and microstructure properties. The results show that using Class F fly ash with GGBFS as a binder leads to a strength performance and showed well-compact and denser geopolymer matrix. The SEM/EDX scanning results revealed the reactivity level of both fly ash and GGBFS with the alkaline solution used.



Assoc. Prof. Dr. Mohd Remy Rozainy Mohd Arif Zainol
School of Civil Engineering, Universiti Sains Malaysia (USM),
Malaysia

A Study on Suitable Sites for Intergrated Smart Trapper System Installation

Rapid expansion in major towns in Malaysia results in the construction of new drainage system mainly open monsoon or storm drains to cater the increase in surface runoff. This research are to study the suitability of selected sites to implement InSmarts and propose at selected sites based on the optimum results. InSmarts is a floatable trapper that was being synchronized with the effective and better communication tools. This product mainly consists of a fibre reinforced plastic tube that acts as floatable rubbish trapper. Acoustic Doppler Current Profiler (ADCP) was used to get water velocity and river profile at sites. The data was acquired at three different points along the river at each sites to know the best position to implement InSmarts. These tests were done to find out the attributes of different rubbish materials and weights in the flowy medium such as river or drainage. From the test that has been done, the optimum condition to install at sites are the velocities of the river must be around 0.1 m/s to 0.6 m/s and the trapper must be set up at 45° angle to accumulate the trash at one side of the trapper.



Dr. Mohd Hafiz Zawawi

Department of Civil Engineering, Universiti Tenaga Nasional (UNITEN), Malaysia

Fluid Structure Interaction Study on Hydro Power Station

Dams are man-made hydraulic structures that provide domestic and economic benefits such as for water storage and electricity. Due to its vast size and high risk purpose, it often being exposed to high risk of failure such as overtopping and deformation. There is a risk of dam overtopping and deformation during the extreme flood event where the volume of inflow increases thus cause spilling of huge volume of water. Therefore, it is essential and vital to study structure integrity of a dam structure in order for a sustainable dam operation and lifespan. Fluid-Structure Interaction (FSI) is a method consist of the combination of water dynamic and transient structural simulation. FSI is a proven method and reliable tool as it is capable to capture both aspects of fluid flow and structural deformation in the modelling. This open up to many more detail studies on dam structure integrity such as operating condition and natural event vibration, cracks and also subsurface seepage problem for dam structure.



Andrie Harmaji, S.T., M.T.

Institut Teknologi dan Sains Bandung (ITSB), Indonesia

Mechanical and Chemical Properties modification of Low Carbon Steel (ST-37) Surface with Fly Ash & Red Mud based Geopolymer Coating

Coal combustion in the industrial waste produced form of fly ash. There are also red mud, which is a waste from refining process of bauxite into alumina with the Bayer method. Both contains useful compounds such as Fe_2O_3 , Al_2O_3 , SiO_2 , TiO_2 . The content of both the wastes can be useful as ceramic coatings on steel. In this study, the waste used as precursors from the synthesis of the alkali activator solution to make Geopolymer. Chitosan is used as a dispersant so that the resulting ceramic particles are homogeneous. Fly ash and Red mud is mixed with a solution of an activator consisting of NaOH and sodium silicate to be a non-aqueous slurry, then superimposed onto the surface of the low-carbon steel with a method of dip coating, followed by calcination for four hours at 850°C temperature. The results are modified ST-37 steel with 75% Fly ash and 25% Red mud with Chitosan coating is 508 HV and Corrosion test shows that the average corrosion rate are 13.13 mm/year.

Part V

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Part VI

General Information



About UniMAP

Universiti Malaysia Perlis (UniMAP) is Malaysia's 17th public institution of higher learning. It was approved by the Malaysian Cabinet on May 2001. Originally known as Kolej Universiti Kejuruteraan Utara Malaysia (KUKUM), or Northern Malaysia University College of Engineering, it was renamed as Universiti Malaysia Perlis (UniMAP) in February 2007. The first intake consisted of 116 engineering students who started classes on June 2002. Currently, UniMAP has approximately 11,000 students and a workforce of more than 1,700 academic and non-academic staff members. It offers 21 undergraduate programmes that lead to Bachelor in Engineering, one undergraduate programmes that leads to an Engineering Technology degree and two undergraduate programmes that lead to a Bachelor in Business. We also offers six Diploma in Engineering programmes and 13 postgraduate programmes that lead to Master of Science in Engineering and PhD degrees. UniMAP graduates are nurtured to become competent practitioners in their area of specialization and to have the confidence to explore entrepreneurial possibilities upon graduation.



They are expected to not only exhibit excellence in the knowledge and skills that are directly related to their specialized fields of study, but also to demonstrate outstanding proficiency in both communication and ICT skills, as well as possess unsurpassed traits of professionalism and patriotism. Most of the engineering programmes at UniMAP have an electronic-based focus. However, both basic and applied studies on other fields of engineering and technology that support the advancement of engineering are also actively pursued here. In addition, International Business, Engineering Entrepreneurship and an MBA in Engineering Management are also on offer. The International Business programme is designed to produce global-business leaders who could function and compete effectively in the globalized market place. The Engineering Entrepreneurship programme aims to equip today's generation of 'technopreneurs' with an excellent entrepreneurial knowledge on managing industrial and technology-based businesses, whilst the MBA in Engineering Management is designed to produce competent managers for the engineering and technology sectors.

PART VII
List of Abstract
**5th International Conference on Green Design
and Manufacture 2019 (IConGDM 2019)**

Dye Sensitized Solar Cell Field Performance in Tropical Climatic Condition: A case study

M E Ya'acob^{1,2}, *N. Roslan¹, A Noor Iskandar¹, H. Othman¹

¹Department of Process & Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

²Centre for Advanced Lightning and Power Energy Research (ALPER), Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

*nadirahroslan1010@gmail.com

Abstract. Dye-sensitized solar cell technology commonly known as DSSC appears to be very well suited for integration into greenhouse glazing systems due to their characteristics of transparency, color tuning and manufacturing directly on glass substrates. The condition and performance of this material are subjected mainly on the location of installation where the sun radiation is a crucial factor to be considered. This study analyses the behavior of dye solar cells in real - life tropical weather conditions from a varying weather of mildly warm to hot sunny and to wet rainy conditions. Four units of experimental Red colored DSSC module (DSS SERIO 3550W13) have been installed in series at the Faculty of Engineering, UPM Serdang, Selangor, Malaysia. The observation is based on the PROVA data logging device for 5 continuous days at 10 min intervals. The effect of different weather conditions on the cell performance is quantitatively investigated by using correlations coefficients of sun radiation (G) to cell performance (I, V parameters) which produces the expected annual energy yield.

Keywords: DSSC Module, Field performance, PV Monitoring, Tropics, Red Dye

Micro Climate Evaluation for Agrivoltaic Horticulture Plots in the Tropics

*N.Fadzlin. Othman¹, A. S. Mat Su¹, M E Ya'acob^{2,3}, A Noor Iskandar², MH. Othman²

¹Department of Agriculture Technology, Faculty of Agriculture, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

²Department of Process & Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

³Centre for Advanced Lightning and Power Energy Research (ALPER), Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

*fadzlin013@gmail.com

Abstract. Rapidly decreasing price of Photovoltaic (PV) modules in the world market in line with the increasing demand of fresh produce promotes the idea of agro-PV integration or commonly known as agrivoltaic system. The agrivoltaic concept is an integrated system that associate, on the same land area, food crops and solar photovoltaic panels where the PV panels provides some shading elements for plant growth. This study provides some important information on the ground condition of an Agrivoltaic system installed in Selangor state, Malaysia. The stochastic tropical weather condition is explored based on three main factors which are air temperature, air humidity and wind speed underneath PV arrays for 5 days continuous monitoring with 1 minute time intervals. The maximum height of PV array at site is 1.3 meter with area of 3.67m x 3.36m (18 x 95Wp Monocrystalline modules). The temperature value using K-type thermosensor underneath PV is segregated into 4 sampling points which are bottom surface of PV, 1 feet down from surface, 3 feet down from surface and ground temperature.

Keywords: Micro climate, Agrivoltaic, Horticulture crops, Solar Photovoltaic, Tropics

A New Approach of Temperature and Humidity Alert System at Composite Panel Manufacturing Area

*M S Ismail¹, Chan Y P², M I Hussain³, N Muhammad⁴
and Z Mohd Zain⁵

^{1,3,4,5}School of Manufacturing Engineering, University Malaysia Perlis, Pauh Putra
Campus, 02600 Arau, Perlis, Malaysia

²School of Electrical Engineering, University Malaysia Perlis, Pauh Putra Campus,
02600 Arau, Perlis, Malaysia

*mohdshihabudin@unimap.edu.my

Abstract. The Internet of Things (IoT) system proposed in this paper is an advanced solution for monitoring the temperature and humidity in the lay-up production line at Company A, a composite panel manufacturing company for aircraft wing components. The temperature and humidity data is visible over internet through cloud based platform and sending alert messages when the temperature and humidity is out of the control range. The Wireless Sensor Network (WSN) based monitoring and alert system consists of DHT11 sensor to detect the temperature and humidity, and NodeMCU WiFi module to send data into the ThingSpeak IoT platform. The data will be displayed on LCD screen and GSM module will send alert messages to the engineer or person in charge. The buzzer and LED will be triggered automatically when the humidity or temperature is out of the control range. The main objective of this project is to design an automatic temperature and humidity alert system at the lay-up production line by using Arduino IDE so that it could help to improve the current alert system used at the company. This automatic temperature and humidity alert system has been located in the lay-up production line at Company A and the data collected by this system has been validated with the data collected by the existing Honeywell Circular Chart temperature and humidity recorder which currently used by the company. As a result, the data collected by the automatic temperature and humidity alert system is reliable since it matches the data recorded by the Honeywell recorder. Finally, this IoT approach could improve the alert system at lay-up production line hence indirectly improve the composite panel quality.

Performance Evaluation for Agrovoltaic DC Generation in Tropical Climatic Conditions

N. F. Othman¹, *S. Yap², M. E. Ya'acob^{3,4}, H. Hizam^{2,4},
A.S. Mat Su¹, Noor Iskandar³

¹Department of Agriculture Technology, Faculty of Agriculture, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

²Department of Electrical & Electronic Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

³Department of Process & Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

⁴Centre for Advanced Lightning, Power and Energy Research (ALPER), Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

*181806@student.upm.edu.my

Abstract. The advancement of photovoltaic (PV) technology requires integration with existing system i.e. agriculture process for a nexus application. In this paper, tropical field performance of 1 kWp Agrovoltaic system is compared with a normal reference array located at the Renewable Energy Research Office (RERO), Faculty of Engineering UPM Serdang, Malaysia. The chosen crops is Misai Kucing (Orthosiphon Stamineus) grown directly underneath the PV array with proper fertigation system. The actual performance of both system is measured for 5 continuous days in December 2018 with 5 minutes data intervals. The results based on the data collection is calculated for these parameters namely energy yield, yield factor, capacity factor, power efficiency and PV array efficiency. The research show that the Agrovoltaic system has better performance compared to the normal reference array in parameters such as DC generation, PV efficiency and Capacity Factor with values of 43.3 kWh, 14.27% 37.9% (maximum CF value) respectively. The plant density factor of Agrovoltaic panel is assumed to be negligible where for this case study, all area underneath the specified PV array is full of crop seedlings.

Actual Field Performance of a Standalone Photovoltaic Mobile-Charging Station in Serdang, Malaysia

N I Ismail¹, A N Iskandar², *M N Mohtar^{1,3}, M E Ya'acob^{2,3}

¹Department of Electrical & Electronic Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

²Department of Process & Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

³Centre for Advanced Lightning, Power and Energy Research (ALPER), Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

*nazim@upm.edu.my

Abstract. Mobile phones and other gadgets especially connected devices have become the most valuable device not only for people with career but also general public especially for updating social media. Due to heavy usage and the limited battery efficiency and life time, this work proposes an off-grid standalone box-type Solar Photovoltaic (PV) charging station (solar tree) with the rated capacity of 320Wp Monocrystalline module comes with 100AH lead-acid battery. The recorded Time of Charge (ToF) is based on rated current supplied to the load i.e 1A and 2A A maximum of 8 gadgets can be plug-in at any one time with a maximum charging time of 3 hours. This PV charging stations works 24 hours with the high battery capacity and solar PV controller in maintaining charging sequence. The actual performance of this charging system is measured for three continuous days in the month of February 2019 in Serdang, Selangor, Malaysia with 10 minutes data intervals. The results are further analyze based on the energy yield, capacity factor, and charging efficiency.

Keywords: Standalone PV, DC charging, PV efficiency, Actual performance, Tropics

Simulation of energy consumption in the library building

*Norasikin Hussin¹, Azli Abd Razak², Faizal Baharum³,
and Y.Yaakob¹

¹Faculty of Mechanical Engineering, Universiti Teknologi MARA Cawangan Pulau Pinang, Kampus Permatang Pauh, 13500 Permatang Pauh, Pulau Pinang, Malaysia.

²Faculty of Mechanical Engineering, Universiti Teknologi MARA Shah Alam, 40450 Shah Alam, Selangor, Malaysia.

³School of Building, Housing and Planning, Universiti Sains Malaysia, 11800 Pulau Pinang, Malaysia

*norasikin245@ppinang.uitm.edu.my

Abstract. Educational building is the biggest contributor for energy consumption because to provide comfort and suitable workplace to learn. The energy consumption of air conditioning system reaches about 60% of the educational building especially for the hot and humid weather in Malaysia. In recent years, the issue of energy consumption in the building sector has been studied. Building energy simulation is one of technique to minimize the demand of energy consumption. IES VE software was used to model the library building, as well as analyze the energy consumption and energy saving. The research aims at identifying the most energy consumption of library building in UiTM Bertam, where the objective is to minimize the consumption. In this study, internal heat gain is necessary to consider in the building simulation. The results showed that the 53% of total energy consumption was consumed by air conditioning (AC) system. The rescheduling of chiller operating hours is potentially to reduce energy usage by AC system. Based on the simulation model, the energy consumption by AC system was decreases by 5.9%. Finally, the findings show the library building is possible to achieve the energy saving.

Investigation of Energy Consumption During Milling Operation.

*Abdul Rahman Hemdi¹, Fauziah Mohamed Hashim¹,
Rizal Mohamed Noor¹, Muhamad Othman¹, Mahadzir
M.M.¹, Mohamed Syazwan Osman², Muhamad Zameri
Mat Saman³ and Safian Sharif³

¹Automotive Research and Testing Center (ARTEC), Faculty of Mechanical Engineering, Universiti Teknologi Mara, UiTM Penang Branch, Jalan Permatang Pauh, 13500, Permatang Pauh, Pulau Pinang, Malaysia.

²Faculty of Chemical Engineering, Universiti Teknologi Mara, UiTM Penang Branch, Jalan Permatang Pauh, 13500, Permatang Pauh, Pulau Pinang, Malaysia

³Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia.

*abdurahman643@ppinang.uitm.edu.my

Abstract. The high usage of energy in manufacturing sector can lead to significant impact to environment and sustainability. Various strategies have been done in order to minimize energy consumption in manufacturing. The reduction of energy during the machining process is one of the initiatives to achieve sustainable machining. Thus, this research was done to investigate the influence of CNC milling parameter for minimum energy consumption. The parameter involves are spindle speed (N), feed rate (Vf) and depth of cut (d) while the output is power and energy usage. The cutting tool of high-speed steel (HSS) was used to cut the aluminium (Al6061) alloy using 5-axis CNC milling machine. The design of experiment (DOE) approach was applied by using response surface methodology (RSM) to optimize the experimental work. Then, the analysis of RSM determines the influence of machining parameter toward energy consumption. The surface plot of energy interaction for each milling parameter was generated using RSM. From the study, it is found that the feed rate is the most influential factor for lower energy machining of milling operation. In addition, the RSM also proposes the regression model to show a relationship between energy and machining parameter which the accuracy of 98%.

Optimum Parameters by Miscellaneous Response Surface of Solid-State Recycling of AA6061 Chips

*SN Ab Rahim¹, NA Faris¹, MA Haron¹, MA Lajis² and Z Shayfull³

¹Department of Mechanical Engineering, Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS), Bandar Darulaman, 06000 Jitra, Kedah, Malaysia.

²Sustainable Manufacturing and Recycling Technology, Advanced Manufacturing and Materials Center (SMART-AMMC), Universiti Tun Hussein Onn Malaysia, 86400 Pt Raja, Batu Pahat, Johor, Malaysia

³School of Manufacturing Engineering, Universiti Malaysia Perlis, KampusTetapPauh Putra, 02600 Arau, Perlis, Malaysia

*Syaiful5599@gmail.com

Abstract. This paper deals with the direct recycling AA6061 aluminum alloy milling chips into semi products by the hot extrusion process. The main goal of this study is to obtain mathematical models that will relate the process parameters of a direct recycling to mechanical properties of final semi products. The influence of preheat temperature, preheat time and constant ram speed on Ultimate Tensile Strength (UTS) was investigated using Miscellaneous Response Surface experimental design. The study has shown that the most influential factor on mechanical properties was preheat temperature. Preheat time does not affect on elongation and preheat temperature most influence on ultimate tensile strength. Optical microscopy revealed the cracks and inhomogeneities for all samples extruded on 450 °C in contrast to those extruded on 550 °C which showed no voids or cracks. Optimal recycling process parameters that would give maximal mechanical properties were found.

Study of physical properties and environmental monitoring for diapers polymer

*Daud Mohamad¹, Salmia Beddu¹, Siti Nabihah Sadon¹,
Hong Wei Sheng¹, Iszmir Nazmi Ismail¹ and Wani
Kasmiah Mohd Sapuan²

¹College of Engineering, Universiti Tenaga Nasional, Kampus Putrajaya, 43000
Kajang, Selangor, Malaysia

²Civil Engineering Department, Infrastructure University Kuala Lumpur, 43000 Kajang,
Selangor, Malaysia.

*Daud@uniten.edu.my

Abstract. High Performance Concrete (HPC) with small water/binder ratio has been widely used in the construction industry nowadays. However, HPC is found to be extremely delicate to the threat of early age cracking which vastly affect the concrete quality. Previous researchers have proposed self-curing technique as a solution to the problem. A self-curing concrete is able to absorb moisture from the surrounding for proper cement hydration. This paper study the environmental monitoring and material characterization of new and used diapers hydrogel polymer. In this study, diapers hydrogel polymer is proposed as a self-curing agent due to its amazing water absorption ability. Laboratory testing was done for environmental monitoring of both new and used diaper polymer, including turbidity test, colour test, pH test, biochemical oxygen demand (BOD) and chemical oxygen demand (COD) test whilst for material characterization, Wavelength Dispersive X-Ray Fluorescence (WDXRF) test, X-Ray Diffraction (XRD) analysis and Fourier Transform Infrared (FTIR) analysis was conducted. As a result, addition of used diapers polymer with pH of 8.34 into high performance concrete mix has no significant effect of the alkalinity of concrete, which it is a crucial requirement to maintain the performance of concrete structure. Hence, it concluded that polymer source from used diaper has a good potential as self-curing agent in concrete.

Design and Implementation of Smart Alert System for Reducing Road Traffic Accidents in Myanmar

Tin Lai Lai Mon^{1,a)} and Thin Lai Lai Thein^{2,b)}

¹*Geographical Information Science Laboratory, University of Computer Studies, Yangon, Myanmar*

²*Faculty of Information Science, University of Computer Studies, Yangon, Myanmar*

* tinlailaimon@ucsy.edu.mm

Abstract. The source of most road traffic accidents is related to the drivers' behavior. Therefore, it is urgently needed to identify unsafe driving and to take actions to change this situation. A new method to detect driver behavior is naturalistic driving. In this method, drivers' behavior is traced in daily trajectories by analyzing their moving recorded GPS data through mobile phones. In this paper, a new method for warning and alert drivers about their aggressive behavior is proposed to reduce the risk of accidents due to the drivers in Myanmar. It is also expected to improve drivers' attentiveness about their driving behavior as well as to inform the responsible organizations such as police stations, other transportation companies and insurance companies about their driver's style of driving. There are four stages in this proposed method. They are data collection, trajectory cleaning using DBScan clustering method, classification of motorized and non-motorized vehicles using J48 algorithm from Weka tool, external interference and aggressiveness evaluation and alerting. The main contribution to this research work is the development of smart alert system for driver and his organization.

Keywords: *Driver behavior, DBScan, J48, Weka, GPS*

Analysis of the particle size distribution of sediment runoff transported from water hyacinth fiber mat

Chow Ming Fai

Universiti Tenaga Nasional (UNITEN), Universiti Tenaga Nasional, Jalan IKRAM-UNITEN Kampus Putrajaya, 43000, Kajang Selangor.

*chowmf@uniten.edu.my

Abstract. The uses of natural fibre mat for soil erosion control is increasingly popular due to the present-day need of alternate sustainable materials. This study is aimed to analyze the particle size distribution of sediment runoff transported from water hyacinth fiber mat under artificial rainfall. The natural fiber mat used in the study was made from the stem of water hyacinth with opening size of 30mm x 30mm. The potential of water hyacinth fibre mat (WHFM) was evaluated in laboratory experiment for 30° slope under two types of rainfall intensities. The results showed that the mass of soil loss had reduced by averagely 83% when covered by WHFM compared to bare soil for both types of rainfall intensities. It can be seen that the sediments collected at 5, 10, 15 and 20 minutes during the simulated rainfall period were mainly soil particle that passed through the 0.30 mm sieve compared to sediments collected at 25 and 30 minutes that passing through 0.063mm sieve. WHFM was successfully proved that can be implemented as soil erosion control for hilly slope condition.

Keywords: Natural fiber mat, Sediment erosion, Slope protection, Water hyacinth

Conceptual Design of Outer Tube Inspection Robot

M A Aziz^{1*}, M F Abdul Jalal², K S Mohamed Sahari², Y W Leong² and S A Sekari¹

¹Materials Engineering and Testing, Generation Unit, TNB Research Sdn. Bhd., 43000 Kajang, Selangor, Malaysia.

²College of Engineering, Universiti Tenaga Nasional, Jalan Ikram-Uniten, 43000 Kajang, Selangor, Malaysia

* mazwan.aziz@tnb.com.my

Abstract. Periodical maintenance and inspection of the power plant system and its subsystem are deemed necessary to avoid shortage and unplanned shutdown. Boiler is one of the main modules in a thermal power plant. The boiler operates under high thermal and mechanical loading that leads to failures caused by degradation, creep, corrosion, and others. One of the critical areas for inspection is the welding joint between the boiler header and tubes. In this paper, the conceptual design of the robotic system for inspecting the outer boiler tube condition, specifically at the welding joint between the boiler header and tubes is presented. The main standard mechanical components namely passive actuator and motor are determined based on the detailed calculation.

Keywords: Outer pipe inspection, power plant, metal magnetic memory

Analysis on Filtering Performance of Solar Powered Water Treatment Device (SWAD) Prototype

I.N. Ismail^{1,*}, F. F. Khean¹, M.H. Zawawi¹, N. M. Zahari¹
S.Z. A. Ahmad¹ W. M. Zuhdi¹; K. Kamarudin¹ M. F.M.
Zawawi¹ M. H. Basir¹

¹Universiti Tenaga Nasional (UNITEN),Universiti Tenaga Nasional,Jalan IKRAM-
UNITEN Kampus Putrajaya, 43000, Kajang Selangor

* iszmir@uniten.edu.my

Abstract. Treated water is an improved water quality and very essential for aquaculture or for domestic usage at remote area. One of the process to treat water is by filtration. A solar powered water treatment device (SWAD) prototype was built to cater this demand. SWAD is basically a floating water filter which operates in a self-sustainable way on calm water body such as lake or pond. Solar panel is used to generates electricity to power the pumps to suck water into the filter. This paper discusses the filtering performance of the prototype by taking UNITEN Lake as the venue for the test. The tests show significant results on the activated carbon filter where the contaminants are removed effectively. The activated carbon is able to filter water in an effective and efficient way.

Keywords: Solar Powered, Water Treatment, Filtration, Activated Carbon

Analysis on Structure Reliability of Solar Powered Water Treatment Device (SWAD) Prototype

I.N. Ismail^{1,*}, F.F. Khean¹, M.H. Zawawi¹, N.M. Zahari¹; S.Z. Abidin¹, W.N. Yusairah¹, A.W.M. Zuhdi¹, M.R. Eqwan¹, H. Mohamed¹, M.Z. Ramli¹, M.H. Mansor¹, F. Syaifoelida¹, A. A. Zakaria¹, M.R. Isa¹, D. Mohamad¹, M. F. Jaafar¹, N. A. Rahmat¹, M.S. Abd Rahman¹

¹Universiti Tenaga Nasional (UNITEN), Universiti Tenaga Nasional, Jalan IKRAM-UNITEN Kampung Putrajaya, 43000, Kajang Selangor

* iszmir@uniten.edu.my

Abstract. An improved water quality is very essential element for aquaculture industry. Solar powered water treatment device is basically a floating water filter which operates in a self-sustainable way on calm water body such as lake. The objective of building a prototype solar powered water treatment device (SWAD) is to have an independent power supply without relying from the grid to run the water treatment process through filtration. The project undergoes preliminary design, CAD drawings with simulation, prototype fabrication and prototype testing. By utilizing CAD simulation, through analysis has been done to determine the suitable size and the type of material for the device structure. The criteria of the structure must be light weight, sturdy and not reactive to water. The structure needs to withstand the total weight of the prototype plus it can float at the water surface.

Keywords: Solar Powered, Water Treatment Device, Stress Analysis, CAD

Development of Solar Powered Water Treatment Device (SWAD) Prototype

I.N.Ismail^{1*}, F.F.Khean¹, M.H. Zawawi¹, N.M.Zahari¹,
S.Z.Abidin¹, W.N.Yusairah^{1f)}, A.W.M.Zuhdi¹, M.R.Eqwan¹,
H.Mohamed¹, M.Z.Ramli¹, M.H.Mansor¹, F.Syaifoelida¹,
A.AZakaria¹, M.R.Isa¹, D.Mohamad¹, M.F.Jaafar¹,
N.A.Rahmat¹ M.S.Abd Rahman¹

¹Universiti Tenaga Nasional (UNITEN), Universiti Tenaga Nasional, Jalan IKRAM-
UNITEN Kampus Putrajaya, 43000, Kajang Selangor

* iszmir@uniten.edu.my

Abstract. Water is the most essential element for life, there are still some remote areas in Malaysia where clean freshwater is not accessible, this problem had troubled the locals for decades. Solar powered water treatment device is basically a floating water filter which operates in a self-sustainable way on calm water body such as lake. The pumps used for the device will obtain the energy from the solar panel to pump water into the filter. For this project, the device is being tested at the UNITEN lake. The main objective of development solar powered treatment device prototype (SWAD) is to improve the water quality by selecting a suitable water filter while the device is supported by a stable structure. The project undergoes preliminary design, CAD drawings with simulation, prototype fabrication and prototype testing. The structure of the device is made of combination aluminium which is light weight, sturdy and not reactive to water. The solar panel that has been selected is rated at 250W and it is sufficient to power four pumps rated at 30W.

Keywords: Solar, Water Treatment

Influence of Native Plant Species on Substrate Moisture Content Behaviour within Extensive Green Roof System

M.F.Chow^{1,*}, M.F.A.Bakar¹

¹Universiti Tenaga Nasional (UNITEN), Universiti Tenaga Nasional, Jalan IKRAM-UNITEN Kampus Putrajaya, 43000, Kajang Selangor.

*chowmf@uniten.edu.my

Abstract. Green (vegetated) roofs are gaining the popularity in recent years as the green technology to meet the environmental sustainability and low-carbon targets in urban cities. Green roofs are useful in mitigating the stormwater runoff and urban heat island in the urban environment. The plant species played an important role on the hydrological performance of green roof. The study of moisture content behavior in extensive green roof system is still lacking in Malaysia. Therefore, this study is embarked to investigate the soil moisture content behavior in extensive green roof during dry periods within extensive green roof system with respect to different native plant species in Malaysia. A total of six green roof testbeds which vary systematically in their vegetation options (namely, *Nephrolepis biserrata* (fern), Cow Grass, Philippine Carpet Grass, *Portulaca Grandiflora* Cultivars (sedum)) were setup in the civil engineering laboratory. The substrate volumetric moisture content (VMC) was recorded by using TDR 100 soil moisture meter at every three hours interval. The highest VMC value was recorded by carpet grass followed by fern, cow grass, sedum, bare soil and finally the mixed plants. This study suggested that sedum species or mixed plant species are the most suitable to be planted in extensive green roof in tropical climate country.

Keywords: Extensive green roof, native plant species, soil moisture content, tropical climate

Effect of Impeller Types on Saponification Reaction Using Stirred Tank Reactor

R Hasibuan^{1,*}, R.R.Parsaulian¹, F.Adventi¹,
R.Manurung¹, J.Hidayati²

¹Department of Chemical Engineering, Faculty of Engineering, University of Sumatera Utara, Medan, Indonesia

²Department of Industrial Engineering, Faculty of Engineering, University of Sumatera Utara, Medan, Indonesia

*rosdanelli@yahoo.com

Abstract. The choice of impeller type is an important factor to maximizing performance of stirred tank reactor (STR) in soap production. This study aims to determine the best type of impeller can produce a short residence time by reviewing changes in alkali concentration. The saponification process was carried out by reacting oil with KOH 30% at operating conditions: temperature 70°C, stirring speed 400 rpm and reaction time 45 minutes using four types of impellers namely paddle-2 blades, pitch blade turbine 45°-2 blades, paddle-4 blades, pitch blade turbine 45°-4 blades. Alkali concentration is tested every 5 minutes until the reaction time is complete. The alkali concentration is obtained at the end of the reaction using paddle-2 blades is 0.182 M and conversion is 97.35%, pitch blade turbine 45°-2 blades is 0.142 M and conversion is 97.93%, paddle-2 blades is 0.106 M and conversion is 98.46%, pitch blade turbine 45°-4 blades is 0.100 M and conversion is 98.54%..

Keywords: Impeller, Kinetics, Reactor, Saponification

Investigation of Wind Energy Generation by Moving Vehicles in UNITEN

Y.L.Chua^{1,*}, N. Asokan¹, Y.Y.Koh²

¹Universiti Tenaga Nasional (UNITEN), Department of Mechanical Engineering,
Universiti Tenaga Nasional, Jalan IKRAM-UNITEN Kampus Putrajaya, 43000, Kajang
Selangor

²School of Engineering Faculty of Engineering and Built Environment Universiti of
Newcastle Australia

* ylchua@uniten.edu.my

Abstract. The purpose of this paper is to investigate the amount of wind energy that can be generated by moving vehicles in and around Universiti Tenaga Nasional (UNITEN). This paper aims to harvest wind movement produced by moving vehicles and calculate how much of that energy can be converted to electrical energy. Various forms of research and experimentation have been done throughout the time period of this project which includes research regarding the importance of renewable energy, the development state of Malaysia in the renewable energy field, the various forms of renewable energy, the potential of wind energy in Malaysia, the types and applications of wind turbines in harvesting wind energy from a variety of sources such as journals, websites and articles. As for the experimentation part of this project, wind speed readings at various locations and various heights were recorded while a wind turbine prototype was designed, fabricated and field tested in and around UNITEN. This project emphasizes on the readings obtained from the prototype field test and output power generated from moving vehicles..

Keywords: Wind energy; Moving vehicles; Wind turbine; Wind speed recordings

Assessment of Free Chlorine and at UNITEN Swimming Pool

*N M Zahari¹, Udeyatarshiniy U.¹, M H Zawawi¹, Iszmir Nazmi¹ Rasdan M I ¹, Agusril Syamsir ¹, and Daud Mohamad ¹

¹*Department of Civil Engineering, Universiti Tenaga Nasional (UNITEN), Jalan IKRAM-UNITEN, 43000 Kajang, Selangor, MALAYSIA.*

*mubinzahari@gmail.com

Abstract. In this experiment, the chlorine been monitored in swimming pool and life cycle cost maintenance at swimming pool calculated. The DPD (N, N-Diethyl-p-Phenylenediamine) method been used to determine the chlorine level. The turbidity and pH level determined as a supportive for the research. Chlorine level obtained in the range of 0.2 mg/l to 3.0 mg/l. Where for the turbidity, it obtained not more or equal to 5 NTU where achieved the standard of turbidity. Where for the pH value of the swimming pool water in the range of alkaline or neutral. The pH in the range of 7-7.5 for the overall swimming pool pH value. The DPD method is the best method to test the chlorine level in the swimming pool.

Keywords: Free chorine, Swimming pool, Water quality

Analysis of Air Pollutants Source using Descriptive Method

*N M Zahari¹, Mahran R M S¹, M H Zawawi¹, Iszmir Nazmi¹ Rasdan M I ¹, Agusril¹, and Aizat Abas²

¹*Institutes Energy Infrastructure, Department of Civil Engineering, Universiti Tenaga Nasional (UNITEN), Jalan IKRAM-UNITEN, 43000 Kajang, Selangor, MALAYSIA.*

²*School of Mechanical Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, MALAYSIA.*

*mubinzahari@gmail.com

Abstract. The air pollutants and meteorological parameters are sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), and particulate matter (PM₁₀). The selected locations are Melaka (Station 1), Kelang, Nilai, Shah Alam, Melaka (Station 2) and Putrajaya for year 2009 until 2015. This study is to analyze the air pollutant sources using descriptive analysis and determine the relationship between the air pollutants parameters. The data was obtained from the Department of Environment Malaysia (DOE). The software used was Statistical Package for Social Science (SPSS) in order to do the analysis which are the descriptive analysis, correlation and principle component analysis. The function of descriptive analysis is to find the value of minimum, maximum, range, mean, standard deviation and variance of the air pollutant parameters.

Keywords: Air pollutant, Descriptive method, Environmental, Air pollution

Study on the Optimal Phase Structure of Recovered Steam Turbine Blades Using Different Technological Spray Modes for Deposition of Al_2O_3

*V V Savinkin¹, T Yu Ratushnaya¹, A A Ivanischev¹, A R Surleva², O V Ivanova¹ and S N Kolisnichenko¹

¹ Transport and Mechanical Engineering dep., North Kazakhstan State University named after M. Kozybayev, 81 Pushkin, Petropavlovsk, Kazakhstan

² Analytical Chemistry dep., University of Chemical Technology and Metallurgy, 8 Kl. Ohridski blvd, 1756 Sofia, Bulgaria

*cavinkin7@mail.ru

Abstract. Laser-plasma renewal of steam turbine blades presents rational approach to improve manufacturability and reduce the cost of the recovery process. The phase composition of recovered material determines turbine blades durability. However, the excising technologies do not take into account the material phase composition. This paper presents the methodology and main results from a study of the phase structure of a turbine blade recovered by laser-plasma spraying of Al_2O_3 . It has been established that thermodynamic processes played an important role in increasing the adhesion of Al_2O_3 particles to the metal surface. The technological conditions were varied in order to obtain optimal martensitic - ferrite class phase structure of recovered steam turbine blades. Specific conditions for coating deposition that assure optimal phase structure of a material with high mechanical properties and increased durability were proposed.

Keywords: Phase structure, Laser-plasma recovery technology, Temperature regimes, Turbine blades,

Design and Development of Fully Automated Water Sprinkler System for Small Agriculture Field

*T Mohanasundram¹, M R Isa¹, I N Ismail¹, N M Zahari²,
M E Roslan¹, H Mohamed¹, W V Vicki¹

¹Department of Mechanical Engineering, Universiti Tenaga Nasional, Jalan IKRAM-Uniten, 43000 Kajang, Selangor, Malaysia.

²Department of Civil Engineering, Universiti Tenaga Nasional, Jalan IKRAM-Uniten, 43000 Kajang, Selangor, Malaysia.

*mrashdan@uniten.edu.my

Abstract. The automated sprinkler system is developed to reduce human effort to water their plant in their backyard. The objectives of the project is to design, develop and analyse the water sprinkler system. The water sprinkler head was designed in solid works. The created design is then optimised using ANSYS FLUENT which the outlet of the water sprinkler head varies. The velocity and pressure is observed from the simulation through ANSYS FLUENT. Based on the result found that 1mm diameter outlet has highest velocity 2.07 m/s and highest pressure 105.64 Pa. The fabricated prototype then tested with developed automated system in UNITEN. The result of the test shows that the sprinkler height of 0.6 m from the ground projects the water the furthest at 0.35 m.

Keywords: Water sprinkler, Pressure, Soil moist sensor

Practical Approach for Total Protection in Ground Mounted PV system

*S. Abdul Zabil¹, M E Ya'acob^{2,3}, J. Jasni³, A. Noor Iskandar², M.H. Othman²

¹Jabatan Tenaga Manusia, Pusat Pentadbiran Kerajaan Persekutuan, D, Presint 1, 62530 Putrajaya, Wilayah Persekutuan Putrajaya

²Department of Process & Food Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

³Centre for Advanced Lightning, Power and Energy Research (ALPER), Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

*fendyupm@gmail.com

Abstract. In this paper, a conceptual and practical approach for total lightning protection system based on the MS/IEC requirements on Ground-mounted Photovoltaic lightning protection system are discussed. The test site is located at the Renewable Energy Research Office (RERO) Faculty of Engineering UPM Serdang, Malaysia with installed capacity of 10 kWp Monocrystalline PV modules c/w Sun Grow Inverter/ Data logging system. Lightning current which passes through the common lightning protection system may still dispersed and affect the ground-mounted PV power system mainly due to the uncertainties of point-of-strike. Hence the uniqueness of this project is the strategic structure bonding of PV systems with wind turbine (external pole) and perimeter fencing to achieve a good common earthing configuration. The protection system is also equipped with Surge Protection Devices (SPD) based on the zonal protection scheme to protect the site from both direct and indirect damages of lightning, with special attention to the protection of PV panels and inverters.

Keywords: Lightning Protection, SPD, Ground-mounted PV, Tropics, Renewable energy

Design and Development of End Effector for Changing Bulb

M M Mohamad Khazani¹, *M F Abdul Jalal¹, M R Isa¹ and
K S Mohamed Sahari¹

*¹College of Engineering, Universiti Tenaga Nasional, Jalan Ikram-Uniten, 43000
Kajang, Selangor, Malaysia.*

*mfairuz@uniten.edu.my

Abstract. Replacing a light bulb is a common household task to be done regularly. Existing bulb changer products on the market, however, can be difficult for the elderly and weak people to use. In this paper, a bulb changer device is designed and developed to help ease people at home doing their household tasks. The device incorporates some of the existing ideas with significant improvement by introducing some sort of automation system. An end effector is designed and developed to be a semi-automated spring gripper. The result shows that the device can perform the essential task of changing a light bulb. The maximum reach attained by the device with extension pole attached is within the range of common ceiling heights of 3 to 4m. The maximum spread of the gripper is below 135mm, meaning that the device can fit into the bulb housing. The overall performance speed is fairly slow but acceptable.

Keywords: End effector, Bulb, Gripper

Fabrication and Static Compression Test of Hybrid Magnetorheological Elastomer-Fluid for Vibration Control Application

*M.F. Jaafar¹, N.A. Ahmad², Z.I. Razali², A.F. Mohamad²,
M.A.I. Zulkiffli²

¹*Institute of Energy Infrastructure, College of Engineering, Universiti Tenaga Nasional,
43000 Kajang, Selangor, Malaysia*

²*Mechanical Engineering Department, College of Engineering, Universiti Tenaga
Nasional,
43000 Kajang, Selangor, Malaysia*

*mohd.firdaus@uniten.edu.my

Abstract. Magnetorheological elastomer (MRE) and magnetorheological fluid (MRF) are widely known as the class of smart materials which contained micron-sized ferromagnetic particles that can reversibly tune the mechanical properties of damping and stiffness coefficient respectively in the presence of magnetic field. However, the current MR technology of MRE and MRF are working individually in addressing both mechanical properties. This study is concerned with investigation on the hybrid MRE-F which incorporates both MRE and MRF as a single system that can work on the stiffness and damping variability simultaneously. To prove the excellent performance of hybrid MRE-F, this study is done to compare the static behavior of all type of elastomers: hybrid MRE-F, MRE and passive elastomer in compression mode. In most cases, the performance of all elastomer types is increasing with the increasing percentage of ferromagnetic particles contained in the elastomer. The result reported on the static performance of hybrid MRE-F is affected not only by the type and volume percentage of the ferromagnetic particles, but also the type of elastomer and the strength of magnetic field applied in addressing the stiffness. Although hybrid MRE-F is claimed to be able to change its stiffness and damping properties simultaneously, its performance is less significant when compared even to the passive elastomer if the volume percentage of ferromagnetic particles contained in the silicone matrix falls below 30 %. The results observed in this research would be useful for vibration control in wide range of engineering application such as engine mounting system.

Keywords: Magnetorheological elastomer, Compression test, Semi-active, Vibration control

Investigation of the effectiveness of water hyacinth as floating wetland plant on treating the nutrient pollutants

*M F Chow¹, V Santhiran², H Haris²

¹*Institute of Energy Policy & Research (IEPre), Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, 43000, Kajang, Selangor.*

²*Department of Civil Engineering, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, 43000, Kajang, Selangor.*

*Chowmf@uniten.edu.my

Abstract. A pilot study utilizing water hyacinth plants floating wetland was conducted in Universiti Tenaga Nasional, Water hyacinth was selected in this study for its abundance and suitable growth due to ideal Malaysian tropical climates. Water hyacinth were placed on floating rafts through a 4-week experimental period in water samples collected from Lake UNITEN. This study was carried out to investigate the effectiveness of water hyacinth as floating wetland plant on nutrient pollutant removal efficiencies. The efficiency of pollutant removal was evaluated in terms of as Total Suspended Solids (TSS), total phosphorus (TP) and total nitrogen (TN). The results obtained showed that removal efficiencies of up to 37.14 % for TSS, 64.44 % for TP and 98% for TN within the experimental period. The results showed that water hyacinth is very effective in removing pollutants such as TP and TN but not for TSS..

Keywords: Floating wetland, Water hyacinth, Nutrient removal, Water quality

Design and Development of Fertilizing Machines for Rows of Ginger Stocks

*H N Ismalina¹, H M Zulfabli ¹, T Amarul², M T M A Idham¹, A Z M I Fahmi¹ M H N Syuhadah¹ and R F N Fatihah¹

¹Mechanical Engineering Department, Politeknik Tuanku Syed Sirajuddin, 02600 Arau, Perlis, Malaysia

²Green Design and Manufacture Research Group, Center of Excellence Geopolymer and Green Technology (CEGeoGTech), Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia.

³PP Diploma, Universiti Malaysia Perlis, Kampus Alam Unicity, Sg Chuchuh 02100 Padang Besar, Perlis, Malaysia

*nurlyena@gmail.com

Abstract. Fertilizing machines for rows of ginger stocks was implemented for solving problems in fertilizing and poisoning ginger plants. Traditionally, the farmers takes lot of times in process of fertilizing and poisoning. The farmer also have to carry heavy bags throughout the spreading process. The proposed fertilizer machines uses a trolley type of mechanism and the main part are two flat fan nozzles to helps for uniform spreading. The process of fertilizers and poisons that spread by the pump to the nozzles can be done efficiently. By using this fertilizing machines a lot of time can be saved, can reduce the burden of farmers to bear the knapsack and wastage of fertilizer can also be avoided.

Keywords: Fertilizing machines, Ginger stocks, Nozzle

PRODUCT DEVELOPMENT OF MECHANICAL PRACTICE: AUGMENTED REALITY (AR) APPROACH

*H M Zulfabli¹, H N Ismalina¹, T Amarul² and A Sahrijan¹

¹Mechanical Engineering Department, Politeknik Tuanku Syed Sirajuddin, 02600 Arau, Perlis, Malaysia

²Green Design and Manufacture Research Group, Center of Excellence Geopolymer and Green Technology (CEGeoGTech), Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia.

³PP Diploma, Universiti Malaysia Perlis, Kampus Alam Unicity, Sg Chuchuh 02100 Padang Besar, Perlis, Malaysia

*mohdzulfablihasan@gmail.com

Abstract. Presently, the quick innovative development has prompted technology assessment that is in accordance with the presence of industrial revolution 4.0. There are 9 pillars of revolution 4.0 and essentially, augmented reality and internet of things (IoT) are the important pillars that has been used for this research. Likewise, revolution 4.0 is an innovation that moves from the digital age to the physical cyber era. Similarly, augmented reality being the interactive method of technology that has been hypnotize peoples especially generation Z. In this regard, 21st Century learning methods are subjected to the technology based in order to attract the student. Consequently, the researchers have made a study on augmented reality technology approach towards Mechanical Workshop practice 1 especially in welding workshop, machine workshop and fitting workshop among the Mechanical engineering students in Politeknik Tuanku Syed Sirajuddin, Arau, Malaysia in order to produce an innovation that can be impacted and interactive to the students. As a result, the innovation of Mechanical Workshop Practice with Augmented Reality approach has been created. Product development of mechanical practice has been done using ADDIE model approach. Hence, this innovation shows that augmented technology was suitable to adapt in 21th century learning method that can be impacted to the students.

Keywords: Augmented Reality Technology, Mechanical Workshop Practice, ADDIE Model

Potential FOD Defects on the Composite Material

*Y Masniza¹, H M Zulfabli¹, T Amarul², S N Khairunnisa¹,
N A R N N Zilawati¹, D Nazera¹ and H N Ismalina¹

¹Mechanical Engineering Department, Politeknik Tuanku Syed Sirajuddin, 02600
Arau, Perlis, Malaysia

²Green Design and Manufacture Research Group, Center of Excellence Geopolymer
and Green Technology (CEGeoGTech), Universiti Malaysia Perlis, 01000 Kangar,
Perlis, Malaysia.

³PP Diploma, Universiti Malaysia Perlis, Kampus Alam Unicity, Sg Chuchuh 02100
Padang Besar, Perlis, Malaysia

*pn.masnizayusof@gmail.com

Abstract. This study is focusing in the use of Quality Tools and Lean Six Sigma methodology in composite material manufacturing hand lay-up process improvement in order to identify potential Foreign Object Debris (FOD). Hand lay-up is a process in which individual layers of prepreg are laid up on a tool and then cured. Hand lay-up is a manual process that resulting in numbers of quality defects such as voids, delamination, warpage and the Foreign Object Debris (FOD). This study exclusively deals with the FOD quality defect. In this study some suitable quality tools along with Lean Six Sigma improvement process DMAIC (Define, Measure, Analyse, Improve, Control) approaches are applied on the hand lay-up process to provide a way to the company on how to identify and reduce the numbers of FOD quality defects of composite panels to get high quality components which ultimately fit in the aircraft. As the result of this study, the main source of the the problem is identified and some solutions were purposed. These solutions included, Kaizen, Standard Operation Process and SMED.

Keywords: Quality tools, Lean Six Sigma, DMAIC

Relative Importance Index (RII) in Ranking of Quality Factors on Industrialised Building System (IBS) Projects in Malaysia

Nor Syahirah Azman^{1, a)}, Mohd Zakwan Ramli^{1,b)},
Ruzaimah Razman^{2,c)}, Mohd Hafiz Zawawi^{1,d)}, Iszmir
Nazmi Ismail^{1,e)}, and Mohd Rashdan Isa^{1,f)}

¹Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional,
43000 Kajang, Selangor, Malaysia.

²Faculty of Engineering Technology & Built Environment, UCSI University, 56000
Cheras, Kuala Lumpur, Malaysia

*nr.syahirahazman@gmail.com

Abstract. The purpose of this paper is to identify and determine the factors affecting the quality management of construction projects by using Industrialised Building System (IBS) and analyze the factors using Relative Importance Index (RII) method. In Malaysia, the used of the Industrialised Building System (IBS) in the construction industry has been rise as it gives many benefits to the project. However, without a decent quality management of the IBS product, it might give a bad perspective from the customers who are the contractors or consultants. From the previous literatures, hundred and nine (109) factors affecting the quality management of construction project that using Industrialised Building System (IBS) were identified and. In this study, the method used for data collection is by distribution of questionnaire. Most significance factors affecting the quality in construction were identified which is proper production equipment and technology with highest value of $RII = 0.684$. This study has important contribution to help project players of construction industry to ensure and maintain the good quality in construction while using Industrialised Building System (IBS) in future construction.

Keywords: Quality Management, Relative Important Index

Causes of Construction Delay for Housing Projects in Malaysia

Z. Ramli^{1,a)}, A. Nordin^{1,b)}, N. T. Roslin^{1,c)}, N. B. Hamid^{2,d)},
N. S. Azman^{1,e)}, and N. M. Zahari^{1,f)}

¹Department of Civil Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia.

²Centre for Diploma Studies, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Johor, Malaysia.

*zakwan@uniten.edu.my

Abstract. Every organization that is involved with the construction industry undoubtedly has delayed progress at some phase in their project or development. Delay in construction project become a common situation that contractor, client, or consultant might face. Construction delay can bring bad impacts to the organization itself or the overall development of a nation. From the previous studies, there are many researchers mentioned about the causes and impacts of the construction in Malaysia. However, little effort has been made to reduce this phenomenon in housing projects. Therefore, this research is to determine the delay factors involved in housing projects and rank the delay factors and delay impacts for housing projects. The qualitative method has been used to collect the data by distributing the questionnaire survey which contains 3 sections, the first section was demographic questions, the second section was the delay factors and lastly the delay impacts. The questionnaire was distributed to 30 experts to validate the delay factors that was obtained from the literature reviews and the second stage was targeted to 151 respondents who are involved in the construction industry. Total of sixty-three delay factors were identified with a total of eight groups meanwhile, the impact of delays in construction determined were twelve. Relative Importance Index (RII) method was used to rank those delay factors and impacts. The outcome of the study highlighted the most significant delay factors which are; (1) weather condition; (2) shortage in skilled laborers due to remoteness of site location; (3) progress payment delay by client; (4) award project to lowest bid price and (5) political interference.

Keywords: Construction Delay

Machining Difficulties and Determinant Parameters on Titanium alloys Machining Process for Aircraft Component and Parts

M S M Yusop^{1,a)}, A Y M Said^{1,b)}, Z Karim^{1,c)}, M Z A Yazid^{2,d)} A S Ramli^{1,e)}

¹Mechanical and Manufacturing Department, UniKL Malaysia France Institute, Section 14, Jln Teras Jernang, Bdr Baru Bangi, 43650 Selangor, Malaysia.

²UniKL Malaysia Itali Design Institute, 119, Jalan 7/91, Taman Shamelin Perkasa, 56100 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia.

*mshahrilmy@unikl.edu.my

Abstract. Aircraft parts and components used a lot of titanium as the material for body parts and engines. The materials offers rigidity, strength and light in weight. This unique characteristic was the major advantages in improving the payload capacity and improving the fuel consumption of the jet engines. The problem raised during the machining process of the material. Titanium is a hard material, elastic and poor thermal conductor. As the material is hard, higher machining force is require to perform the machining. Elasticity added the difficulties as it will spring away from the cutting tool which cause the tool to rub instead of cutting that can increased the heat. Thus, machining titanium materials is expensive and difficult. Machining and design parameters were important in determining the cost effectiveness in titanium machining. These parameters will further discussed in this paper and the parameters were composed from the previous paper reviewed, past research experience and interviews with the titanium machining experts. Various titanium machining parameters by the current manufacturer were then summarized.

Keywords: Titanium Alloys, Mchining

Combine Effect of Soft Drink Tins and Polypropylene Fibres on Mechanical Properties of Concrete

A Syamsir^{1,a)}, W Adnan^{2,b)}, V Anggraini^{3,c)}, N M Zahari^{2,d)},
S Norhisham^{2,e)}, S Beddu^{2,f)}, and Z Itam^{2,g)}

¹Institute of Energy Infrastructure (IEI), College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia.

² Civil Engineering Department, College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia.

³School of Engineering, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, 47500 Subang Jaya, Selangor, Malaysia

*agusril@uniten.edu.my

Abstract. The combine effect of soft drink tins (SDT) and polypropylene (PP) fiber on mechanical properties of concrete such as compressive and flexural strengths were observed in this research. In this research it is found that by combining 0.2% of SDT with 0.2 % PP fiber has increase compressive strength of concrete by 30% and 18.4 % for SDT 30 mm and 60 mm long, respectively. It was also observed by using the same combination for SDT 60 mm has increase flexural strength of concrete by 23.8% and 12.6 % for SDT 30 mm and 60 mm long, respectively. It is concluded that the optimum fiber contents are 0.2% for SDT and PP and the use of 30 mm long SDT fiber has better performance as compared to 60 mm SDT fibre.

Keywords: Polypropylene Fibres

Design and Development of Magnetic Track Inspection Robot

M Z S Abdul Salam¹, M F Abdul Jalal ^{1*}

¹College of Engineering, Universiti Tenaga Nasional, Jalan Ikram-Uniten, 43000
Kajang, Selangor, Malaysia.

*mfairuz@uniten.edu.my

Abstract. The traditional method used for bridge inspection by using truck and scaffold is dangerous for the inspector and it also can cause traffic congestion in certain cases. The objective of this project is to design and develop a magnetic track robot to support the steel bridge inspection. This robot uses tracked locomotion design to enhance the capability of traveling on the uneven terrain. Research has been conducted to investigate the current design and recommendation of the inspection robot. Several concepts have been developed and analyzed by using commercial software. The final concept has been decided and undergoes the fabrication process. As a result, the objective of this project was partially achieved.

Keywords: Design, Magnetic Track Inspection Robot

Poly-Lactic Acid (PLA)/Maghemite (γ -Fe₂O₃) Nanoparticles Mixed with Ultra Hard and Flexible (UHF) Bio-Resin for 3D Tissue Engineering Scaffold

Nor Hasrul Akhmal Ngadiman^{1a}, Zulhafizan Zulkifli¹,
Noordin Mohd Yusof¹, Ani Idris², Aini Zuhra Abdul Kadir¹,
Jaysuman Pusppanathan³

¹School of Mechanical Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, Johor Bahru, Johor, 81310 Malaysia

²School of Chemical Engineering, Faculty of Engineering, c/o Institute of Bioproduct Development, Universiti Teknologi Malaysia, Johor Bahru, Johor, 81310 Malaysia

³School of Biomedical Engineering & Health Sciences, Faculty of Engineering, Universiti Teknologi Malaysia, Johor Bahru, Johor, 81310 Malaysia

* norhasrul@utm.my

Abstract. The need for tissue engineering (TE) scaffold in providing a template for bone growth has become tremendously important due to the challenges faced when dealing with large scale bone repair. Recently, a novel processing technique has been developed for this purpose. In this study, digital light processing (DLP) 3D printer system was used. The DLP 3D printer uses the UV light projector to display the entire X and Y cross-sectional layer of the structure at once onto a polymer resin and solidified the liquid on the exposed area. The solidified layer is formed by slices on the collector and it moved on the Z axis to produce the structure of specific height. This system reduced processing time thus increasing the productivity and reproducibility of the scaffold. Poly-Lactic Acid (PLA) filled Maghemite (γ -Fe₂O₃) nanoparticles mixed with Ultra-Hard and Flexible (UHF) bioresin was used in this study. Maghemite (γ -Fe₂O₃) nanoparticles with its unique magnetic properties have increased the mechanical properties as well as the cell proliferation rate under 3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The successful of fabricating 3D structure from PLA biopolymer, γ -Fe₂O₃ nanoparticles and UHF bioresin via DLP 3D printing with enhanced mechanical and biocompatibility properties provide evidence of their great potential for use in various biomedical industry application.

Investigation of Tool Entry Strategy when Pocket Milling Titanium Alloy, Ti-6Al-4V under Wet Condition

A S Ramli^{1,2,a)}, S Sharif^{1,b)}, A Y M Said^{2,c)}, MSM
Yusop^{2,d)}, Z Karim^{2,e)}, A S Mohruni^{3,f)}

¹School of Mechanical Engineering, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia

²Mechanical and Manufacturing Section, Universiti Kuala Lumpur, 43650 Bandar Baru Bangi, Selangor, Malaysia

³Department of Mechanical Engineering, Faculty of Engineering Sriwijaya University, Indonesia

*anasalwa@unikl.edu.my

Abstract. Tool entry strategy determines how the cutting tool enters and moves into the workpiece during pocket milling operation without collision between the tool and workpiece. This work aims to investigate the effect of tool entry strategies on the tool wear of TiAlN coated carbide insert when pocket milling titanium alloy, Ti-6Al-4V under wet coolant condition. Two tool entry strategies namely circular and angular ramping were evaluated under rough machining condition. Three main cutting parameters of cutting speed (V_c), feed rate (f_z) and depth of cut were used with constant values at 90m/min, 0.1mm/tooth and 2mm respectively using fixed entry angle of 3° . Tool wear was observed and recorded for both circular and angular ramping entry modes at the end of the experiment. Experimental results showed that tool flank wear increases as the number of pass or run increases. During the first run, the recorded flank wear was at 0.016mm and 0.033mm for circular and angular entries respectively. At the fifth or the last run, the recorded flank wear was 0.028mm and 0.041mm for circular and angular entries respectively. It can be clearly concluded that the best tool entry when pocket milling Ti-6Al-4V was circular ramping as compared to angular entry due to the small immersion angle and intermittent tool engagement. These phenomena made it possible to ensure better stability during machining and prolong the tool life thus reducing the machining cost and enhance the overall performance of the pocket milling process.

Machining Difficulties and Determinant Parameters on Titanium alloys Machining Process for Aircraft Component and Parts

M S M Yusop^{1,a)}, A Y M Said^{1,b)}, Z Karim^{1,c)}, M Z A Yazid^{2,d)} A S Ramli^{1,e)}

¹Mechanical and Manufacturing Department, UniKL Malaysia France Institute, Section 14, Jln Teras Jernang, Bdr Baru Bangi, 43650 Selangor, Malaysia.

²UniKL Malaysia Itali Design Institute, 119, Jalan 7/91, Taman Shamelin Perkasa, 56100 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia.
3400, Selangor, Malaysia

*mshahrilmy@unikl.edu.my

Abstract. Aircraft parts and components used a lot of titanium as the material for body parts and engines. The materials offers rigidity, strength and light in weight. This unique characteristic was the major advantages in improving the payload capacity and improving the fuel consumption of the jet engines. The problem raised during the machining process of the material. Titanium is a hard material, elastic and poor thermal conductor. As the material is hard, higher machining force is require to perform the machining. Elasticity added the difficulties as it will spring away from the cutting tool which cause the tool to rub instead of cutting that can increased the heat. Thus, machining titanium materials is expensive and difficult. Machining and design parameters were important in determining the cost effectiveness in titanium machining. These parameters will further discussed in this paper and the parameters were composed from the previous paper reviewed, past research experience and interviews with the titanium machining experts. Various titanium machining parameters by the current manufacturer were then summarized.

Keywords: Titanium Alloys Machining

Measurement of Dissolved Oxygen in the Cascade Aerator for Groundwater Treatment at Rumah Nur Kasih Ulu Sepetang, Perak

Mohd Remy Rozainy Mohd Arif Zainol¹, Muhammad Faiz Syazwan Md Razif²

¹School of Civil Engineering, Universiti Sains Malaysia (USM), Engineering Campus, 14300 Nibong Tebal, Seberang Perai Selatan, Penang

²Politeknik Tuanku Sultanah Bahiyah, Kulim Hi-Tech Park, 09000 Kulim, Kedah, Malaysia

*ceremy@usm.my

Abstract. A tube well 15 meter deep and 150 mm diameter had been constructed as alternative water supply at Rumah Nur Kasih to help minimize operating cost for orphanage home by water cluster Universiti Sains Malaysia (USM). However, the groundwater wills changed color to rusty after oxidizes with oxygen, unpleasant taste and appearances due to high concentration of iron (Fe³⁺) and manganese (Mn⁴⁺). This groundwater is unable to use for domestic usage. So, this study is proposed to solve the problem of iron and manganese in groundwater at Rumah Nur Kasih. This study focuses on a cascade aerator to increase the concentration dissolved oxygen and from the water sample. From the dissolved oxygen indication, the removal of iron (Fe³⁺) and manganese (Mn⁴⁺) can be determine. Aeration using cascade aerator is more suitable to use in Rumah Nur Kasih because it is low operating and maintenance cost laterally by transferring oxygen into water mass. The removal of iron (Fe³⁺) and manganese (Mn⁴⁺) could be occurred due to oxygen transfer in aeration process. The quality of groundwater at Rumah Nur Kasih consist high concentration of iron (11.56 mg/L) and manganese (0.38 mg/L). The groundwater only used for external usage such as cleaning purposes. In this study, cascade aerator physical model used with flow rate of 22mL/s. It was found that the concentration of dissolved oxygen is increase between 1.7-22 mg/L. The concentrations of iron and manganese removal were 11.56 mg/L to 10.88mg/L (5.8%) and 0.38mg/L to 0.37 mg/L (3.6%) respectively.

Keywords: Groundwater Treatment

Numerical Modeling on Behavior of Concrete Slab Due to Low Velocity Impact

A Syamsir^{1,a)}, S Islamiyah^{2,b)}, V Anggraini^{3,c)}, Z Itam^{2,d)}, N M Zahari^{2,e)}, S Norhisham^{2,f)}, N L M Kamal^{2,g)}, N M Nor^{4,h)}
and D Mohamad^{2,i)}

A Syamsir^{1,a)}, S Islamiyah^{2,b)}, V Anggraini^{3,c)}, Z Itam^{2,d)}, N M Zahari^{2,e)},
S Norhisham^{2,f)}, N L M Kamal^{2,g)}, N M Nor^{4,h)} and D Mohamad^{2,i)}

¹*Institute of Energy Infrastructure (IEI), College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia*

²*Civil Engineering Department, College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia.*

³*School of Engineering, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, 47500 Subang Jaya, Selangor, Malaysia*

⁴*Faculty of Engineering, Universiti Pertahanan Nasional Malaysia (UPNM), 57000 Kuala Lumpur, Malaysia.*

*agusril@uniten.edu.my

Abstract. This paper presents on the low velocity impact loading on plain slab concrete. There are three different thicknesses of concrete slabs; namely 20mm, 30mm, and 40mm, all of which have been subjected to 1 blow of impact from 1.25kg steel ball per slab. The resulting deflections and stresses on the concrete midspan was then observed. It was found that the highest deflection occurs for the concrete slab with the 20mm thickness with a value of 9.965mm, while the lowest deflection was found to be at 4.157mm for the slab thickness of 40mm.

Keywords: Numerical Modeling

Development of Temperature Monitoring Towards Industry 4.0

*T.Sharmilah¹, M.Yahya², K.M.Fuzi², M.Pauzi²,
Z.Shirlynda³ and N.A.Faris²

¹Department of Mechanical Engineering, Faculty of Mechanical and Manufacturing Engineering, Universiti Tun Hussein Onn Malaysia (UTHM), 86400, Batu Pahat, Johor, Malaysia

²Department of Mechanical Engineering, Politeknik Sultan Abdul Halim Mu'adzam Shah, 06000 Jitra Kedah, Malaysia

³Department of General Study, Politeknik Sultan Abdul Halim Mu'adzam Shah, 06000 Jitra Kedah, Malaysia

*ilasharmilah@gmail.com

Abstract. Due to the market needs, it is necessary to develop a temperature monitoring that has fast response, low cost and high reliability in monitoring the CNC machine based on Message Queuing Telemetry Transport (MQTT) with the concept of Internet of Things to avoid machine accidents causes by overheating in machining. This system consists of Temperature and Humidity sensor to keep track of current status of temperature in CNC machining controlled by the Raspberry Pi B+ system with screen display on Monitor and Android Smartphone. This system was targeted to assist users in monitoring the CNC machines. Since the emergence of Internet of Things, a lot of effort and research had been conducted by the researcher resulted in the monitoring of CNC machine. In order to ensure a long lasting of electrical component in machining, the monitoring of overheating is a measure to provide safety and health in industrial which will lead to the ultimate goal of monitoring machine to realize the concept of "Internet of Things" and towards Industry 4.0. This research had proposed an idea to develop a temperature monitoring to be communicated with smartphone in order to monitor and control. It was developed by MQTT to ensure the communication of transmission of data between sensor and Android smartphone. With the function of smartphone, it allows the ease of portability and receiving data from sensor using MQTT. As the result from the research, temperature monitoring helps to improve the quality of machining in CNC machine, increase productivity, saves times, avoid machine from accidents and enabling of monitoring machine.

Poly-Lactic Acid (PLA)/Maghemite (γ -Fe₂O₃) Nanoparticles Mixed with Ultra Hard and Flexible (UHF) Bio-Resin for 3D Tissue Engineering Scaffold

*Nor Hasrul Akhmal Ngadiman¹, Zulhafizan Zulkifli¹,
Noordin Mohd Yusof¹, Ani Idris², Aini Zuhra Abdul Kadir¹,
Jaysuman Pusppanathan³

¹School of Mechanical Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, Johor Bahru, Johor, 81310 Malaysia

²School of Chemical Engineering, Faculty of Engineering, c/o Institute of Bioproduct Development, Universiti Teknologi Malaysia, Johor Bahru, Johor, 81310 Malaysia

³School of Biomedical Engineering & Health Sciences, Faculty of Engineering, Universiti Teknologi Malaysia, Johor Bahru, Johor, 81310 Malaysia

*norhasrul@utm.my

Abstract. The need for tissue engineering (TE) scaffold in providing a template for bone growth has become tremendously important due to the challenges faced when dealing with large scale bone repair. Though many attempts have been made to develop TE scaffold, however, mechanical and biocompatible properties are still a major concern. The materials and the process plays crucial roles to determine the properties of the developed TE scaffold. In this study, digital light processing (DLP) 3D printer system was used. The DLP 3D printer uses the UV light projector to display the entire X and Y cross-sectional layer of the structure at once onto a polymer resin and solidified the liquid on the exposed area. The solidified layer is formed by slices on the collector and it moved on the Z axis to produce the structure of specific height. This system reduced processing time thus increasing the productivity and reproducibility of the scaffold. Poly-Lactic Acid (PLA) filled Maghemite (γ -Fe₂O₃) nanoparticles mixed with Ultra-Hard and Flexible (UHF) bioresin was used in this study. Maghemite (γ -Fe₂O₃) nanoparticles with its unique magnetic properties have increased the mechanical properties as well as the cell proliferation rate under 3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The successful of fabricating 3D structure from PLA biopolymer, γ -Fe₂O₃ nanoparticles and UHF bioresin via DLP 3D printing with enhanced mechanical and biocompatibility properties provide evidence of their great potential for use in various biomedical industry application.

Numerical simulation of thermal fluid-structure interaction on flexible PCB in reflow soldering atmosphere

A M Iqbal^{1,2}, *M. S. Abdul Aziz¹, M. Z. Abdullah¹, M. H. H. Ishak³, Hamid Yusoff⁴

¹School of Mechanical Engineering, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal, Penang, Malaysia

²Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan (UMK), Jeli Campus, Locked Bag No. 100, 17600 Jeli, Kelantan, Malaysia

³School of Aerospace Engineering, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal, Penang, Malaysia

⁴Fakulti Kejuruteraan Mekanikal, Universiti Teknologi MARA, Cawangan Pulau Pinang

*msharizal@usm.my

Abstract. The substrate of the flexible printed circuit board (FPCB) introduced a new segment in surface mount technology (SMT) microelectronic industry to replace the conventional rigid printed circuit board (RPCB). Superior in flexibility and thin physical accommodate the necessity of present electronic devices. However, a far more critical issue would lie in the soldering connection between components and FPCB in the thermal reflow soldering atmosphere. These works investigate the factor of Reynold numbers (Re) and a conveyor speed of FPCB surface with the incorporation of single BGA. For this simulation purpose, the model was performed using finite volume (FV) based and finite element (FE) based, coupled simultaneously in FLUENT system coupling. Findings indicate both effects have major respond on FPCB surface and soldering connection at maximum deflection and von Mises stress, respectively. Moreover, the Re showed dominant influence towards soldering connection over conveyor speed.

Immobilization of heavy metal in coal bottom ash (CBA) mortar

*Nur Liyana Mohd Kamal¹, Salmia Beddu¹, N. M. Zahari¹,
Agusril Syamsir¹, Zarina Itam¹, Daud Mohamad¹, Siti
Nabihah Sadon¹, Kho Jia Yang¹, Teh Sabariah Binti Abd
Manan²

¹Department of Civil Engineering, Universiti Tenaga Nasional, Jln IKRAM-UNITEN,
43000 Kajang, Selangor, Malaysia

²Civil and Structural Engineering Department, Faculty of Engineering and Built
Environment, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

*Yana_kamal@uniten.edu.my

Abstract. Coal bottom ash (CBA) is a coal combustion by-products produced by coal-fired power plants. It is an alternative for cement material whilst reducing greenhouse effect. This research aims to investigate immobilization of heavy metal in concrete mortar contained of CBA. The solidification/stabilization (S/S) method was applied for the immobilization purpose. Chemical bonding and the functional group of the CBA mortar were comparable to the OPC cement mortar as negative control. Thus, CBA has good potential as eco-friendly cement binder for a better environment.

Keywords: Coal bottom ash; greenhouse; heavy metal; cement; binder

Characterization of Mechanical Properties on Natural Fibre Reinforced Polymer using Kenaf and Polyurethane

*M R Isa¹, A B Suhaimi¹, O S Zaroog¹, N M Zahari², S N Sulaiman³, I N Ismail¹, H Mohamed¹

¹Department of Mechanical Engineering, Universiti Tenaga Nasional, Jalan IKRAM-Uniten, 43000 Kajang, Selangor, Malaysia.

²Department of Civil Engineering, Universiti Tenaga Nasional, Jalan IKRAM-Uniten, 43000 Kajang, Selangor, Malaysia

³Faculty of Mechanical & Manufacturing Engineering Technology, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, Melaka, Malaysia

*mrashdan@uniten.edu.my

Abstract. Natural fibre composition is one of the excellent alternative for the most extensively utilized fibre in the composite revolution such as covers; vehicle door's panel and automobile roofs. Renewable, low cost and also decomposable (biodegradable) are some of benefits natural fibre composites. In latest years, a lot of researchers involved in natural fibre project to reinforced polymer. This study was done using kenaf fibres and polyurethane (PU) as the polymer. Composites have been organized the usage of the three unique percentages of composites 2%, 4% and 6% of kenaf fibre. The hardened composites were cured for 24 hours earlier than it was once shaped in accordance to precise dimensions. Mechanical tests were performed on the samples to study the behavior. In addition, the morphology of the materials were observed using scanning electron microscope (SEM) Result found that the 6% of kenaf fibre has the highest hardness value, tensile as well as impact strength. It could be seen using SEM that 6% fiber loading showed lesser void and superior interfacial bonding between the fiber and polymer matrix.

A Review: Independent Water and Wastewater Treatment Methods

*W N Yusairah¹, M H Zawawi¹, S Z Abidin¹, I N Ismail¹ M N Zahari¹, M.A.Kamaruddin² and L.M.Sidek¹

¹Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Malaysia

²School of Civil Engineering, Universiti Sains Malaysia, 14300 Parit Buntar, Malaysia

*wnyusairahnasir@gmail.com

Abstract. The purpose of this paper is to present examples of independent water and wastewater treatment methods in a way to provide clean water to the community. Out there, tons of method exists to reduce the effect of the water pollutant and improve the water quality problems. In order to reduce the water problems, this paper focuses on the process of water and wastewater treatment by using three different methods which are natural and independent water and wastewater treatment, independent artificial water, and wastewater treatment and hybrid water and wastewater treatment. Natural independent method mostly using vegetation as a medium or mechanism to purify water. For the hybrid method, green energy artificial floating island(GAFI), solar power artificial floating Island (SAFI) and solar power lake and pond aeration system were studied the removal efficiency by all the devices. The methods were reviewed in order to find the efficiencies and effectiveness of each method.

Keywords: Independent, Water, Waste Water, SAFI.

A Simulation of Particle Movement by using DEM-DPM

*Nurhanani A Aziz¹, M H Zawawi¹, Aizat Mazlan¹, M Z Ramli¹, M R M Radzi², Aizat Abas³, Aqil Azman³

¹Department of Civil Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia

²Generation Division, Tenaga Nasional Berhad, Malaysia

³School of Mechanical Engineering, Universiti Sains Malaysia, 14300 Parit Buntar, Pulau Pinang, Malaysia

*nurhanani_abdaziz@yahoo.com

Abstract. Shoreline changes that leads to coastal erosion is a natural phenomenon that concern many researchers worldwide. It is important to understand the particle movement of the sand that induced by sea waves to predict the changes of the shorelines. In the present study, sand sediment erosion model has been developed to determine which division that has high movement of the particle by using DEM-DPM method. The simulation works reported that, the velocity magnitude of the particle at the upper part is high while at the lower part is low. It is also found that, the total pressure at the upper part of the sand sediment is low compare to the lower part of the sediment. Furthermore, the most critical division can be determined through this simulation as the critical division has a high movement of the particle. Based on the findings, the most critical division for this sand sediment model is Division A as the particle on that division has a high movement of the particle due to high velocity magnitude and low total pressure.

Stress and Deformation Analysis on Dam Spillway Structure due to Water Discharge

*N H Hassan¹, M H Zawawi¹, M A Abas², M R M Radzi³,
A Hassani³, N M Zahari¹, M Z Ramli¹, M A Kamaruddin⁴
and L M Sidek¹

¹Department of Civil Engineering, Universiti Tenaga Nasional, 43000 Kajang,
Selangor, Malaysia

²School of Mechanical Engineering, Universiti Sains Malaysia, 14300 Parit Buntar,
Pulau Pinang, Malaysia

³Generation Division, Tenaga Nasional Berhad, Malaysia

⁴School of Civil Engineering, Universiti Sains Malaysia, 14300 Parit Buntar, Pulau
Pinang, Malaysia

*nhh.husnahassan@gmail.com

Abstract. This study assesses the structural analysis on the sector gate in dam spillway with 5 m gap opening. The parameters determined on this study are equivalent stress and total deformation. The structure analysis on the spillway structure is due to the impact of water discharge. Computational fluid dynamic (CFD) modelling is applied to assess the water flow that affect stress and deformation occurred using computational aided program using ANSYS. Result of the transient structure model show that the highest stress value is at the radial gate which is 29.69 MPa and the lowest stress value is at stilling basin which is 0.037×10^{-9} MPa. All the deformation values are relatively low especially at the stilling basin which is 1.021×10^{-9} m and the largest deformation value is at the radial gate which is 10.47×10^{-6} m. It can be concluded that the stress and deformation give different result due to different materials. Stress and deformation values at mild steel material parts are higher than concrete material parts due to the high impact of water pressure. Future mitigation measures have to take to ensure the sustainability of the structural integrity.

Keywords: Structural Analysis, Water Discharge; Computational Fluid Dynamic (CFD), Stress, Deformation

Structural Dynamic Behavior Study of the Kenyir Hydropower Station Ungated-type Spillway

Azizi Arbain¹, Mohd Hafiz Zawawi², *Ahmad Zhafran
Ahmad Mazlan¹, Mohamad Aizat Abas¹, Mohd Rashid
Mohd Radzi³ and A Hassani³

¹School of Mechanical Engineering, Engineering Campus, Universiti Sains Malaysia,
14300 Nibong Tebal, Penang, Malaysia.

²Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional,
43000 Kajang, Selangor, Malaysia.

³TNB Generation Division, Tenaga Nasional Berhad, 59200 Kuala Lumpur, Malaysia.

*zhafran@usm.my

Abstract. Frequency response function (FRF) and modal parameters including the natural frequency, damping ratio and mode shapes need to be studied in order to aid the monitoring process as well as to avoid the resonance to the structure. This is important since these measurements will be used as reference for any operational methods for the dam structure. This paper will discuss the structural dynamic analysis of one of the dam available in Malaysia which is Kenyir Dam (Sultan Mahmud Power Station) in Terengganu. The study has been conducted on the spillway section of the dam structure. The CAD model of the structure has been designed based on real size structure (1:1 scale) with the consideration of real build-in materials. A finite element (FE) model of the structure is then constructed in ANSYS Workbench software to run the analysis. Meshing sensitivity analysis has been conducted and the boundary condition has been set before performing the analysis. 30 natural frequencies have been determined and 6 most significant mode shapes are chosen to be discussed in this paper. For the FRF, all three axes, x, y and z-direction have the same dominant natural frequency value of 19.6 Hz, where the highest deflection occurred at z-direction with 6.795×10^{-4} m.

Characteristics of Polyethersulfone Membranes With the Addition of Silver Nitrate; Tensile Strength, Microstructure and Permeability

*A Mataram¹, S Rizal², R A Saputra¹

¹Mechanical Engineering Department Engineering Faculty Universitas Sriwijaya,
30662 Indralaya, Indonesia.

²Mechanical Engineering Department, Politeknik Negeri Sriwijaya, 30139 Palembang,
Indonesia

*amaram@unsri.ac.id

Abstract. On this research will be used as raw material for the manufacture of polymer membrane synthesis of Polyethersulfone (PES). Properties of a membrane are known about the characteristics of the membrane which can figure out the effectiveness and efficiency of a membrane that is created by the presence of parameter testing. Study of the parameters used, namely tensile strength, strukturmikro and permeability of the membrane. This membrane is created using three different aqueous concentrations of PES (27.5%, 25%, 30% by weight) with the addition of concentrations of silver nitrate (AgNO₃) a 1% weight and N, N-Dimethylformamide (DMF) as a solvent. The results of the mechanical strength of Adhesion machine using Tearing Strenght Tester showed an increase in the value of the pull-test of the 523.3626333 kPa to concentrations of 25%, the 593.554966 kPa to 27.5% and the concentration of the 621.5878333 kPa to 30% concentration. For testing of micro-structure using Scanning Electron Microscopy to the result increase the diameter of the pores, to range 1,396 μ m-2,151 μ m, there without void for concentrations of 25%, range 645.2 nm to 967.9 nm size without voids for concentrations of 27.5% and 573.5 nm up to 1,950 μ m size with no voids at concentrations of 30%. For the ability of membrane permeability on pressure 2 bar using the Ultrafiltration Education Tool Kit for 25% concentration of 69.9420 L.m-2.h-1 for the concentration of 27.5% 18.24575 L.m-2.h-1 for the concentration of 30% 14.81776 L.m-2.h-1.

Keywords: Manufacture polymer, Polymer membrane, Membrane synthesis

Coastal Sediment Transport Study along Shoreline by using Smooth Particle Hydrodynamics

M H Zawawi¹, *Aizat Abas², Aqil Azman², M R M Radzi³,
A Hassani³, Nurhanani A Aziz¹

¹Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional, Selangor, Malaysia.

²School of Mechanical Engineering, Engineering Campus, Universiti Sains Malaysia, 14300, Nibong Tebal, Penang, Malaysia.

³Generation Division, Tenaga Nasional Berhad, Malaysia

*aizatabas@usm.my

Abstract. Sediment transport typically due to combination of gravity acting on the sediment, and/or the movement of the fluid in which the sediment is entrained. This paper gives an exposure simulation of three-dimensional (3D) sediment transports by using Smooth Particle Hydrodynamics (SPH) at coastal area. The SPH formulation from Monaghan constructed in the code is modified according to the desired model to be solved. The code is then computed by using single Graphics Processing Unit (GPU) with 14 cores multiprocessors. The behavior of sediment transport is investigated in this research based on Herschel-Bulkley-Papanastasiou (HBP) model. A constant sinewave of $0.5\sin(0.5\pi t)$ is applied to the fluid domain to create sea wave effect that will cause sediment transport. The results show that the goal to get sediment transport is achieved and for the further study, the rate of erosion and accretion can be determined to give more meaningful and valuable to the result.

Keywords: Sediment transport, Sediment movement, Gravity acting

Effect of Free Surface Water Level of Kenyir Dam on Spillway Structure using Fluid-Structure Interaction (FSI) Analysis

M R M Radzi¹, Muhammad Naqib Nashrudin², Mohd Hafiz Zawawi³, *Aizat Abas², Aqil Azman², A Hassani¹

¹Generation Division, Tenaga Nasional Berhad, Malaysia.

²School of Mechanical Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia.

³Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia

*aizatabas@usm.my

Abstract. This paper investigated the effect of free surface water level of Kenyir Dam towards the stress and deformation of spillway structure by using fluid-structure interaction (FSI) simulation. The water flow across the spillway is visualized as modelled based on volume of fluid (VOF) scheme. For free surface water level of 155 m, higher stress is computed at the spillway (40.4 MPa) and at the downstream (8.9 MPa) compared to the result of free surface water level of 146 m. It is found that the higher the free surface water level caused high force exerted by the water flow on the spillway structure.

Keywords: Spillway structure, Free surface, Surface water

Numerical Visualization of Flow in Spillway and Downstream of Dam using Fluid/Structure Interaction

Muhammad Naqib Nashuridin¹, *Aizat Abas¹, Aqil Azman¹, F C Ng¹, M R M Radzi², A Hassani²

¹School of Mechanical Engineering, Universiti Sains Malaysia, Engineering Campus, Nibong Tebal, 14300, Penang, Malaysia.

²Generation Division, Tenaga Nasional Berhad, Malaysia.

*aizatabas@usm.my

Abstract. This paper presents the visualization of flow in the spillway and downstream of a reservoir dam by using the fluid/structure interaction (FSI) numerical simulation. The current investigated height of free water surface is 146 m. A steady flow of water along the spillway is successfully simulated using the volume of fluid (VOF) scheme and open channel flow.

Keywords: Flow spillway, Spillway downstream, Downstream reservoir, Fluid structure

Water Quality Physical Parameters Distribution Mapping at Upstream of Dam Spillway

*F Nurhikmah¹, M H Zawawi¹, N M Zahari¹, N H Hassan¹,
W N Yusairah¹, Nurhanani A Aziz¹, Aisyahira Melan¹, M
R M Radzi², A Hassani² L M Sidek¹

¹Department of Civil Engineering, Universiti Tenaga Nasional, 43000, Kajang,
Selangor, Malaysia

²Generation Division, Tenaga Nasional Berhad, Malaysia

*cikfarahghazali@gmail.com

Abstract. Water quality monitoring is indispensable for the development of society and health. Water quality can be determined either by individual parameter of any specific interest or by selected a few important parameters to assess the overall quality. A study was conducted at one of hydropower dam station in Malaysia to identified the pattern of water quality distribution using Surfer software involving turbidity (Tur), total suspended solids (TSS), and total dissolved solids (TDS) on the upstream area of the dam. The parameters were measured at six different points on different depth. The pattern of distribution from upper stream to downstream dam spillway has been determine using colour contour mapping. The results of the analysis showed that the highest value for turbidity is >1000 NTU, for TSS is >1000 mg/l and for TDS is 39 mg/l.

Keywords: Water quality, Quality monitoring, Monitoring indispensable, Society health

Removal of Malachite Green from Aqueous Solution by Using Pineapple Peel

`Atiqah Mohamad Radzi¹, *Sharifah Zati Hanani Syed Zuber¹, Nor Fauziah Zainudin¹, Noor Amirah Abdul Halim¹, Rozaini Abdullah¹

¹Faculty of Engineering Technology, Universiti Malaysia Perlis, Sungai Chuchuh, 02100 Padang Besar, Perlis, Malaysia.

*sharifah.zati@unimap.edu.my

Abstract. This study investigates the potential of pineapple peel (PP) as a low cost agricultural adsorbent in the removal of malachite green (MG) from aqueous solution. The potential of PP as an adsorbent was proven by Fourier Transform Infrared Spectroscopy and Scanning Electron Microscopy (SEM). The adsorption process was conducted in a batch experiment for different parameters such as initial of dye concentration, adsorbent dosage and contact time. The experiment showed that the amount of dye adsorbed was highest at 3.92 mg/g for 100 mg/L MG concentration. The amount of dye adsorbed was found to increase with increase in initial dye concentration. Besides, the experimental results showed that 0.5 g of PP was capable to remove 95.25% of MG dye as the percentage removal of MG dye were increase with the increase in adsorbent dosage. The optimum contact time was 180 minutes which give the highest percentage of MG dye removal of 88.02%. The effect of contact time showed that the percentage of dye removal increase with the increase in contact time. Furthermore, the adsorption kinetic was well described by pseudo-second order with a good correlation factor R² of 0.9981. Moreover, Langmuir isotherm model is best described the adsorption of MG dye onto PP compared to Freundlich isotherms since the R² value is 0.9909. This study indicate that the PP can be an alternative adsorbent for the removal of MG from aqueous solutions.

Keywords: Mg dye, Adsorbent removal, Dye concentration, Dye adsorbed

Experimental Investigation of Thermophysical Properties ZnO Nanofluid with Different Concentrations

*N H Safir¹, Z M Razlan¹, N A M Amin¹, Nazih A Bin-
Abdun¹

¹School of Mechatronics Engineering, Universiti Malaysia Perlis, Kampus Tetap Pauh
Putra, 02600 Arau, Perlis, Malaysia.

*nadhs_69@yahoo.com

Abstract. In recent years, studies on nanofluids has increased and the thermal properties of nanofluids and their heat transfer abilities have gained importance. Nowadays nanofluids shows great potential for conventional heat transfer and enhancing the thermal conductivity of a base fluid. In the present work, the theoretical and experimental work are carried out to evaluate the thermal properties of nanofluids ZnO/De-ionized water nanofluid with different ZnO nanoparticles. The nanofluid (ZnO/De-ionized water) was prepared by dispersing a nominal diameter of 40 nm with different volume concentrations (0.09 %, 0.18 % and 0.44 %) of ZnO nanoparticle in base fluid (DI water). In addition, Sodium Dodecyl Sulfate (SDS) surfactant used to improve the stability of nanofluid. The sedimentation of nanoparticles inside the base fluid gives the highest dissipation on the eighth day for the 0.44% volume concentration of ZnO/De-ionize water nanofluid. The thermal conductivity, of ZnO/De-ionize water nanofluid at 0.44% vol. concentration is improved by 4.11% than of the base fluid at 35 °C.

Keywords: Base fluid, zno de, Water nanofluid, Thermal properties

Numerical Investigation of the Aerodynamic Characteristics of a Coupling of the Three Blades VAWT with a Movable Vanes

Kadhim H. Suffer¹, Isam E Yousif², *Salsuwanda Bin Selamat³

¹Mechanical Engineering Dep., Engineering College, Al-Nahrain University, P.O. Box 64040, Baghdad, Iraq

²Fuel and energy Engineering Technologies Dep., Technical College, Northern Technical University, Kirkuk, Iraq

³School of Environmental Engineering, Universiti Malaysia Perlis, Kompleks Pusat Pengajian, Jejawi 3, 2600 Arau, Perlis, Malaysia.

* salsuwanda@unimap.edu.my

Abstract. Vertical axis wind turbine (VAWT) is one type of wind machine which is used now a day to produce electricity. The aerodynamics of a VAWT is very complex due to the dynamic stall when the blade of the turbine is an airfoil. Low starting torque is the wind turbine disadvantage when the airfoil is used as a blade. In the present study, the numerical simulation is carried out to perform the aerodynamic characteristics of a proposed three coupling blade vertical axis wind turbine model. Each blade in the proposed model, including a couple of horizontal movable vanes with straight airfoil to solve the starting torque problem. A commercial available computational fluid dynamic ANSYS FLUENT 16.1 software's with (SST) k- ω turbulence and finite volume method were used to estimate the aerodynamic characteristics of the coupling of the three blades VAWT with a movable vane in the current simulation. The predicted results from the numerical simulation show that the drag coefficient (Cd), static pressure drop and starting torque are increased in the positive side and decreases in the negative side of the turbine rotor. The flow of air passes freely through the movable vanes in case of the vanes are fully open at the negative side of the turbine, this case helps to increase turbine rotation and so, thus, the power of the turbine increases. Finally, the predicted results from the simulation give a good agreement with those results reported in the published literature for VAWT has different blade configurations.

Keywords: Renewable energy; Wind energy; VAWT; CFD; Straight blade rotor; k- ω turbulence model.

List of Abstract
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Research Regarding the Use of Secondary Raw Materials for Photovoltaic Systems Development

Alina Nicolae¹, George Poteras², Gyorgy Deak³, Marius Olteanu⁴, Andreea Baraitaru⁵

^{1,2,3,4,5}National Institute for Research and Development in Environmental Protection ,
Bucharest, Romania

Abstract. In order to ensure a sustainable development by substantially reducing human contribution to accentuating the greenhouse effect phenomenon and exhausting natural resources, it was necessary to develop various installations for capturing, storing and transforming the energy produced by renewable sources into electricity. At the same time, efficient resource use is one of the most important prerequisites for sustainable economic growth and the transformation of waste into secondary raw materials forms the basis for systems that promote the circular economy. In this sense, it is necessary to research and apply new technologies for the integration of recycled materials into complex systems of green energy production. The present paper describes the preliminary results obtained from the laboratory tests which involved the use of recyclable materials in order to produce electricity based on solar energy.

Bioengineering Models for Wind Turbines Blades

Alina Nicolae¹, George Poteras², Gyorgy Deak³,
Andreea Daescu⁴, Cristina Sirbu⁵

^{1,2,3,4,5} National Institute for Research and Development in Environmental Protection –
INCDPM, 294 Splaiul Independentei, 6th District, 060031, Bucharest, România

Abstract. Starting from the directing and fluid concentration effect in a cylindrical enclosure, it was developed, at laboratory scale, an integrated installation to be use in coastal areas which use 3 natural resources for the production of electricity within the same system. Initially, the wind turbine, which is an integral part of this system, was provided with trapezoidal blades. In order to obtain higher power, other types of blades have been studied and proposed, whose geometry is inspired by nature. As a result of the tests carried out at the pilot station, it was demonstrated that if bioengineering models are used, the rotation speed of the blades increases by approx. 37% compared to trapezoidal ones.

Exhaustive Approach to Livestock Wastewater Treatment in Irrigation Purposes for a Better Acceptability by The Public

Carmen Tociu¹, Irina-Elena Ciobotaru^{*,}, Cristina Maria¹,
György Déak¹, Alexandru-Anton Ivanov¹, Ecaterina
Marcu¹, Florica Marinescu¹, and Ioana Savin¹

¹ National Institute for Research and Development in Environmental Protection –
INCDPM, 294 Splaiul Independentei, 6th District, 060031, Bucharest, România

Abstract. Water is an essential but scarce resource and its preservation is one of the issues that have gained an increased interest in the last decades. The reuse of treated wastewater has become a practice employed more frequently in the recent years, particularly in irrigation purposes. However, the public perception on this aspect should be taken into consideration so that the effects on people's comfort are minimised. This paper addresses the issue of treating livestock wastewater in order to meet the requirements for its reuse as irrigation water, also taking into consideration some parameters that may influence the public acceptability, such as odour and colour. Ozonisation is a proposed method for the advanced treatment of this type of wastewater. The results showed an improvement of physicochemical and bacteriological parameters adequate to the regulations regarding crop irrigation. The organoleptic properties of the final effluent have registered a decrease of colour intensity and odour up to acceptable values. Ozonisation has proved efficient in the treatment of livestock wastewater and although it involves high operating cost, it provides effluents that may be more easily accepted by the public for reuse in irrigation purposes near the living areas.

Assessing the Heavy Metals Concentrations in the Dambovită River

György Deák¹, Florina-Diana Dumitru¹, , Mihaela-
Andreea Moncea¹, Ana-Maria Panait¹, Mădălina Boboc^{1,2},
Tiberius Dănilache¹, Elena Holban¹, Florica Marinescu¹,
Petrache Ionuț Gheorghe¹ and Irina Ciobotaru¹

¹National Institute for Research and Development in Environmental Protection
(INCDPM Bucharest), 294 Splaiul Independentei, 060031, Bucharest, Romania

²Dunărea de Jos University of Galați, Romania, 47 Domnească Street, 800008, Galați,
Romania

Abstract. Anthropogenic activities can lead to the contamination of freshwaters with heavy metals, which are some of the most persistent pollutants in waterbodies, due to their difficulty to degrade. These pollutants can be accumulated in sediments, aquatic macrophytes and other aquatic organisms, leading to ecological disturbances and potential human health risks. Thus, the present paper aims to determine the heavy metal concentrations along the Dambovită River. For each sampling point, 3 specimens were collected. The water specimens were analysed by using atomic absorption spectrophotometry to determine the Ni, Pb, Cd and Hg concentrations. The obtained results showed that the water specimens are aligned with the Romanian water quality standards for the foreseen indicators. The biota analysis showed the presence of aquatic macrophytes and algae.

Assessment of Recovery Opportunities and Environmental Impact of Mining Residues from Moldova Noua Tailings Pond

Florina-Diana Dumitru¹, György Deák¹, , Mihaela-Andreea Moncea¹, Ana-Maria Panait¹, Monica Matei¹, Mădălina Boboc^{1,2}, Lucian Laslo¹, Nicu Ciobotaru¹, Lucian Lumînrăoiu¹, Gabriel Cornăţeanu¹ and Petrache Ionuţ Gheorghe¹

¹National Institute for Research and Development in Environmental Protection (INCDPM Bucharest), 294 Splaiul Independentei, 060031, Bucharest, Romania

²Dunarea de Jos University of Galati, Romania, 47 Domnească Street, 800008, Galati, Romania

Abstract. Considering the continued increase in demand for mining products used in industry along with the limitations of the existing resources, a possible solution is to capitalize mining residues and recover useful elements. Besides the economic aspect that arises with the recovery of secondary raw materials, the potential impact of these residues on the environment must be analyzed, in order to adopt the most adequate sustainable remediation solutions. Thus, the present paper aims to assess the mining residues present in the tailings pond from Moldova Noua, Romania in order to identify the opportunity to recover critical elements and to establish their potential impact to the soil. In this respect, samples taken from the tailings pond were characterized by X-ray fluorescence and scanning electron microscopy coupled with energy dispersive X-ray spectroscopy. The density and porosity of the samples were also determined. The results indicate high porosity of the samples and the presence of Cu in form of calcopirite and borite ores, along with other types of minerals.

Impact of Temporary Loss Of Connectivity In The Epurasu Branch And Its Effects On The Composition And Distribution Of Ihtiofauna

Adrian-Ștefan Zamfir^{1,2}, György Deák¹, Tiberius Marcel Dănilache^{1,3}, Puiu Lucian Georgescu^{1,2}, Marius Constantin Raischi^{1,2}, Alexandru Cristea¹, Lucian Oprea² and Lucian Gheorghe Lumînăroiu¹

¹ National Institute for Research and Development in Environmental Protection, 060031, Bucharest, Romania.

² University „Dunărea de Jos” of Galați, Faculty of Industrial Engineering, 800008, Galați, Romania

³ University of Agronomic Studies and Veterinary Medicine, 011464, Bucharest, Romania

Abstract. Connectivity is now recognized as a fundamental property of all ecosystems. In this study, the effects of temporarily connection loss of the Epurasu branch, caused by low flows and the emergence of sandbanks throughout its length, were investigated. In this context, scientific fishing activities, water sampling, and measurements for the determination of hydrological conditions, were carried out. For scientific fishing an approved electric device was used, and two ADCP equipment were used to determine the hydrological parameters. The obtained results revealed differences in the number of species captured at the entrance of the branch compared to those captured at the exit of the branch, where a smaller number of catches were recorded. In the area of the Epurașu branch, low water discharge, associated with high nutrient and organic concentrations have led to favorable conditions for the development of phytoplankton and the emergence of eutrophication. Water quality results have shown that the eutrophication phenomenon affects the area Epurașu branch, the values of the nutrient concentrations (total mineral nitrogen and total phosphorus), chlorophyll "a" and phytoplankton biomass registered values that were in the field of hypertrophy.

Measurement of Dissolved Oxygen in the Cascade Aerator for Groundwater Treatment at Rumah Nur Kasih Ulu Sepetang, Perak

Rhahimi Jalil^{1,a)}, Mohd Remy Rozaimy Mohd Arif Zainol^{2,b)} and Muhammad Faiz Syazwan Md Razif^{2,c)}

¹Politeknik Tuanku Sultanah Bahiyah, Kulim Hi-Tech Park, 09000 Kulim, Kedah, Malaysia

²School of Civil Engineering, Universiti Sains Malaysia, Kampus Kejuruteraan, 14300 Nibong Tebal, Pulau Pinang, Malaysia.

Abstract. A tube well 15 meter deep and 150 mm diameter had been constructed as alternative water supply at Rumah Nur Kasih to help minimize operating cost for orphanage home by water cluster Universiti Sains Malaysia (USM). However, the groundwater wills changed color to rusty after oxidizes with oxygen, unpleasant taste and appearances due to high concentration of iron (Fe³⁺) and manganese (Mn⁴⁺). This groundwater is unable to use for domestic usage. So, this study is proposed to solve the problem of iron and manganese in groundwater at Rumah Nur Kasih. This study focuses on a cascade aerator to increase the concentration dissolved oxygen and from the water sample. From the dissolved oxygen indication, the removal of iron (Fe³⁺) and manganese (Mn⁴⁺) can be determine. Aeration using cascade aerator is more suitable to use in Rumah Nur Kasih because it is low operating and maintenance cost laterally by transferring oxygen into water mass. The removal of iron (Fe³⁺) and manganese (Mn⁴⁺) could be occurred due to oxygen transfer in aeration process. The quality of groundwater at Rumah Nur Kasih consist high concentration of iron (11.56 mg/L) and manganese (0.38 mg/L). The groundwater only used for external usage such as cleaning purposes. In this study, cascade aerator physical model used with flow rate of 22mL/s. It was found that the concentration of dissolved oxygen is increase between 1.7-22 mg/L. The concentrations of iron and manganese removal were 11.56 mg/L to 10.88mg/L (5.8%) and 0.38mg/L to 0.37 mg/L (3.6%) respectively.

Extreme Events in Romania Associated with Large-Scale Atmospheric Circulation

M. Matei¹, *G. Deak¹, N. Ciobotaru¹, L. Laslo¹, M. Boboc¹, T. Lupei¹

¹National Institute for Research and Development in Environmental Protection ,
Bucharest, Romania

*dkrcontrol@yahoo.com

Abstract. For the quantitative characterization of these phases, an index was also defined which represents the difference between the atmospheric pressure anomalies between two zones characteristic of the Azores anticyclone and the Icelandic depression. The NAO index presents positive values when atmospheric pressure values are higher than normal in the Azores anticyclone, its negative values being associated with higher atmospheric pressure values in the Icelandic depression (Hurrell, 1995). Baric systems influencing the dynamics of air above Romania are represented by the four main centers: the Azores Anticyclone, the Icelandic Cyclone, the Eastern European Anticyclone and the Mediterranean Cyclones. An important factor influencing the climate variability in Romania is NAO. According to the study by Bojariu and Paliu, (2000), the positive phase of the oscillation causes higher.

Keywords: Extreme Events, Romania, Large-Scale Atmospheric Circulation

Preliminary Assessment of the Status of Romanian Wetlands Through the Framework of Habitat Quality Analysis

Nicu Ciobotaru¹, Lucian Laslo¹, Theodor Lupei¹, György Deák¹, Monica Matei¹, Norbert Bara¹

¹INCDDPM Bucharest, 294 Splaiul Independenței, România

*dkrcontrol@yahoo.com

Abstract. Despite their important role to offer multiple ecosystem services, throughout the history, wetlands were underestimated and were perceived as wastelands. Therefore, many wetland areas were drained and transformed into areas serving other purposes, e.g. farmlands, this process taking place even today. To assess the pressures exerted upon wetlands, the Habitat Quality (HQ) model of the InVEST framework was used. The analysis is based on High Resolution layers from Copernicus Land portal, which delineate the wetlands with a good precision. Therefore, we offer information for about 1420 km², that were identified as wetlands in Romania, compared with the official area of over 8000 km². The results are showing that a very high proportion of the Romanian wetlands are in a good condition (HQ=0.9-1), due to the great share of Danube Delta wetlands in national surface, while the average value of HQ index is about 0.76 for all wetlands, with a poorer state for wetlands outside Danube Delta and Lower Danube Floodplain, where average values of HQ are about 0.5 - 0.1, indicating their high susceptibility to pressure exposure state. The results are not compared with field data, future research being necessary, but this type of assessment is a good framework for decision makers in order to prioritize the conservation plans for wetlands.

Keywords: Preliminary Assessment, Romanian Wetlands

A Review: A Removal Sediment by Using Siphon Technique In Water Reservoir

Zainordin Firdaus Zulkefli¹, *Mohd Remy Rozainy Mohd Arif Zainol¹, Mohamad Aizat Abas², and Ismail Abustan¹

¹School of Civil Engineering USM, 14300, Nibong Tebal Seberang Perai Selatan, Pulau Pinang, Malaysia

²School of Mechanical Engineering USM, 14300, Nibong Tebal Seberang Perai Selatan, Pulau Pinang, Malaysia

*ceremy@usm.my

Abstract. Today, Reservoir is a hydraulic infrastructure constructed by impounding water from a large body of water such as a river using a dam. Reservoirs have multifunctionality such as supplying water for domestic use as an important purpose, electricity supply and flood control. According to ICOLD figures, world storage of reservoirs is decreasing critically because of sedimentation. Deposition of sedimentation also contributes to damage to dam structure. The reliability and performance of a reservoir depend on several factors, especially the storage. Sediment disturbs the storage. In this study, sediment removal using siphon technique in a water reservoir is discussed. Understanding the deep principles of siphon in dynamic fluid as a realistic condition is to get an excellent design of siphon. A few designs of siphon have been produced in solid works refer to design guidelines from review in small scale model and analyzed using Ansys R18.2. The design with optimum velocity of suction has been identified and ongoing improvement has been done.

Keywords: Sediment, Siphon Technique, Water Reservoir

Determination of BOD Kinetic Parameters of Domestic and Industrial Wastewater Using Different Mathematical Methods

D Alrousan¹ and M F Murshed^{1,2,3}

¹School of Civil Engineering, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia.

²Cluster of Solid Waste Management, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia.

³Cluster of Water Security, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia

Abstract. The biochemical oxygen demand (BOD) of different types of raw wastewater including industrial and domestic wastewater in Jordan were studied using manometric method for a period of 20 days in the year 2018. This paper evaluates different BOD kinetic parameters estimation methods to determine the best method to be used (BOD₂₀, L). Mathematical methods were used to determine the ultimate BOD (mg/L) and constant rate (per day) by using the Thomas, Iteration and GMM methods. The study revealed that the mean ultimate BOD value for the slaughterhouse samples was the highest and the wastewater samples from all the three locations were classified as strong water. Furthermore, it was found that GMM method was the best method for estimating the first order BOD kinetic parameters while Thomas method was the least favorable method.

Diurnal Variability of Ground Level and Nitrogen Dioxide during Festive Holidays in Kelantan, Malaysia

A Z Ismail¹, N S Adnan¹, N R Awang¹, W W, Khong¹, H A Aziz¹, and A U M Nazir¹

¹Faculty of Earth Science, University Malaysia Kelantan, Kampus Jeli, Locked Bag 100, 17600 Jeli, Kelantan, Malaysia.

Abstract. Ground level ozone (O₃) is a noxious secondary air pollutant known to affect human health and the environment adversely. Its photochemical reactions greatly depend on anthropogenic emission that controls their production and accumulation. The impact of several significant festive celebrations in Kota Bharu Malaysia onto O₃ was critically investigated in this study. Two years secondary continuous air monitoring data (2013-2014) in Kota Bharu were divided into festive and non-festive holidays according to the specific date of the celebrations and analysed using descriptive statistics, box and whisker plot, time series plot and diurnal plot. The comparisons of diurnal variation of these pollutants during festive and non-festive holidays were analysed using independent sample t-test. The diurnal patterns of ozone during festive and non-festive holidays were showing a consistent trend with slightly different magnitude. The minimum ozone level was observed at nighttime (started from 6 p.m. onwards), and before sunrise, meanwhile, the maximum level of ozone concentration was at noontime (12 p.m. to 2 p.m.). There are no apparent differences between O₃ concentrations prior, during and post-festive holidays and changes in human activities are insignificantly influence O₃ diurnal variations in Kota Bharu.

Potential Antioxidants from Crude Extracts of Roselle Seeds and Cashew Nut Shells for Biodiesel Storage Stability Improvement

Mohamad Habid Hasan¹, Muhammad Shahariz
Mohamad Adzib¹ and Zul Ilham¹

¹Biomass Energy Lab, Institute of Biological Sciences, Faculty of Science, University of Malaya 50603 Kuala Lumpur, Malaysia.

Abstract. Biodiesel or fatty acid methyl ester (FAME) is a green alternative fuel that degrades under long-term storage. Antioxidants are utilized in maintaining the oxidation stability of biodiesel by inhibiting the propagation of free radicals resulting in prolonged shelf life. Usage of natural antioxidants from renewable resources is preferred to sustain a green economy and potentially match synthetic antioxidants without being hazardous to the environment. In this study, the potential of antioxidants from crude extracts of Roselle seeds (*Hibiscus sabdariffa*) and cashew nut shells (*Anacardium occidentale*) which are agricultural residues that are commonly left unconsumed has been tested for biodiesel storage stability improvement. ABTS antioxidant test on both plant parts showed significant results for all samples regardless of their polarity while β -Carotene test favored polar samples. Positive correlation of DPPH test and total phenolic content (TPC) test confirmed the antioxidant activity of phenolic compounds in all samples. Total flavonoid content (TFC) test also showed positive results for all samples. GC-MS and LC-MS profiling of both plant parts revealed that all samples contained phenolic compounds with the exception of roselle seeds extracted with hexane (RH), which contained mostly fatty acids. Oxidative stability test using Rancimat test showed that polar samples have superior performance than nonpolar samples whereas 3-pentadecyl phenol showed a poor performance in improving biodiesel storage stability.

Dynamic FSI Simulation of Pin Transfer Process for Solder Paste Transport

L H Tung¹, M A Fatah M Mukhtar², Aizat Abas¹, Aqil Azman¹, F C Ng ¹, Muhammad Naqib Nashrudin ¹, and Z Samsudin³

¹School of Mechanical Engineering, Universiti Sains Malaysia, Engineering Campus, 14300, Nibong Tebal, Penang, Malaysia.

²Faculty of Engineering, DRB-Hicom University of Automotive Malaysia, 26607 Pekan, Pahang, Malaysia.

³Jabil Circuits, 56, Hilir Sungai Kluang 1, Bayan Lepas, 11900 Penang, Malaysia.

Abstract. This paper is aimed to simulate the pin transfer process for solder paste to determine the viability of this technique to perform as an alternative to other solder paste deposition technique such as stencil printing. A model of fluid-structure interaction is designed to model the pin transfer process where the pin dipped into the solder bath and picking up the solder paste. Based on the previous study, it is found that the design of the pin nozzle exhibits certain limitations which is the consistency of the volume of solder paste transfer as well as the desire texture of the solder paste displace onto PCB pad. Different size and type of components require a designated pin to perform the pin transfer process. The development of the pin nozzle design is a time consuming process. An introduction of the pin transfer process simulation model managed to facilitate the designing process and reduce the time taken. In this research, the process of dipping the pin nozzle into the solder paste bath is study with dynamic mesh. The dipping process of the pin nozzle in simulation required a fine meshing to ensure the high accuracy of the simulated outcome. Moreover, the optimum time step size for the pin dipping process simulation is determined in the study. Generally, the implementation of the pin transfer process simulator, the design process of the pin can be improved with an increasing efficiency and productivity process which is beneficial to the industry.

Hydrodynamic Parameters Assessment using Specialized Techniques, in The Context of Low Flows. Case Study Epurasu Branch - Danube River

Deák György¹, Georgeta Tudor¹, Alina- Florina Nicolae¹,
Bogdan Urițescu¹, Constantin Cîrstinoiu¹, Marius
Raischi¹, Ștefan - Adrian Zamfir^{1,2}, Gabriel Badea^{1,3}, and
Tiberius-Marcel Dănălache^{1,4}

¹National Institute for Research and Development in Environmental Protection, 294
Splaiul Independenței, 6th District, 060031 Bucharest, Romania

²"Dunarea de Jos" University of Galati, 47 Domneasca Street. RO-800008, Galati,
Romania

³University Politehnica of Bucharest, 313 Splaiul Independenței, 6th District, 060042
Bucharest, Romania

⁴University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Marasti
Boulevard, District 1, 011464, Bucharest, România

Abstract. To acquire precise data on the hydrodynamic parameters is of major importance for the characterization of a watercourse. In this regard, specialized techniques have been developed and used in order to measure, process, analyze and forecast the data which define the watercourse, such as: riverbed bathymetry, flow, water level and water current velocity. In this paper, these parameters were studied in the Epurașu Branch - Danube River sector. This area is of particular importance due the presence of community interest species, but also because of the anthropic interventions carried out, which raised the problem of ensuring the longitudinal connectivity of the branch with the Danube River. The research activities, which involved in situ measurement campaigns, processing and numerical modeling, were carried out for low flow conditions, upstream of the studied area the water flow did not exceed 680 m³/s.

Numerical Study of The Effect of Flow on Bottom Outlet of Dam

Aqil Azman¹, Aizat Abas¹, M H Zawawi², Mohd. Remy Rozainy M. A. Z³, and Ismail Abustan³

¹School of Mechanical Engineering, Engineering Campus, Universiti Sains Malaysia, 14300, Nibong Tebal, Penang, Malaysia.

²Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional, Selangor, Malaysia.

³School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia, 14300, Nibong Tebal, Penang, Malaysia.

Abstract. In this work, bottom outlet which is a part of dam that functional to flow a water. The design of bottom outlet is constructed by Computer-aided design (CAD) modelling and simulated using Computational fluid dynamic (CFD) software. The effect of water flow pattern, velocity and vorticity of the bottom outlet has been analyzed in this research work. Based on the result, the peak velocity occurs at the middle area of bottom outlet with amount of 146.8430 m/s and vorticity occurs at the end of bottom outlet with velocity of 16.3159 m/s.

Influence of Water to Binder Ratio on Mechanical Properties of Blended Cements with Brick Powder Waste

Deák György¹, Ana Maria Panait¹, Andreea Mihaela Moncea¹, Diana Florina Dumitru¹, Madalina Boboc^{1,2}, Monica Matei¹, and Marius Viorel Olteanu¹

¹National Institute for Research and Development in Environmental Protection, no. 294 Splaiul Independentei, 6th District, 060031, Bucharest, Romania

²Dunarea de Jos University of Galati, Romania, Domneasca Street, 47, RO-800008, Galati, Romania

Abstract. Currently, the construction and demolition wastes are recovered and recycled in a reduced proportion. An efficient and easy approach to recover this waste is to embed it in inorganics binders. Considering that bricks represent porous ceramic bodies, the incorporation of the powders resulted from brick milling into cements could influence the water / binder ratio, which ensures the hardening process of binders. Therefore, the influence of the water / binder (w/b) ratio on mechanical strengths of the ordinary Portland cement with an addition of 20% brick powder waste was studied up to 360 days. The investigations showed that a w/b ratio of 0.45 determines compression strengths values which could be compared with those of references samples. After one year of hardening the mortar specimens were subjected to freeze-thaw cycles in order to determine their durability. The mortars specimens with w/b ratio of 0.45 recorded the best mechanical strengths values after 40 freeze-thaw cycles.

The Thermal Properties of Metakaolin Geopolymer Coated With MgO Particles

S Wahyuni¹, A D Permatasari¹, R Irfanita¹, S Sudarman²,
and Subaer¹

¹Material Physics Lab, FMIPA, Universitas Negeri Makassar, Indonesia

²Chemistry Department, FMIPA, Universitas Negeri Makassar, Indonesia

Abstract. The main objective of this study is to experimentally investigate the influence of MgO particles on the thermal properties of metakaolin geopolymer. Geopolymer was produced through alkali activated of metakaolin by adjusting the oxide molar ratios of the starting materials to the fixed value of $\text{SiO}_2/\text{Al}_2\text{O}_3 = 1.5$, $\text{Na}_2\text{O}/\text{SiO}_2 = 0.3$ and $\text{H}_2\text{O}/\text{Na}_2\text{O} = 10$, and curing temperature at 70°C for 2 hours. The particle size of MgO was reduced by means of ball milling at 300 rpm for 5 hours and then painted on the surface of geopolymer before reaching its setting time. The variation of MgO mass relative to the mass of metakaolin were 0%, 1%, 2% and 3%. The resulting composite-like geopolymer-MgO materials were stored in open air for 28 days before commencing any thermal measurement. The structure of geopolymer-MgO was examined by using x-ray diffraction (XRD) and the results showed the presence of magnesium aluminum oxide phase as the MgO concentration increases. The thermal properties of the resulting materials were examined by means of thermal conductivity measurement, heat resistance at 750°C and fire resistance around 1000°C for 30 minutes. The results showed that the thermal conductivity of the samples decrease as the concentration of MgO on the surface of geopolymer increases. The thermal resistance measurements showed the development of cracks on the surface of the samples increased as the MgO concentration increase and hence reducing the density and the mechanical strength of the materials. The fire resistance measurements indicated that all samples were able to maintain their integrity up to 1000°C . It is concluded that MgO particles was able to improve the thermal resistance of geopolymer especially when it is exposed to intense fire.

Analysis of Satellite Vegetation Indicators, Meteorological and Water Use Data for Sustainable Management of Irrigations in Romania

Lucian Laslo¹, Monica Matei¹, Nicu Ciobotaru¹, György
Deák¹, Mădălina Boboc¹

¹INCDPM Bucharest, 294 Splaiul Independenței, România

Abstract. Water shortage is encountered for increasing number of cases, due to climate change phenomena, population growth and urbanisation. Agriculture is the one of the main water use sector, which is why improving the efficiency of irrigation can be a sustainable solution. In this paper are presented the results of the statistical analysis performed with SPSS software. The irrigation data at Romanian level were used as dependent variable, while indicators from satellite and meteorological data were used as predictors in multiple hierarchical regression. Factorial analysis and descriptive statistics of the predictors was used to investigate the evolution of indicators. These methods and data can be used to facilitate efficient use of water for irrigations.

Studies regarding the state of *Alosa immaculata* (Bennet, 1983) migrating population into the Lower Danube River

Tiberius Danalache^{1,2}, Deák György¹, Elena Holban¹,
Marius Raischi^{1,3}, Ștefan Zamfir^{1,3}, Madalina Boboc^{1,3},
Monica Matei¹, Cosmin Pârlog^{1,4}, Diana Fronesco¹,
Alexandru Cristea¹ and Carmen Georgeta Nicolae¹

¹National Institute for Research and Development in Environmental Protection
Bucharest

294 Splaiul Independentei, Romania

²University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

³Dunarea de Jos" University of Galati

⁴Ecological University of Bucharest, Romania

Abstract. Biometrical data of the migrating population of Pontic shad *Alosa immaculata* Bennet from the Romanian sector of the Lower Danube is analysed. The surveys were done by the National Institute for Research and Development in Environmental Protection-Bucharest between 2011 and 2018 during the spawning migration. In total, 286 individuals have been examined. The majority of the individuals (53.2%) were part of the age classes of two and three year old. Overall F/M ratio was 1.1. The length-weight relationship is described by the equation $W = 0.0149 \times TL^{2.8926}$, $R^2 = 0.986$. Fulton's condition factor values ranged between 1.39 and 1.41 with the average value of 1.40.

Synthesis of Rice Husk Ash Through Various Methods and Determination of The Highest Silicon Content for Subsequent Applications

Andreea Baraitaru^{1,2}, György Deák¹, Mădălina Boboc¹,
Marius Olteanu^{1, 2}, Monica Matei¹, Lucian Lumînrăoiu¹,
and Marius Raischi¹

¹National Institute for Research and Development in Environmental Protection
Bucharest, Splaiul Independenței 294, Bucharest, Romania

²Politehnica University of Bucharest, The Faculty of Material Science and
Engineering, Splaiul Independenței 313, Bucharest, Romania

Abstract. In this research, six different types of rice husk ash (RHA) were developed through various synthesis methods, in order to obtain a high concentration of silica for future applications in zeolite synthesis processes as a silicon base. The as-synthesized samples were characterized by X-ray fluorescence (XRF) to calculate the elemental composition, by scanning electron microscopy (SEM) to observe the microstructure and the particle size, and by laser granulometry to determine particle size distribution. Based on these analyses, it was verified which of the obtained RHA samples present higher silica concentration and the optimal microstructure, in order to capitalize them in the proposed applications. For all RHA samples, silica concentration exceeded 85%, although, the approached synthesis routes had a high influence on the physico-chemical characteristics of the resulting powders.

Element Distribution in Slag Geopolymer using Synchrotron based Micro-X-Ray Fluorescence (μ -XRF)

Ikmal Hakem Aziz 1, Mohd Mustafa Al Bakri Abdullah 2,
Arif Anuar Salleh 1, Emy Aizat Azimi 1, Jitrin Chairapa 4

¹Center of Excellence Geopolymer and Green Technology, School of Materials
Engineering, Universiti Malaysia
Perlis (UniMAP), P.O. Box 77, D/A Pejabat Pos Besar, 01000, Kangar, Perlis,
Malaysia

²Faculty of Engineering Technology, Universiti Malaysia Perlis (UniMAP), P.O. Box
77, D/A Pejabat Pos Besar, Kangar, Perlis 01000, Malaysia

³Synchrotron Light Research Institute, Muang, Nakhon Rathasima 3000, Thailand

Abstract. A nondestructive testing, Micro-X-ray Fluorescence (μ -XRF) was applied in this work to image the element distribution of slag geopolymers. The μ -XRF map reveal the Al, Si, and Ca chemical spatial on the samples. The details of samples preparation and micro-XRF setting used were discussed in this paper. The bulk XRF and micro-XRF results of slag geopolymers are comparable.

Ceramic with Potential Application of Kuantan Nesosilicate (East Coast Of Malaysia) in Building Construction: Mineralogy and Physicochemical Composition

M Y Mohd Tadza¹, A A Noraini¹, and S Tripathy²

¹Faculty of Civil Engineering and Earth Resources, Universiti Malaysia Pahang, Kuantan, 26300, Pahang, Malaysia.

²Geoenvironmental Research Centre, School of Engineering, Cardiff University, Cardiff, United Kingdom

Abstract. Our aim is to characterize nesosilicate from the locality of Kuantan situated in East Coast region of Malaysia. X-ray diffraction, chemical composition, particle size distribution, organic matter content and plasticity were investigated in raw nesosilicate materials in order to determine their suitability for building material. Ceramic properties such as bulk density and mineral formations were also investigated by firing specimen at a temperature range 105°C - 1350°C. Andalusite represent dominant mineral phases, in addition to minor quantities of quartz. The physical parameters of the nesosilicate display high amount of silt (78%) with relatively high plasticity index (27%) and low organic matter content (0.36%). The appearance of mullite which favor the densification of the ceramic structures occur at 1350°C.

Application of Statistical Techniques in Environmental Modelling

Ahmad Shukri Yahaya¹

¹School of Civil Engineering, USM Engineering Campus, 14300 Nibong Tebal, Pulau Pinang

Abstract. The aim of statistical modeling is to predict with good accuracy the variable of interest and sometimes to determine the contribution of the independent variables towards the dependent variable. Over the years, researches have always tried to produce better models in order to increase the accuracy of their predictions. This paper will discuss some statistical techniques that were used frequently in environmental research as well as recent techniques and advances in statistical modelling. The first technique that will be discussed is the multiple linear regression (MLR) models. Some other regression models will also be given. Next probability distributions will be discussed. This is to obtain statistical distributions that best fit the variable of interest. This will enable the researcher to predict the return period of an event. The application of Bayesian statistics has increased over the years. The use of least squares method in MLR and hypothesis testing is known as classical statistical techniques. The Bayesian statistics is based on the probability distributions of the prior and likelihood of the Bayes theorem. The results of using classical and Bayesian statistics will be discussed. Machine learning method will be deliberated next. Machine learning is the application of artificial intelligence that provides systems the ability to automatically learn and improve from experience without being programmed explicitly. Some machine learning methods that will be discussed are boosted regression trees, artificial neural networks and support vector machines. Finally, hybrid models that are the combination of two statistical models will be deliberated next. It is hoped that by combining two statistical models, a more accurate and improved model will be obtained.

Assessment of Water Quality in Chilia – Bastroe Area as Part of A Model, Designed for Wetland Protection

D. György¹, F. D. Dumitru¹, F. Marinescu¹, M. Boboc^{1,2},
S. Stanciu², L. Laslo¹, M. Matei¹, A. M. Panait¹, M. A.
Moncea¹

¹National Institute for Research and Development in Environmental Protection, Splaiul
Independentei, no. 294, 6th district, Bucharest Romania

²Dunarea de Jos University of Galati, Romania, Domneasca Street, 47, RO-800008,
Galati, Romania

Abstract. The Romanian wetland protection represents a priority confirmed by the Ramsar Convention signed in 1971, which came into effect from 1975. In order to develop the monitoring capacity, assessment and capitalization of natural resources offered by Romanian wetlands a pilot model was developed and implemented in the Danube Delta region. An important component of the model represents the water quality from the studied area (Chilia-Bâstroe). Thus, water samples were collected from various points along Chilia-Bâstroe braches and their physical-chemical and biological quality parameters were determined. By comparing the obtained values with the thresholds imposed by Romanian standards, the results showed that the water can be ranked up to the fourth quality class, due to the high values of iron concentration.

On Thermal Characteristics of Coarse Grained and Fine Grained Soils in Ground Heat Exchanger Applications

M Y Mohd Tadza¹, A A A Karim¹, A Abdullah¹, D Mohamed², and M. Y. Taib²

¹Faculty of Civil Engineering and Earth Resources,
Universiti Malaysia Pahang, Kuantan, 26300, Pahang,
Malaysia.

²Faculty of Mechanical & Manufacturing Engineering, Universiti Malaysia Pahang,
Pekan, 26600, Pahang, Malaysia.

Abstract. The thermal properties of soils and rocks is an important property for the design of thermally active ground structures such as geothermal energy foundations and heat exchange systems. This paper presents the results of a laboratory study thermal diffusivity (α) of two different soils namely, sandy and clayey soils. These soils were tested under varying water content to investigate the effects of water content on the thermal properties. From complete dryness, the soil water content of the specimens were varied to eight different percent of water content (0, 4, 8, 12, 16, 20, 24, and 28 %). In addition, at each water content, the thermal properties variations were measured using a KD2 pro analyzer. Additionally, the water retention characteristics of both soils were established using a WP4C chilled-mirror dew-point hygrometer. Test results revealed that in general, water-sorbed specimens have improved thermal characteristics than dry specimens of the same soil. Furthermore, it was noted that the soil containing higher percentage of clay particles had lower thermal characteristics as compared to soil having higher percentage of quartz content at the same percentage of water content. Test results also showed that the thermal characteristics increased with increasing water content. Although the water retention characteristics for coarse grained soil appears to be limited, a greater percentage of quartz is more effective in transferring heat than soil containing higher percentage of clay having greater water content.

Bentonite and Marconite for Electrical Grounding Applications from Geotechnical Engineering Perspective

M Y Mohd Tadza¹, D Mohamad , S Tripathy², R A Rahman³, and M A M Ismail⁴

¹Faculty of Civil Engineering and Earth Resources, Universiti Malaysia Pahang, Kuantan, 26300, Pahang, Malaysia.

²Geoenvironmental Research Centre, School of Engineering, Cardiff University, Cardiff, CF24 3AA, UK

³Faculty of electrical & electronic Engineering, Universiti Tun Hussein Onn, Johor, 86400, Malaysia

⁴School of Civil Engineering, Universiti Sains Malaysia, Penang, 14300, Malaysia

Abstract. Bentonite and marconite are commonly used as soil substitute and filler material for electrical grounding applications in trouble environments. Bentonite is a fine grained highly plastic clay derived from volcanic formation, whereas Marconite is an engineered material in the form of super conductive aggregate derived from coal power production. Both material are used to reduce the electrical resistance between the soil and earth-electrode rod. In this study, a sodium based bentonite, namely MX80 bentonite and Marconite aggregates were characterized and tested to perform as grounding material under varying water contents. After each test, the resistivity of each specimens were measured using a Nelsson 2-point resistivity meter. In addition, aluminum discs were inserted into the specimens to measure the effect of wetting and corrosion induced by both material. Test results indicated that the resistivity behavior of bentonite is greater than that of Marconite. On the contrary, the resistivity of Marconite is far lower than that of MX80 bentonite. The lowest resistivity achieved by Andrassy bentonite was found to be 2.4 Ωm under very wet conditions as compared to 0.44 Ωm in Marconite. Based on the tests results, the resistivity behavior of bentonite is governed by the water content. Water within the pores acts as particle bridging for electrical currents to pass through the bentonite. The resistivity values is lower under liquid state as compared to under plastic or solid state. On the hand, Marconite resistivity behavior remained somewhat unchanged under both dry and wet conditions indicating that interparticle contact is more dominant. Higher corrosion was observed on aluminum discs placed within bentonite specimens due to the availability of water.

Cured Epoxy Resin Dielectric Characterization Based on Accurate Waveguide Technique

Nurulfadzilah Hasan¹, Nur Shahira Mat Hussain¹, Ahmad Afif Mohd Faudzi¹, Syamimi Mardiah Shaharum¹, Nurhafizah Abu Talip Yusof¹, Nurul Hazlina Noordin¹, Nur Alia Athirah Mohtadzar² and Mohamad Shaiful Abdul Karim¹

¹Faculty of Electrical and Electronics Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia.

²Faculty of Engineering, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.

Abstract. Complex permittivity of a substrate plays an important role in designing a compact and robust antenna. Thus, measuring complex permittivity must be done carefully in order to achieve accurate and reliable result. Waveguide is a widely used technique to determine complex permittivity of a dielectric material. In this paper the permittivity of cured epoxy resin is determine using waveguide technique, within the G-band frequency range. It determines the complex permittivity by analyzing only the measured transmission coefficient of the material and easily noise affected reflection coefficient is not used. Sample is only partially loaded in the waveguide to avoid the resonance during measurement. Therefore, results obtained are accurate and reliable. Also, the estimated real part of complex permittivity is in a good agreement with available data from other work.

Sludge Characterization of Coagulation/Flocculation of Leachate by Using Different Ratio of Composite Coagulant (PACTF)

W P Ng¹, M Z N Shaylinda¹, Z A Hazreek¹, and W M W
Afnizan¹, S N A Mohd-Salleh¹

¹Department of Water and Environmental Engineering, Faculty of Civil and
Environmental Engineering, University Tun Hussein Onn Malaysia, 86400, Parit Raja,
Johor, Malaysia

Abstract. Landfill leachate is considered as a highly polluted liquid that is produced from infiltration of water through municipal solid waste. This study investigated the effectiveness of composite coagulant used in removing total suspended solid (TSS) of leachate through coagulation-flocculation process and characterized the sludge produced by determining its sludge volume index (SVI), sludge settling rate (SSR), and morphology of sludge using SEM. The composite coagulant used was PACTF that combined chemical (polyaluminium chloride) and natural coagulant (tapioca flour). With ratio TF/PAC of 0.38 and dosage of PACTFb of 168.9 mg/L Al, the TSS percentage removal was 97.4%. While, the SVI and SSR of sludge were 461.5 ml/g and 1.73 cm/min, respectively. The size of sludge particle for PACTFb was in the range of 20 μm to 50 μm . Addition of TF into PAC as composite coagulant improved the sludge formation.

The Effect of Sediment Sizes to Pump Sump System in Physical Modeling

N M Tahir ¹, S H A Talib ², Abustan M S ², S I N S Hashim¹, Saiful Anuar N S¹, and Radzaly N F I ¹

¹Postgraduate Student, Faculty of Civil and Environmental Engineering, Universiti Tun Hussien Onn, Parit Raja, 86400 Batu Pahat, Johor, Malaysia.

²Lecturer, Faculty of Civil and Environmental Engineering, Universiti Tun Hussien Onn, Parit Raja, 86400 Batu Pahat, Johor, Malaysia.

Abstract. Reservoir is one of the main sources of water supply and provides functions to hydroelectric power, domestic use, agriculture, flood protection and recreation. However, there are several problems related to sedimentation in the reservoir. Sedimentation occurred when there is a dynamic action between sediment flowing along water against a solid surface. Moreover, sediment can block intakes in reservoirs and damaging tunnels or turbines. Thus, this phenomenon will disturb the water flow and affecting the pump sump system. In order to reduce the problem related to sedimentation problem in pump sump system, this research was conducted to achieve the objectives which are to determine the sediment accumulation in pump sump system and to determine the sediment deposition area in pump sump system. Thus, experimental procedure was conducted using physical modeling. This experiment was carried out with 3 different sizes of pump sump which are 150 micron, 425 micron and 850 micron. Different water flows between 1 l/s to 11 l/s were used at different water level to achieve both objectives. The result of this experiment shows that when the size of sediment is small, it will moves faster to the propeller and affect the efficiency of the propeller, while if the sediment size is big, it will deposited on the bay of the pump system and affect the capacity of pump sum thus decreasing the amount of water. If the water flow increases, more sediment will be brought to the propeller. This situation interfere the effectiveness of the propeller when there were too many impurities to pass through the propeller than water. Other than that, different water level also gives effect on the effectiveness of pump sump system.

TOC, TKN and C/N ratio Fractionation of Organic Wastes under Elevated Temperature Regime by using Hydrothermal Approach

M A Kamaruddin¹, N F H M Halid², M S Yusoff², M R R M A Zainol², and R Alrozi³

¹Environmental Technology Division, School of Industrial Technology, Universiti Sains Malaysia, 11800 Penang, Malaysia.

²School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang, Malaysia

³Faculty of Chemical Engineering, Universiti Teknologi MARA, Penang Branch, 13500 Permatang Pauh, Penang, Malaysia.

Abstract. Food waste is the highest percentage that was disposed in landfills. This caused difficulty in management of food waste and reduces the lifespan of a landfill. The objectives of this study are to determine the food waste generation and composition study at Ani's Cafe, Bakti Permai Cafetria USM; to determine the characteristics of food waste before and after autoclaving under different time and temperature; and to determine the main variable that affected the C/N ratio by statistical analysis. Few criteria on physical and chemical characteristics of food waste was studied such as pH, moisture content, TOC, TKN and C/N ratio. In this study, food waste was autoclaving based on four different temperatures at three different times. Food waste generation throughout this study was 269.6 kg within thirteen days period of study which is equal to 20.74 kg/day and per capita generation was ranging between 0.04 kg to 0.11 kg per day. From this study, the moisture content of food waste before treatment was 69.33% with the pH value of 5.80. Meanwhile, the results of before treatment of TOC and TKN were 32.50% and 1.63% respectively. pH was found to be acidic after autoclaving with the values 5.17 to 5.76. The C/N ratio of food waste was found to be increased after autoclaving compared the C/N ratio before autoclaving. Statistical analysis in this study showed that time was the main variable that affected the C/N ratio with the p-value less than 0.05 ($p = 0.033$). In this study, it is also proven that C/N ratio of food waste can be increased by autoclaving.

Study on Nature Inspired Optimization Techniques for Load Frequency Control (LFC) using Fractional Order PID (FOPID) Controller

N F A Latif^{1,2}, *K Naidu¹, and V K Raja²

¹Electrical Technology Section, Universiti Kuala Lumpur British Malaysian Institute, 53100, Gombak, Selangor, Malaysia.

²PSI Incontrol Sdn Bhd, No. 15, Jalan BRP 9/1d, Bukit Rahman Putra, 47000 Sungai Buloh, Selangor, Malaysia.

*kanendra@unikl.edu.my

Abstract. This research presents a comparative study on nature inspired optimization techniques for Load Frequency Control (LFC) in a single area reheat thermal system using FA and CSA. LFC is an important control element in the synchronous generator which is tasked to damp frequency oscillation during load changes. This research addresses tuning of Fractional order PID (FOPID) controller for single area of reheat thermal system. The FOC possess important properties such as eliminating steady state error, robustness toward plant gain variations and also good disturbance rejection. The fitness function Integral Time of Squared Error (ITSE) is chosen as the objective function to ensure optimum steady state performance. Firefly Algorithm (FA) and Cuckoo Search Algorithm (CSA) are used to comparatively investigate the LFC performance under various scenarios. Load variation, system parameter variation and investigation under different error criterions are carried out to gauge the efficiency of the optimized controller. Results show that the CSA exhibits greater system performance compared to FA in attaining better settling time with lower overshoot. Further investigation to extend the system to include different generating sources can be carried out using optimized FOPID controller.

Application of Thermocouple Sensors on Hot Stone for Voltage Generating in Renewable Energy

*A.H.A.Rahman¹, F.F.Anuar¹, N.A.Sapiee¹, N.Ramli¹,
I.Ahmad¹, M.A.Abu¹ and M.T.Mustaffa¹

¹Electronic Technology Section, Universiti Kuala Lumpur British Malaysian Institute,
53100 Gombak, Selangor, Malaysia.

*abdhalim@unikl.edu.my

Abstract. This study is conducted for the search of new energy to accommodate today's renewable energy shortage in various aspects such as the high cost needed to make renewable energy plantations, requiring a large amount of space, revealing pollution in the early farms of renewable energy and renewable energy limited in each country itself. To solve this problem, a renewable source of renewable energy is reviewed based on hot stone and data collection to strengthen this new discovery. By placing the thermocouple in the rock, it will display the current temperature in the rock and, in practice, the temperature inside the rock is higher than its surrounding temperature. In this study the temperature heat in the rock will be converted into a voltage value and the results will be displayed on the LCD. To charge 12V battery, it will take 12 to 16 hours completely and also depends on sensor sensitivity used in the thermocouple and the weather at that time. With this study, it has proven that hot stone can be one of the more effective and efficient renewable new energy to reduce space, pollution and low cost to be implemented.

Application of Water and Wind Energy for Low Cost Portable Mobile Phone Charger (PMPC)

*N. Ramli¹, A.H.A.Rahman¹, M.R.Rusli¹ and N.A. Sapiee¹

¹Electronics Technology Section, Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor, Malaysia.

*norhaslinawati@unikl.edu.my

Abstract. The primary focused of this project is to develop a portable low-cost electric generator purposely as a mobile phone charger by using two renewable energy sources that are wind and water. Usually, when people went into the forest for camping, they will get hard to charge their phones. They can use a power bank to charge up their phone but not for so long because the power bank also will be empty sooner or later. They need a very convenient way to charge their phones or power bank. There is also a solar charger power bank but this kind of portable charger only use the sun as the source which can cause problems when it comes at night time. The user had to wait for sunrise to charge the power bank. Sometimes, the consistency of using the solar power bank also drops when in the forest. There are limited sunlight. Hence, the user needs an unlimited energy source that they can use to generate electricity. This project uses renewable energy as the main source of this project. The two energy is wind and water. These energies will be used to harvest electrical energy to charge mobile phones and other small electronic applications. When the energy is in contact with the turbines, it will produce electricity. A small DC motor and a hydro generator will be used. After generating the electricity, it will be stored in the capacitors. These capacitors act as energy storage to charge the mobile phone. Next, Arduino Uno is use to read the voltage output from the wind generator and the water generator and display the voltage reading using the LCD display. The LCD will display the changes of voltage from the wind and water generator. This will alert the user about how much the output voltage obtain from the motor generators. Then, the voltage will be step up and maintain to 5 volt because that is the main target for this project that is to produce a 5 volt as the output to charge mobile phones. LCD display will display few readings of the voltage in three different ranges that are 0V, less than 2V and greater than 2V from both wind and water generator respectively. In conclusion, a portable and low cost electric generator purposely as a mobile phone charger by using two renewable energy sources that are wind and water was successfully developed. For future, it is recommended to upgrade this portable charger so that it can be used to charge all kind of mobile phones including those with IOS system as this prototype can only be used to charge an android phones.

Footstep Power Generation using Arduino Uno

*M S Subri¹ and T A T Aziz¹

¹Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor, Malaysia.

*syamirsubri96@gmail.com

Abstract. This project is to develop a new source of renewable energy with low-cost budget with the help of Arduino Uno as the microcontroller. The foot step power generation system is to capture the typically wasted energy surrounding a system and transforming it into electrical energy. The technique used in gaining the energy is via piezoelectric materials. This method employs piezoelectric components where deformations created by dissimilar means are directly transformed into electrical charge through piezoelectric effect. Afterwards, the electrical energy can be regulated or stored for further use. In this project, we are generating electrical power as a non-conventional method by simply walking or running as the input source. The piezoelectric sensor will then send the signal into the Arduino Uno and transform it into electrical energy. The LCD will then displayed the amount of voltage generated by the circuit. The highest voltage generated in this project is 8.29 V. Then, the voltage stored in the battery can be used to charge the mobile phone. The results shown that this foot step generation system is very important for utilization in today's world.

The Study of Factors That Effects Growth of Plant in Greenhouse

*N A Sapiee¹, A H A Rahman¹, I Ahmad¹, N Ramli¹, M A Abu¹, M T Mustaffa¹, M Z Ismail¹ and M H M Salim¹

¹Electronics Technology Section, Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor, Malaysia.

*noramalia@unikl.edu.my

Abstract. The primary issue of greenhouse is based on the horticulture which is to manage the greenhouse environment optimally in order to comply with the economic and environmental requirements. The controlled parameters in a greenhouse are watering system, humidity and temperature sensor that was automatically function when it is integrated with microcontroller as the main brain of the project. This project will able to the water the plants when the control temperature and humidity in a greenhouse is increases. This project successfully able to improve the watering system from manual to automatically function when the sensor detected the increase of air temperature. Increases of heat and humidity in plantation have to be controlled and watering is necessary to provide water in order to ensure the plant growth healthily therefore this project will prevent the excessive water to the crops and the wastage of water can be avoided.

Smart Traffic Light for Emergency Vehicle by using Arduino

*M Z Ismail¹, A I Z Abdul Latif¹, and M A Mohd Roslan¹

¹Communication Technology Section, Universiti Kuala Lumpur British Malaysia Institute, 53100 Gombak, Selangor, Malaysia.

*mzain@unikl.edu.my

Abstract. In this paper, a new system to solve problem of emergency vehicle to pass through the traffic light where the traffic light was jammed with long queue of vehicle. Once the emergency vehicle able to pass through traffic light easily that will save the travelling of the emergency vehicle and also save the situation depending of the type of emergency vehicle ie fire or life. This new system is using the advantages of arduino and sensor which is bluetooth.. The client bluetooth is attached to emergency vehicle and the master Bluetooth and arduino is located at the traffic light. In this system, when the emergency vehicle approach the traffic light of red light and long queue, the Bluetooth sensor will give the signal to the arduino to change the green light. Hence, the queuing vehicle will move and give the space to emergency vehicle to pass through the traffic jam. When the emergency vehicle pass through the traffic light, the traffic light will go to the normal sequence. With this new system, obviously, the emergency vehicle is able to pass through easily without delay.

Development of Alcohol Sensor Detector with Engine Locking System for Accident Prevention

*I Ahmad¹, M F Suhaimi¹, N A N Yusri¹

¹Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor, Malaysia.

*izanoordina@unikl.edu.my

Abstract. The alcohol detection with engine locking system is proposed to eliminate the rise of number of roads accidents caused by extreme intake of alcohol by drivers. The system is developed to monitor the level of alcohol in the exhaled breath of a driver and the data is transmitted through the wireless communication to activate the engine locking system. The Arduino Mega microcontroller with MQ-3 alcohol sensor, DC motor and HC-05 Bluetooth module is used for the system development. The experimental results show that the presence status of passive in-vehicle driver breath alcohol detection could be transmitted through the Bluetooth module and received by the dedicated emergency contact number for notification purpose. Therefore, the prototype is useful for preventing fatal accident due to the drunken driver.

The Development of the Fuzzy-based Infant Incubator

*I Adam^{1,2}, H F Rozi², S Khan¹, Z Zainuddin^{1,2}, K A Kadir² and A N Nurdin¹

¹Kulliyyah of Engineering, International Islamic University, P.O. Box 10, 50728, Kuala Lumpur, Malaysia.

²University of Kuala Lumpur, Batu 8, Jalan Sungai Pusu, 531000 Gombak, Selangor, Malaysia.

*ismail@unikl.edu.my

Abstract. In the Bio-medical field, preterm infant care is one of the most important and popular areas of study. The newborns are at a higher risk of mortality and are called high-risk infants because of the gestational age or their birth weight put them at a higher-than-average risk of disease and death. For that purpose, the preterm baby requires surrounding exactly similar as in the womb to cope with the external environment. This paper addresses the development of the fuzzy-based infant incubator which controlled the temperature and humidity. The objective of this paper is to design and develop the fuzzy-based controlled incubator to regulate temperature and humidity at a maximum error of 0.5°C and 5% respectively. The novelty of this paper is in the temperature and humidity range regulated.

Smart Child Detector Alert System

*Z Mansor¹, M A Azsha¹ and S M M Maharum¹

¹Advanced Telecommunication Technology Research Cluster, Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor, Malaysia.

*zuhanis@unikl.edu.my

Abstract. The multiple cases of forgetting a baby in a car are the first step to prevention. Even with your car windows open two inches wide, the temperature inside the car can reach harmful degree which can cause fatal consequences to the baby. Youngsters are more inclined to overheating than a grown-up as their body overheats 3-5 times faster than a grown-up body. Smart Child Detector Alert System is developed to give the user an assurance of instantaneous alert in the form of SMS notification if the child/toddlers left in the car. This system uses temperature sensor to detect the temperature in the car which more than 40°C indicate fatal to child. The LM35 temperature sensor measured the temperature of surrounding and send it to Arduino database to evaluate and if it is more than 40°C, the SMS alert will be send to the designated number and the buzzer alarm will activate.

Upper Limb Rehabilitation Equipment with Animation Performance for Isotonic & Isokinetic Exercises

*S M M Maharum^{1,5}, N I I Ishak², Z Mansor^{3,5} and A M M Ali⁴

¹Electronics Technology Section,

²Medical Engineering Technology Section,

³Communication Technology Section,

⁴Electrical Technology Section,

⁵Advanced Telecommunication Technology Research Cluster,
Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor,
Malaysia.

*sitimarwangi@unikl.edu.my

Abstract. Numerous commercialized robotic limbs are currently available in the market. However, these robotic limbs are heavy and bulky. Hence, such rehabilitation robots are not portable and only available at hospitals and rehabilitation centers. In this paper, a portable and user friendly upper limb rehabilitation equipment is proposed to assist the patients to perform rehabilitation exercises interactively with minimum supervision from the physiotherapist. Furthermore, the patient's progress and performance are available for monitoring. A prototype of the equipment which is equipped with electromyography (EMG) sensors to record and evaluate the muscles activity during rehabilitation sessions is developed. To continuously motivate the patients to undergo repetitive rehabilitation exercises, a gaming animation is incorporated with the help of gyro-accelerometer sensor to interpret the muscles activity progress in terms of game scoring. The developed equipment was tested during isotonic and isokinetic exercises performed by a normal individual to assess the sensor adaptability and overall functionality. The highest muscles contraction reading was recorded to reach approximately 1000mV and 600mV for isokinetic and isometric exercises, respectively. The results showed that the developed prototype is able to record the muscle activity (i.e. contraction and relaxation) and interpret it into meaningful and interactive progress monitoring.

Preliminary Study of Rectus Femoris and Medial Gastrocnemius signals for Leg Exoskeleton

*N H Harun¹, H M Desa¹, H A A Razak¹

¹ Universiti Kuala Lumpur British Malaysia Institute, 53100 Gombak, Selangor, Malaysia.

*noorhasmiza@unikl.edu.my

Abstract. Electromyogram signal is commonly used in control system such as prosthetics and robotic devices such as leg exoskeleton. For human assistive robotics, electromyogram signal provide information for effective support for user. However, its usage is limited by a complex user-dependent and calibration procedure which limits their use in laboratory environment. Thus, it is important to design a noncomplex input controllable leg exoskeleton to assist various stage of stroke survivors in their post stroke therapy and rehabilitation training. In this study, electromyogram signal from Rectus Femoris and Medial Gastrocnemius muscle is used as the triggering signal for the leg exoskeleton. Electromyogram signal from Rectus Femoris muscle and Medial Gastrocnemius muscle is acquired via surface electrode will be fed into a circuit for rectification and conditioning process. Further, the signal is analysed based on the maximum and minimum peak of Rectus Femoris and Medial Gastrocnemius muscles for 16 samples in two gait cycles. Results shows that the peak signal from Rectus Femoris and Medial Gastrocnemius range between 50mV to 90mV are essential for further analysis as triggering signal for leg exoskeleton.

Body Temperature and ECG Monitoring System for Cardiac Problem Patient

*M S Afifah¹, I N Salimah¹, F M Fadli²

¹Medical Engineering Technology Section, Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor, Malaysia.

²Texas Instrument, No. 1, Lorong Engang 33, Ampang /Ulu Klang Free Trade Zone, Kuala Lumpur, 54200, Kuala Lumpur, WP Kuala Lumpur, Malaysia.

*sitiafifah@unikl.edu.my

Abstract. This project is the development of body temperature and ECG monitoring by using web server database. The project focuses on subject who has Sinus Tachycardia problem who is having an excessive heart rate above 100 beats per minute. The data is continuous and can be saved. Besides that, body temperature is one of the four main vital signs that must be monitored to ensure safe and effective care. This project is developed by using AD8232 Single Lead Heart Rate Monitor and LM60. The sensors are connected to Beaglebone Black. The acquired ECG signal from Beaglebone Black is recorded continuously in web server together with the body temperature of the patient. The recorded ECG graph and body temperature can be viewed and accessed by users at any place with internet using secured WSN. Thus, allowing easy supervision anywhere and anytime.

A Comparison of Standalone and Hybrid System in Diagnosing Anterior Cruciate Ligament (ACL) Injury

*S M Sazwan¹, M H Razali¹ and M Z Ayob¹

¹Electronics Technology Section Universiti Kuala Lumpur British Malaysian Institute,
53100 Gombak, Selangor, Malaysia.

*sazwan.mazlan14@s.unikl.edu.my

Abstract. This paper presents a comparison of standalone and hybrid diagnosing system. The hybrid system applied sorting and learning system on diagnosing ACL knee injury. The development of the system involves processes of intelligent system, sorting injury and classifying injury based on MRI. Sorting is done through support vector machine (SVM), which identifies and isolates potential ACL injuries. The raw data were extracted by the image-processing phase using k-mean clustering system with parameter of $C = 23$ and $\gamma = 2-4$. The injury classification applied an ANN model using data scheme of training (70%), testing (20%) and validation (10%). The outcome is categorized into three types of injuries; normal, partial and crucial. Results of ensemble sorting and learning system improved the current analysis system performance by an average accuracy of 86.2% and it is proven by ROC curve that shows sensitivity at 81.7%.

Automated Portable RJ45 Tester System

*Z M Hussin¹, M R Amit¹, L A Tiron¹, M R A Razak¹ and
S Mohammad¹

¹Universiti Kuala Lumpur British Malaysian Institute, 53100 Gombak, Selangor,
Malaysia

*zarinahussin@unikl.edu.my

Abstract. This paper presents a portable Registered Jack 45 (RJ45) tester system using a smartphone to test the RJ45 cable and easy to carry everywhere and at any time. This system can be used to help the workers and network testers to carry out cable installation and troubleshoot in the server room and telecommunication room. It is used to identify the fault from the broken cables before or after the network installations and also used for troubleshooting where both activities are commonly applied at the work field. Also, it is applicable to avoid any mistakes while connecting RJ45 to the network cable since all RJ45 units are identical. Basically, this system is comprised of three particular elements which are the smartphone, Arduino micro-controller and Android studio software. The Android studio used in this system acts as the main programme while the Arduino acts as the subordinate programme. An Android application is installed in the smartphone to send the message to Arduino to check and test the connectivity of the cable which uses RJ45 by finding the specific number. Then, the data number is sent back to the main software to determine the cable types of RJ45. When the Arduino received the data, the Arduino needs to check and test the data flow until the data result appears on the screen of the smartphone where the Arduino sends the data result to the application to read and also to determine the cable type used in the cable connection. The result application shows either “Straight-through” or “Crossover” as the final result obtained from the checking and testing of the network. This system also identifies error in installation when the cable is broken or undefined, which relates to the output results where the numbers of the data are fixed or other mismatched numbers of the data or no number.

Development of Wireless Transmission for Meteorological Stations Data Logging

*H Basarudin¹ and H H Iberahim¹

¹Communication Technology Section, Universiti Kuala Lumpur British Malaysia Institute, 53100 Gombak, Selangor, Malaysia.

*hafizb@unikl.edu.my

Abstract. Wireless technologies and the growth of popularity of portable devices such as smartphones and tablets have created a variety of opportunities in the modern world. Wireless communications are changing the world because wireless devices are convenient, easy to use and can provide interconnectivity in virtually any place. Each day's people were obese with simplicity of their activities. So, we created "The development of wireless transmission for meteorological stations data logging". This Project is a based on data storage and remote device for measuring rain rate. The aim of this project used to monitor and display rain rate data log from different type of sensors using Arduino or similar device wirelessly. The device gives many advantages to the user since they can monitor data logging anytime and anywhere. This project also consists of creating a storage where data being collected and will sort based on time recorded. Furthermore, this data is very useful for further study related to rain rate. For this project, we used this information to make relation between rain rate and satellite signal strength feedback. In conclusion, this device has been created and implemented that allows a better monitoring logging technique for users.

Smart Home Meter Reading using Internet of Thing (IoT) with Blynk App

M S Osman ¹⁾

¹Section of Electrical Engineering Technology, Universiti Kuala Lumpur British Malaysian Institute, 53100 Batu Caves Selangor, Malaysia

Abstract. Smart Automated House Application using IOT (Internet of Thing) is a system where a basic housing facility can be handled by device from any place such as ON and Off of Light, Fan, AC, Water pump, Gardening of Water. One can handle all these things with the help of device NodeMCU ESP8266, Android Application, Internet Connection. This paper includes the functionality of node esp8266 are connected with either of above given house applications like fan, light, water pump, gardening and meter reading with help of coding and hosting online with the web server. All the functionality is handled by Mobile App created in android application, from which house application is controlled with the help of internet. This paper clarifies that monitoring of the circuit devices through wireless using Node MCU and controlling using App Blynk

Keywords: Automated Home using the Internet of Thing(IoT)

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