



PROGRAM AND ABSTRACT BOOK

ICST 2018



UNIVERSITAS GADJAH MADA
BADAN PENERBIT DAN PUBLIKASI



The 4th International Conference on Science and Technology

7–8 August 2018 | Yogyakarta, Indonesia

Computer and Information Technology

Electronics, Communication, Control, and Instrumentation

Environmental and Earth Science

Material Science and Chemistry

Mechanical and Industrial Engineering

Power and Energy

Remote Sensing and Geomatics



About **Universitas Gadjah Mada**

Universitas Gadjah Mada (UGM) was established on December 19, 1949 as a state and national university. Considered one of the oldest universities in Indonesia, it serves as a pillar of educational awakening in Indonesia, and purports to be a defender and disseminator of Pancasila.

UGM headquarters is located in the Bulaksumur Campus, Yogyakarta. As of today, UGM has 18 faculties, a vocational school, and a graduate school, offering more than 251 courses. UGM's mission is inspired by the spirit of Tri Dharma of Higher Education (Tri Dharma Perguruan Tinggi), comprised of Teaching, Research, and Community Services. More than 56,000 students, both domestic and international, are studying at UGM in a myriad of vocational, undergraduate, and graduate programs.

Citizenship commitment is manifested in community services as well as community empowerment activities, one of which by assigning students to a rural internship program in all regions of Indonesia.



UGM humanizes academic and non-academic activities in the principle of educopolis environment. This principle is elaborated multidisciplinary collaborative learning process in which responsive to ecological issues. The vision of UGM is to be a pioneer world class national university, excellent and innovative univesity, to serve the nation and humanity based on national cultural values and the national Ideology, Pancasila. The mission of UGM is to carry out education, research, and community service as well as preservation and development of knowledge that is excellent and useful for society.

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About

Badan Penerbit dan Publikasi UGM

Badan Penerbit dan Publikasi Universitas Gadjah Mada (BPP UGM) is a supporting unit for publishing as University's Tridharma (Education, Research, and Community Service). Established since February 2015, the objective is to encourage and support the academicians' publication work in international scientific journals. BPP also together with UGM Press as an academic publisher in UGM. We lead publishing journals and books from UGM's academic works.

The International Conference on Science and Technology (ICST), the International Conference on South East Asia Studies (ICSEAS), the International Conference on Tropical Agriculture (ICTA), the International Conference on Health Sciences (ICHS), and the International Conference on Bioinformatics, Biotechnology, and Biomedical Engineering (BioMIC) are parts of UGM Annual Scientific Conferences (UASC) which organized by BPP UGM.

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✉ BPP_UGM



About UGM Press

UGM Press continuously supports the vision of UGM to be a pioneer world class national university, excellent and innovative university, especially in the field of education through a mission to provide a high-quality education by publishing academic publications. Established since 1971, UGM Press's objective is to encourage and facilitate academic publications to become a trusted partner in educating the nation.

UGM Press proved to be one of the university publishers in Indonesia recognized by Southeast Asia University seen from the number of books published. Every year UGM Press publications continue to increase. Counting from 1971 to 2017, more than 2,000 book titles have been published.

Currently UGM Press initiated the reading community through the "Let's Buy Original Books" campaign since the increase in the purchase of the original book will increase the productivity of writing the book.

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The 4th International Conference on Science and Technology
Program and Abstract Book

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Welcoming Remarks from the Chairman

The honorable Rector of Universitas Gadjah Mada, dear distinguished guests, invited speakers, participants, ladies, and gentlemen, on behalf of the organizing committee, I would like to welcome you all to the 4th International Conference on Science and Technology (ICST 2018).

The 4th International Conference on Science and Technology consists of seven symposia, namely Computer and Information Technology Symposium; Electronics, Communication, Control, and Instrumentation Symposium; Environmental and Earth Science Symposium; Material Science and Chemistry Symposium; Mechanical and Industrial Engineering Symposium; Power and Energy Symposium; and Remote Sensing and Geomatics Symposium. In addition, the conference committee has invited nine renowned speakers, Prof. Fitri Yuli Zulkifli from Universitas Indonesia; Prof. Gerard Remijn from Kyushu University, Japan; Prof. Hutomo Suryo Wasisto from Technische Universität Braunschweig, Germany; Dr. Deendarlianto from Universitas Gadjah Mada; Prof. Azhar Zam from University of Basel, Switzerland; Assoc. Prof. Rohayu Che Omar from Universiti Tenaga Nasional, Malaysia; Prof. Cheon-Gyu Cho from Hanyang University; Dr. Julius Motuzas from the University of Queensland, Australia; and Prof. Rianarto Sarno from Institut Teknologi Sepuluh Nopember, Indonesia.

This year, the 4th International Conference on Science and Technology (ICST 2018) received 397 submissions from 12 countries throughout the world. All submitted papers went through a rigorous review process and each paper was evaluated by at least three independent reviewers in accordance with the standard blind review process. Based on the results of the rigorous review process, 266 papers have been selected, which constitute the acceptance rate of 67.0 %. The accepted and presented papers will be submitted to journals/proceedings that are indexed by Scopus: IEEE Xplore digital library, Trans Tech Publications, and E3S Web of Conferences. Quality selected papers from Material Science and Chemistry symposium will be published in Indonesian Journal of Chemistry.

The ICST 2018 could not become a reality without the support and assistance of many parties. In this occasion, I would like to sincerely thank the Rector of Universitas Gadjah Mada, BPP officers and staff, invited speakers, and all members of the Organizing Committee. I would also like to thank authors, reviewers, all speakers, and session chairs for their support to ICST 2018.

In addition to the outstanding scientific program, we hope that you will find time to explore Yogyakarta and the surrounding areas. Yogyakarta is a city with numerous cultural heritage, natural beauty, and the taste of traditional Javanese cuisines, coupled with the friendliness of its people.

Lastly, I would like to welcome you to ICST 2018 and wish you all an enjoyable stay in Yogyakarta.

Yogyakarta, 7 August 2018

Chairman of the Organizing Committee,
Dr. I Wayan Mustika

Welcoming Remarks from the Rector of Universitas Gadjah Mada

Dear distinguished speakers, participants, ladies, and gentlemen.

On behalf of Universitas Gadjah Mada, it is my pleasure and privilege to welcome you all to Yogyakarta for the 4th International Conference on Science and Technology (ICST 2018), hosted by Universitas Gadjah Mada (UGM). This conference has a role to carry out excellent and useful research for society. As we know, society has never moved faster without the whole acceleration spectrum of science and technology timelines. History of UGM's education has earned a reputation as a pioneering university, pushing the boundaries between academics and professionals across the world, to serve and discover scientific progress as a valuable source of knowledge for the benefit of humankind.

The wonderful thing about ICST is bridging the gap between disciplines through this conference to bring and share their innovation, research, and ideas about our scientific issues today. UGM is proud to be leading the way in facilitating the interdisciplinary research dissemination of cutting-edge information between subjects as diverse as chemistry, computer science, electronics, earth sciences, mechanical, environmental, power, energy, remote sensing, and many others.

After 3 year ago, ICST as a part of Annual Scientific Conference Series, holding annual gatherings for the brilliant minds from Indonesia and abroad to share the latest findings in their fields. It proves UGM's consistency to preserve the international academics relation. This series has been enormous success to bring collaboration with our international partners, shaping the scientific networks, increasing Indonesia author's greatness in the global publications scopes, and with a global readership, and underscoring UGM's place as a standard-bearer of scientific development.

We are honored and humbled to many experts who have attended this year's conference. We thank the speakers for the expertise and knowledge that will bring to spur great discussion during the conference. Special thanks are also extended to the organizing committee members for their hard work, as well as the entire staff of UGM's Badan Penerbit dan Publikasi (BPP) for making and bringing the ICST 2018's realm. And finally, we would like to thank all the conference participants who will contribute to making this truly the most memorable ICST yet. For unfinished business, this event should impact the fields of science, technology and also our humanity for the next many years.

I am sure you will have fruitful and rewarding exchanges in the next two days. I wish you all a wonderful stay in Yogyakarta, and above all a successful ICST 2018.

Thank you.

Rector of Universitas Gadjah Mada,
Prof. Ir. Panut Mulyono, M. Eng., D.Eng.

Table of Contents

2	About Universitas Gadjah Mada 2	84	Abstracts Speakers 88
	Badan Penerbit dan Publikasi UGM 4		Computer and Information Technology 98
	UGM Press 5		Electronics, Communication, Control, and Instrumentation 156
6	Book information		Environmental and Earth Science 182
			Material Science and Chemistry 220
7	Welcoming remarks		Mechanical and Industrial Engineering 280
			Power and Energy 320
			Remote Sensing and Geomatics 344
11	Table of contents	370	Curriculum vitae
12	Venue	381	Presentation guidelines
18	Schedule Day 1 schedule 20	382	Committee
	Day 2 schedule 44		
66	List of participants	383	Emergency number

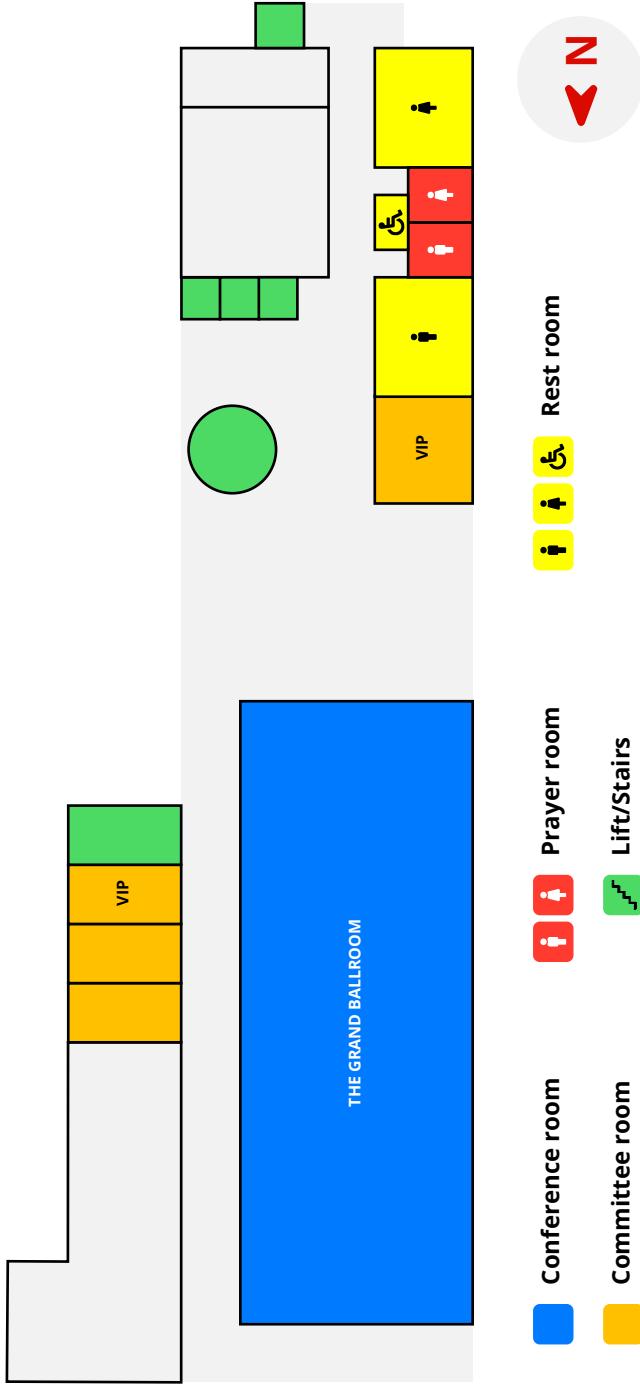
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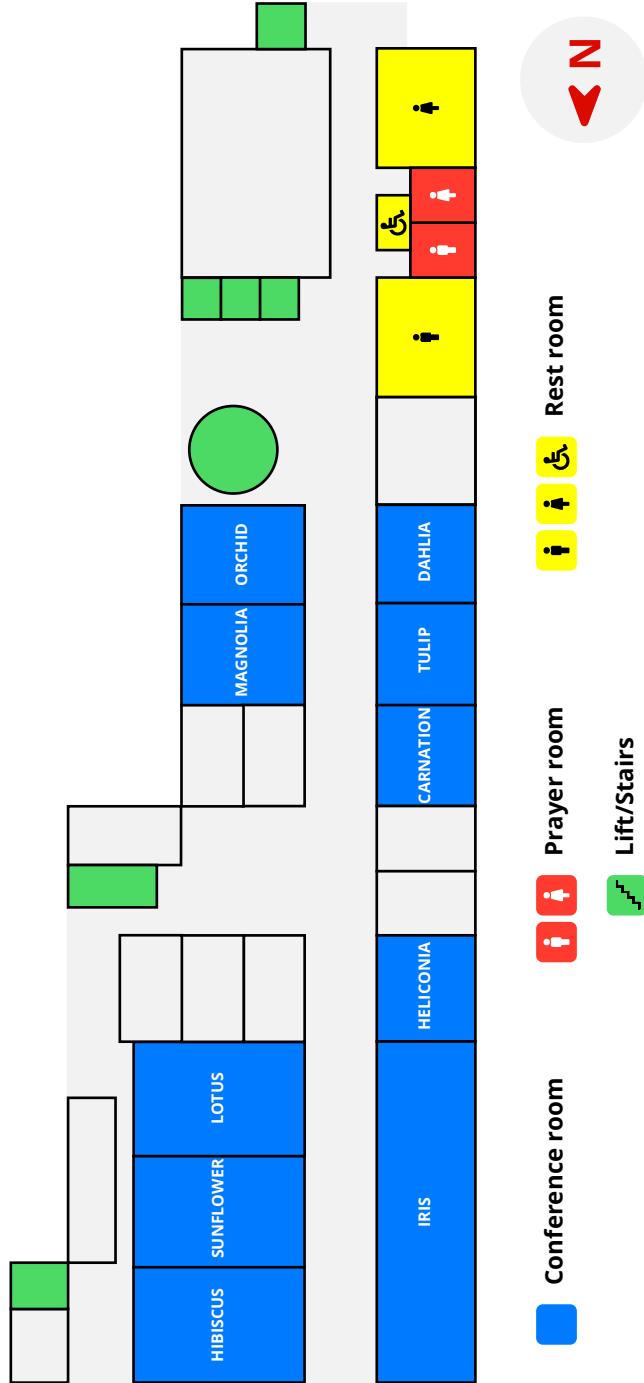
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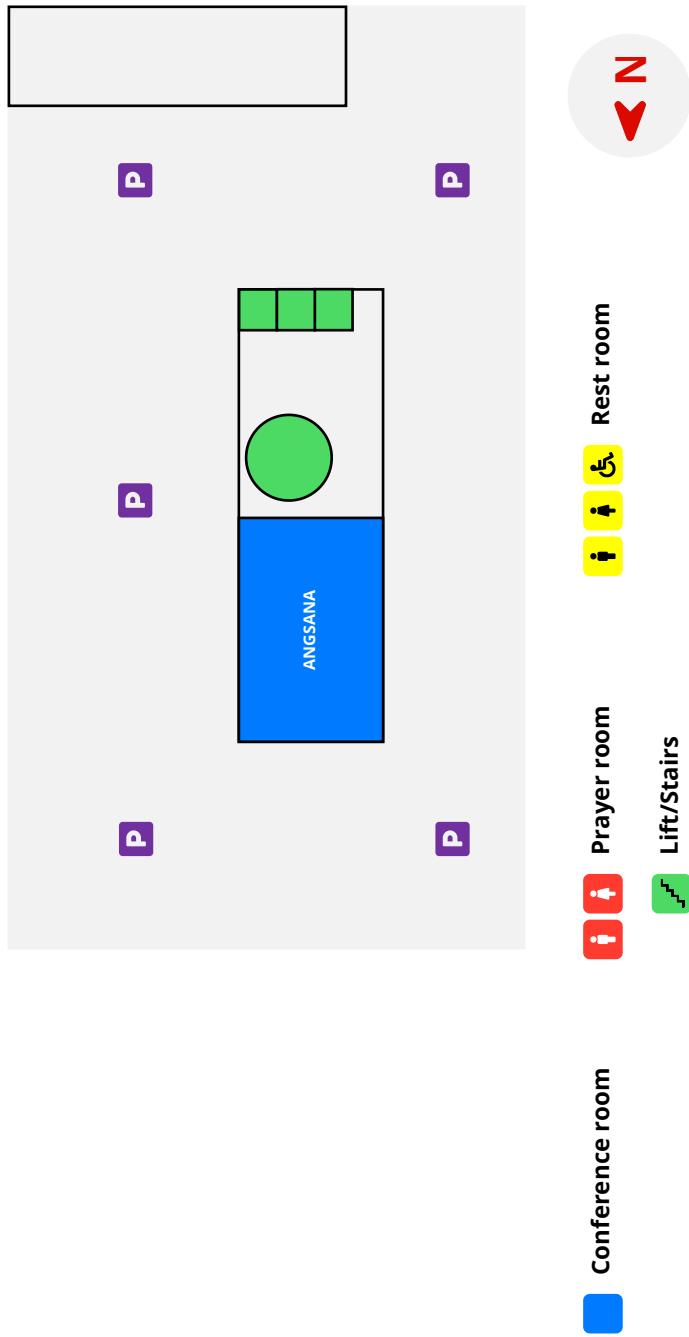
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The 3rd floor of Eastparc Hotel



The basement floor of Eastparc Hotel



SCHEDULE

AGU

MINGGU

5

23 PAHING

12

30 WAGE

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2

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7 LEGI

8 PAH

26

14 PON

27

15 WAG

17 Agustus 2018 : Hari Kemerdekaan
22 Agustus 2018 : Hari Raya Idul Adha





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GADJAH MADA

JULY 2018

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13 IWON	14 2 LEGI	15 3 PAHING	16 4 PON	17 5 WAGE	18 6 KLIWON
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DAY 1

Conference schedule

TUESDAY, 7 AUGUST 2018

Time	Program	Venue
07:00–08:00	REGISTRATION	Ballroom lobby
OPENING CEREMONY		
08:00–09:00	Dr. I Wayan Mustika <i>ICST 2018 Chairman</i> 	Ballroom
	Prof. Panut Mulyono <i>Rector of Universitas Gadjah Mada</i> 	
09:00–09:10	PHOTO SESSION	
PLENARY SESSION I		
09:10–10:10	Prof. Fitri Yuli Zulkifli <i>Universitas Indonesia, Indonesia</i> 	Ballroom
DISCUSSION		
10:10–10:25	COFFEE BREAK	Ballroom lobby
PLENARY SESSION II		
10:25–11:30	Prof. Gerard Remijn <i>Kyushu University, Japan</i> 	Ballroom
	Prof. H utomo Suryo Wasisto <i>Technische Universität Braunschweig, Germany</i> 	
DISCUSSION		
11:30–13:00	LUNCH BREAK	Ballroom lobby
13:00–14:25	SYMPOSIA SESSION I	Parallel rooms
		

Time	Program	Venue
14:25-15:50	SYMPOSIA SESSION II	Parallel rooms
		
15:50-16:10	COFFEE BREAK	Front of parallel rooms
16:10-17:35	SYMPOSIA SESSION III	Parallel rooms
		

DAY 1

Computer and Information Technology Symposium

LOTUS ROOM

Code	Title and Authors
SYMPORIUM SESSION 1 13:00 – 14:25	
<hr/>	
CI1-425	Resource Endowments Strategy for Sustainable E-Government Nurdin
CI1-995	Context based-Tourism Recommender System: Towards Tourists' Context-Sensitive Preference Conceptual Model Kusuma Adi Achmad, Lukito Edi Nugroho, Achmad Djunaedi, and Widya Widayawan
CI1-920	Needs vs. Aspirations in Inter-Agency IT Alignment Haemiwan Z Fathony, Bobby Nazief, and Qorib Munajat
CI1-416	E-archives Implementation Readiness: A Case of the National Archives of the Republic of Indonesia Parno Nusantara, Bobby Nazief, Puspa Sandhyaduhita, and Haemiwan Z Fathony
CI1-922	Smart City for Development: Towards a Conceptual Framework Kusuma Adi Achmad, Lukito Edi Nugroho, Achmad Djunaedi, and Widya Widayawan
SYMPORIUM SESSION 2 14:25 – 15:50	
<hr/>	
CI3-689	Segmenting Retinal Vessels with a Multi-scale Modified Dolph-Chebyshev Type I Function Matched Filter Dhimas Arief Dharmawan and Boon Poh Ng
CI3-626	Multilevel Wavelet Packet Entropy and Support Vector Machine for Epileptic EEG Classification Inung Wijayanto, Achmad Rizal, and Sugondo Hadiyoso
CI3-958	Robust Pupil Localization Algorithm Based on Circular Hough Transform for Extreme Pupil Occlusion Muhammad Setiawan, Sunu Wibirama, and Noor Akhmad Setiawan

Code	Title and Authors
CI3-345	EEG-Based Emotion Classification Using Wavelet Transform and K-Nearest Neighbor Agfianto Eko Putra and Catur Atmaji
CI3-417	Adaptive Threshold Determination Based on Entropy in Active Contour Without Edge Method for Malaria Parasite Candidate Detection Faza Azif, Hanung Adi Nugroho, and Sunu Wibirama

SYMPOSIUM SESSION 3

16:10 – 17:35

CI5-155	A Review of Contrast Enhancement Techniques in Digital Image Processing Dananjaya Ariateja, Igi Ardiyanto, and Indah Soesanti
CI5-686	Three-Class Classification of EEG Signals Using Support Vector Machine Methods Catur Atmaji and Agfianto Eko Putra
CI5-747	Modification of Grey Level Difference Matrix (GLDM) for Lung Sound Classification Achmad Rizal, Risanuri Hidayat, and Hanung Adi Nugroho
CI5-316	Intra and Inter-Observer Comparison of Semi-Automated and Manual Methods Assessment by Non-Pathologist for Counting Cells Expressing P75 in Endometriotic Lesion Agung Dewanto
CI5-552	Do You See What I See Taking Perspective of Others Using Facial Images Yustinus Eko Soelistio

DAY 1

Computer and Information Technology Symposium

SUNFLOWER ROOM

Code	Title and Authors
SYMPOSIUM SESSION 1 13:00 – 14:25	
CI2-894	A Persuasive Mobile Learning System for Informal Learning of Vegetable Farmers Abdurrahman Iskandar, Yusep Rosmansyah, and Albarda Albarda
CI2-636	Optimized Back-propagation Artificial Neural Network Algorithm for Smart Agriculture Applications Budi Cahyo Suryo Putro S, I Wayan Mustika, and Lukito Edi Nugroho
CI2-009	Real Time Face Recognition Comparison Using Fisherfaces and Local Binary Pattern Banu W Yohanes and Iwan Setyawan
CI2-885	The Implementation of Genetic Algorithm in Smote (Synthetic Minority Oversampling Technique) for Handling Imbalanced Dataset Problem Tince Tallo and Aina Musdholifah
CI2-497	Design of Fuzzy Simulation for Determining the Duration of Traffic Light Based on Vehicle Density Level and Carbon Monoxide Level Akhsin Nurlayli, Febrianto Alqodri, and Intan Sakkina
SYMPOSIUM SESSION 2 14:25 – 15:50	
CI4-576	Analyzing the Performance of Machine Learning Algorithms in Anomaly Network Intrusion Detection Systems Pascal Maniraho and Tohari Ahmad
CI4-548	Security System Analysis in Combination Method: RSA Encryption and Digital Signature Algorithm Farah Jihan Aufa

Code	Title and Authors
CI4-727	A Conceptual Model for Information Security Risk Considering Business Process Perspective Eva Hariyanti, Arif Djunaidy, and Daniel Siahaan
CI4-887	A Revisit on Blockchain-based Smart Contract Technology Fengkie Junis, Faisal Prasetya, Farouq Lubay, and Anny Sari
CI4-688	Prediction Learning Style with Prior Knowledge Muhammad Said Hasibuan, Lukito Edi Nugroho, and Paulus Insap Santosa
SYMPOSIUM SESSION 3 16:10 – 17:35	
CI6-728	INARTE: An Indonesian Dataset for Recognition Textual Entailment Abdiansah Abdiansah, Azhari Azhari, and Anny Sari
CI6-968	Analyzing Employee Voice Using Real-Time Feedback Andry Alamsyah and Dessy Monica Ginting
CI6-941	An Ontology Model for Clinical Pathway Audit Dhomas Hatta Fudholi and Lalu Mutawalli
CI6-969	A Comparative Study of Employee Churn Prediction Model Andry Alamsyah and Nisrina Salma
CI6-482	Adaptive Synthetic-Nominal (ADASYN-N) and Adaptive Synthetic-KNN (ADASYN-KNN) for Multiclass Imbalance Learning on Laboratory Test Data Adhistya Erna Permanasari, Yulia Ery Kurniawati, and Silmi Fauziati

DAY 1

Electronics, Communication, Control, and Instrumentation Symposium

DAHLIA ROOM

Code	Title and Authors
SYMPORIUM SESSION 1 13:00 – 14:25	
EC1-768	An Output Feedback Controller in the Presence of Measurement Error Janghoon Yang
EC1-558	A New Blood Pressure Measurement Technology Based on the Flipping of Magnetic Dipole Moment Bambang Murdaka Eka Jati, Kusminarto Kusminarto, Agung Bambang Setio Utomo, and Guntur Maruto
EC1-961	Radio Frequency to Lightwave Signal Using Integrated Antenna and Optical Material for Electro Optic Alteration Yus Natali, Purnomo Priambodo, and Eko Tjipto Rahardjo
SYMPORIUM SESSION 2 14:25 – 15:50	
I3	Prof. Rianarto Sarno  Institut Teknologi Sepuluh Nopember, Indonesia
EC2-098	Effect of the Receiver Coil Rotational Motion on Induction Voltage of Wireless Power Charging C. Bambang Dwi Kuncoro, Win-Jet Luo, and Yean-Der Kuan
EC2-673	Metal Oxide Semiconductor Based Electronic Nose as Classification and Prediction Instrument for Nicotine Concentration in Unflavoured Electronic Juice Trisna Julian, Shidiq Hidayat, and Kuwat Triyana
SYMPORIUM SESSION 3 16:10 – 17:35	
EC3-164	Design of Simple ECU for LPG Fuel Injection on Conventional Generator Set I Wayan Adiyasa, Eka Firmansyah, and Adha Imam Cahyadi, and Anggito Kautsar

Code	Title and Authors
EC3-519	Electronic Nose Coupled with Chemometrics for Monitoring of Tempeh Fermentation Process Shidiq Hidayat, Tri Nuringtyas, and Kuwat Triyana
EC3-604	Multiband Optically Transparent Antenna from Indium Zinc Tin Oxide Thin Films with Half-Circular Shaped Yus Rama Denny, Teguh Firmansyah, Erfan Handoko, Isnaeni Isnaeni, Kangil Lee, and Channae Park
EC3-069	Quality Classification of Chili Sauce Using Electronic Nose with Principal Component Analysis Danang Lelono, Deny Permana, Fandy Achmad, Triyogatama Wahyu Widodo, Kuwat Triyana, and Muhammad Agung Bramantya
EC3-783	Calibration of Capacitive Soil Moisture Sensor Radi Radi, Murtiningrum Murtiningrum, Fajar Muzdrikah, and Ngadisih Ngadisih

DAY 1 Environmental and Earth Science Symposium

CARNATION ROOM

Code	Title and Authors
SYMPOSIUM SESSION 1 13:00 – 14:25	
EE1-802	Environmental Economic Valuation of Cibodas Botanical Garden Using the Travel Cost Method Iwan Juwana and Muhammad Albar
EE1-163	Flood Insurance Rate Map for Non-Structural Mitigation Rasyikin Roslan and Rohayu Che Omar, and Badariah Solemon
EE1-642	Value Chain Analysis of Batik Wood Craft in Krebet Tourism Village Dyah Widiyastuti
EE1-907	Nett Present Value (NPV) Analysis for Projection of Feasibility of Coastal Sand Dune Tourism in Parangtritis Village Dicky Satria Dwiputra, Yan Abdi Rahmanu, Muhammad Naufal, Atikarosa Sih Tofani, Jundi Muhammad Bariq, and Khansa Sitostratufana Arsy An Nisa
EE1-967	Temporal-Spatial Analysis in Accordance with Gender Development Index on the Improvement of the Quality of Women in Central Kalimantan Province Prameswari Kusumaningrum, Ari Yulianto, Alviyah Daniati, Shinta Nurvitasisari, and Ratih Putri
SYMPOSIUM SESSION 2 14:25 – 15:50	
EE3-012	Gravity Satellite Data Analysis for Subsurface Modeling in Mt. Merapi and Mt. Merbabu, Java, Indonesia Puspita Dian Maghfira and Sintia Niasari
EE3-070	Thermal Comfort and Settlements Quality for Ec0-settlement Based Management in Yogyakarta Djaka Marwasta
EE3-263	Spatial Analysis of Coral Reefs and Its Degradation Patterns in Bunaken National Park Nafil Attamimi

Code	Title and Authors
EE3-950	Landuse Change Monitoring and Population Density Analysis of Penjarnegan, Cengkareng, and Cakung Urban Area in Jakarta Province Ratih Putri and Sunu Wibirama
EE3-054	Kite Aerial Photography (KAP) for Rip Current Identification in Parangtritis Beach Barandi Sapta Widartono, Muchsin Nur Wachid, Deha Agus Umarhadi, Anggini Nur Azizah, and Restu Dwi Cahyo
SYMPOSIUM SESSION 3 16:10 – 17:35	
EE5-018	Analysis of Java Island's Ozone Layer and Ultra Violet Index Variability Based on Satellite Data Ninong Komala
EE5-621	The Tropopause Height Analysis in Equatorial Region Through the GPS-RO Rohaniza Mohd Zali
EE5-689	The Impact of Climate Variability on Tobacco Productivity over Temanggung Regency Andi Syahid Muttaqin, Utia Suarma and Emilya Nurjani, Faricha Kurniadhin, Ratna Prabaningrum, and Retno Wulandari
EE5-956	Sustainability of Rainwater Harvesting for Supplying Domestic Water Demand in Yogyakarta City Basyar Arijuddin, Setyawan Purnama, and Emilya Nurjani
EE5-857	The Nature of Carbon Flux in Various Ecosystem Types in the Biduk-Biduk Karst Region, Berau District, East Kalimantan Danardono Danardono, Eko Haryono, and Margaretha Widyastuti

DAY 1 Environmental and Earth Science Symposium

TULIP ROOM

Code	Title and Authors
SYMPORIUM SESSION 1 13:00 – 14:25	
EE2-361	Design of Coal Mine Drainage System Waterman Sulistyana Bargawa, Agus Panca Adi Sucahyo, and Hesti Farra Andiani
EE2-526	Bismuth/Hydroxyapatite-Modified Carbon Screen-Printed Electrode for Heavy-Metal Ion Detection in Aqueous Media Aamir Khan, Huma Ajab, Asim Yaqub, and Mohd Azmuddin Abdullah
EE2-588	Multi-channel Analysis of Surface Wave Method for Geotechnical Site Characterization in Yogyakarta, Indonesia Nwai Ngal
EE2-960	Design and Modification of Horizontal-Flow Roughing Filter as Watertreatment at UGM Retention Pond Niesa Hanum Mistoro and Sri Saraswati
EE2-823	Optimization of Operational Techniques in Waste Management Case Study: Lhokseumawe City Ade Widya Isharyati, Agus Prasetya, and Rochim Bakti Cahyono
SYMPORIUM SESSION 2 14:25 – 15:50	
EE4-725	Sand Transport Characterization on the Foredune Area of Parangtritis, Indonesia Mukhamad Malawani, Djati Mardiatno, and Sunarto Sunarto
EE4-747	Relation of Lineaments and Volcano-Stratigraphy of Tertiary Volcanic Rock in Kulon Progo Mountains Area, Yogyakarta-Indonesia Asmoro Widagdo
EE4-359	Petrogenesis and Depositional Environment of Paleozoic Sedili and Pengerang Volcaniclastics in East Johor Basin, Peninsular Malaysia Sugeng Surjono, Shafeea Leman, Che Ali, and Fathan Mada

Code	Title and Authors
EE4-929	The Development of Cave Passage in Donomulyo, Malang, Indonesia Mohammad Labib, Eko Haryono, and Sunarto Sunarto
EE4-701	Assesment of New Geosites in Gunungsewu Karst Area, Wonogiri Regency, Central Java, Indonesia Trihandy Saputro, Rakan Mahardhika, and Agus Hendratno
SYMPOSIUM SESSION 3 16:10 – 17:35	
EE6-072	Water Quality and Sustainability of Merdada Volcanic Lake, Dieng, Indonesia Sudarmadji Professor, Slamet Suprayogi, Sri Lestari, and Mukhamad Malawani
EE6-166	Macroinvertebrate Benthic Community as Rapid Quality Assesment in Winongo, Code, and Gajah Wong Streams Inside Yogyakarta City District Special Region of Yogyakarta Province Qisti Fauziyah
EE6-554	Spatial Distribution of Dominant Ions in the Groundwater in Banyumulal Groundwater Basin, Central Java, Indonesia Setyawan Purnama
EE6-531	The Hydrogeological Mapping of the Southwestern Part of Serang District, Banten, Indonesia Ahmad Cahyadi, Romza Agniy, Nurul Khakhim, Setyawan Purnama, Igor Bachtiar, and Wikan Prihantarto
EE6-989	Hydrograph Modeling with Rational Modified Method Mega Widasmara, Mohammad Hadi, and Nugroho Christanto
EE6-884	Clay Mineralogy of Landslide Occurrences in Hydrothermally Altered Area: A Case Study of Durensari Area Purworejo, Central Java Ilham Putra, Anastasia Titisari, and Hiznaiti Husna

DAY 1 Material Science and Chemistry Symposium

HIBISCUS ROOM

Code	Title and Authors
SYMPORIUM SESSION 2 14:05 – 15:50	
MC2-667	Synthesis of curcumin analogs under ultrasound irradiation for inhibiting α-amylase Lana Tantriasta D. T., Chairil Anwar, and Endang Astuti
MC2-720	Antioxidant activity of sweet swimming extract (<i>Cinnamomum burmanii</i>) to overcome rancidity on cooking oil Yufita Tuhuteru
MC2-857	In silico approach in evaluation of jack bean (<i>Canavalia ensiformis</i>) Canavalin protein as precursors of bioactive peptides with dual antioxidant and angiotensin I converting enzyme inhibitor Zulvana Anggraeni Harvian, Andriati Ningrum, Sri Anggrahini1, Widiasutti Setyaningsih
MC2-946	Ultrasound-assisted synthesis of some mono-carbonyl Curcumin analogs and their synergistic effect with ferulic acid on α-amylase inhibition Siti Khoiri Inayah, Chairil Anwar, and Harno Dwi Pranowo
MC2-965	Synthesis and Heme Polymerization Inhibitory Activity (HPIA) assay of chalcone, flavone, and flavanone derivatives Novia Suryani, Sabirin Matsjeh, and Respati Tri Swasono
SYMPORIUM SESSION 3 16:10 – 17:35	
MC4-280	The Influence of Physico-chemical properties on Heavy Metals Content on the Illegal Land Fill Kadisoka, Sleman, Special Region of Yogyakarta Fitri Rizqi Amaliyah, Adhitasari Suratman, and Suherman
MC4-286	Comparison the effect of using different fatliqour to the formation of chromium (VI) in leather production Mustafidah Udkhiyati and Laili Rachmawati
MC4-445	Determination of risk of radioactive in chemical fertilizer using gamma ray spectrometry Rindi Genesa Hatika and Purwo Subekti

Code	Title and Authors
MC4-682	<p>Enhancement of EAPR system using aeration process on the removal of heavy metal (Cu and Fe) in the wastewater and up-take by Vetiver grass (<i>Vetiveria zizanioides</i> L)</p> <p>Rudy Syah Putra, Vivian Viani, Iis Setianingrum, Ega Dwi Sintadani, Durrotul Uuliyah, and Muhammad Faiq Faridani</p>
MC4-990	<p>Analysis of dexamethasone in “jamu” Indonesian traditional medicine using ^1H NMR-based metabolomics</p> <p>Yulia Shara Br Sembiring, Respati Tri Swasono, Chairil Anwar, and Tri Rini Nuringtyas</p>

DAY 1 Material Science and Chemistry Symposium

IRIS ROOM

Code	Title and Authors
SYMPOSIUM SESSION 1 13:00 – 14:05	
I1	Dr. Julius Motuzas  The University of Queensland, Australia
I2	Prof. Cheon-Gyu Cho  Hanyang University, South Korea
SYMPOSIUM SESSION 2 14:05 – 15:50	
MC3-011	Synthesis, characterization, and anticancer activity of N-acetyl pyrazolines from veratraldehyde Tutik Dwi Wahyuningsih, Artania Adnin Tri Suma, and Endang Astuti
MC3-012	The opportunities of oil palm fronds to become a commercial liquid smoke Seri Maulina and Fadhil Al Faruq Sinaga
MC3-014	Synthesis of dehydrozingerol and the activity test as fruit flies attractant Murdiah, Deni Pranowo, and Tri Joko Raharjo
MC3-963	Synthesis and biological evaluation of chalcone derivatives as antioxidant and sunscreen agents Damayanti Iskandar and Tutik Dwi Wahyuningsih
MC3-986	Extraction of condensed tannins from tropical plants as affected by leaves maturity, maceration time, and centrifugal force Awistaros Angger Sakti, Kustantinah, Raden Wisnu Nurcahyo, Lovy Perdani, and Melisa Ekaningrum
SYMPOSIUM SESSION 3 16:10 – 17:35	
MC5-039	Effect of silver concentration towards formation of AgPt nanofern films as SERS substrates Norhayati Abu Bakar, Nur Adliha Abdullah, Akrajas Ali Umar, Muhamad Mat Salleh, and Joseph George Shapter

Code	Title and Authors
MC5-282	Microstructures and Functional Group Properties of Nano-sized Chitosan Prepared by Ball Milling Kartika Sari, Edi Suharyadi, Roto, and Kamsul Abraha
MC5-293	The influence of Cu dopant concentration on the optical properties of Fe3O4/SiO2/TiO2 nanocomposite Aisyah Restutiningsih Putri Utami, M. Sulthon Nurharman Syah Putra, M. Miqdam Musawwa, Eko Sri Kunarti
MC5-645	The role of reduced graphene oxide concentration as ablated material on optical properties of graphene quantum dots Fiqhri Heda Murdaka, Ahmad Kusumaatmaja, Isnaeni, and Iman Santoso
MC5-718	Selection of polyanions as complexation agent in the formation of nanochitosan by polyelectrolyte complex method Al Dina Khoerunisa N., Prihati Sih Nugraheni, Mohammad Fahrurrozi, and Wiratni Budhijanto
MC5-947	Antibacterial activity of TiO2- Ag-Nanoparticle under visible light Endang Tri Wahyuni, Roto, and M. Prameswari

DAY 1

Mechanical and Industrial Engineering Symposium

MAGNOLIA ROOM

Code	Title and Authors
SYMPORIUM SESSION 1 13:00 – 14:25	
MI1-827	Analysis of Fundamental Parameters on Zooming and Rotation Using Pinch Gestures Valentina Kunthi Brataadewi, Cheng-Jhe Lin, and Titis Wijayanto
MI1-919	A Study on the Visual Menu Design Using Pinch Gestures on Touchscreens Orchida Dianita, Cheng-Jhe Lin, and Titis Wijayanto
MI1-964	Investigation of Potential Impact Parameters to Be Used for Future Detection of Kopyor Coconut with Drop Test Method Alfian Kamil, Muhamad Bayu, Agung Shamsuddin Saragih, and Radon Dhelika
MI1-415	Transportation Cyber-Physical Systems: Impacts on Humans Fitri Trapsilawati, Matrissya Hermita, and Christopher Wickens
MI1-902	Design and Development of Wearable GPS Tracking Device by Applying the Design for Wearability Approach Teddy Sjafrizal, Yahya Muhyiddin, Andre Wijaya, and Rino Andias Anugraha
SYMPORIUM SESSION 2 14:25 – 15:50	
MI3-493	Ergonomic Student Laptop Desk Design Using the TRIZ Method Hari Purnomo and Fikriadi Kurnia
MI3-071	Analysis of Mental Workload in Human Resource Department Sri Indrawati and Suci Miranda
MI3-565	User Needs Analysis for Industrial Design of Kansei Engineering-based Sensor for Agroindustry (KESAN) Taufik Agassi, Mirwan Ushada, and Atris Suyantohadi
MI3-713	Analysis of Air Traffic Conflict Geometry on Brain Activity Fitri Trapsilawati, Agustyandini Nugraheni, and Muhammad K Kusumawan Herliansyah

Code	Title and Authors
SYMPOSIUM SESSION 3 16:10 – 17:35	
MI5-343	Basic Analysis of Logistics Cost for Indonesian Fishery Commodities Kuncoro Harto Widodo
MI5-365	Supply Chain Strategy of Catchment Sea-Fish Based on Logistics Cost Structure Adi Guritno
MI5-393	Risk Mitigation for Fresh Raw-Milk in the Rural Supply Chain Kuncoro Harto Widodo
MI5-472	Managing On-Time Delivery in Engineering-To-Order Supply Chain with Buffer Time Optimization Budhi Wibowo
MI5-637	Model of Warehouse Performance Measurement Based on Sustainable Warehouse Design Sri Indrawati and Suci Miranda

DAY 1

Mechanical and Industrial Engineering Symposium

ORCHID ROOM

Code	Title and Authors
SYMPOSIUM SESSION 1 13:00 – 14:25	
MI2-938	Free Expansion Behaviour of Coronary Stent Based on Strut Linker Geometry Rachmat Sriwijaya
MI2-958	The Comparison of Material and Force Difference on the Development of Lower Limb Exoskeleton Design for Post Stroke Patients Djoko Kuswanto, Ibnu Wicaksono, and Faiqoh Agustin
MI2-785	Numerical Investigation on Flexibility of Metal Cardiovascular Stent Alva Tontowi
MI2-909	The CFD Simulation of Cyclone Separator with the Counter-cone in the Updraft Gasification Process T. Firdani, H. Saputro, Riyadi Muslim, Sri Lasmini, and Khaniffudin Khaniffudin
MI2-303	Experimental Investigation on Air-Water Two Phase Flow and Transition Phenomenon in Capillary Channel Ardi Wiranata, Indro Pranoto, Muhammad Imaduddin, Sudarja Sudarja, Deendarlianto Deendarlianto, and Indarto Indarto
SYMPOSIUM SESSION 2 14:25 – 15:50	
MI4-440	Investigating the Temperature and Air Velocity Distribution of Split-Type Air Conditioners Using Computational Fluid Dynamics Yosua Heru Irawan, Daru Sugati, Harianto Harianto, Muhamad Abdulkadir, Yohanes Jayatun, and Dandung Hartana
MI4-117	Effect of Inlet Pressure, Size and Wind Speed of an Evaporator on Amount of Refrigerant Charge and Performance of a Portable Propane Air Conditioner Jeri Siang

Code	Title and Authors
MI4-176	Experimental and Simulation Study of the Vibration of a Rectangular Plate with a Vertical Clamped Midline Gandha Adi, Indraswari Kusumaningtyas, and Gea Parikesit
MI4-970	SEM PLS Models for Performance Analysis of Manufacturing Companies D. Baroroh and A H Mahardhika
MI4-973	Effects of Heat Treatments on Mechanical Properties, Specific Wear and Corrosion Rate of HQ 809 Steel for Machinery Components Application Viktor Malau and Wildan Fauzi

SYMPOSIUM SESSION 3

16:10 – 17:35

MI6-905	Design and Hydrodynamic Test Propeller of Mini Submarine with High Efficiency and Low Cavitation Mahendra Indriyanto, Nurwidhi Asrowibowo, Navik Puryantini, and Muhammad Utina
MI6-692	Simultaneous Optimization of Tensile Strength, Energy Consumption and Processing Time on FDM Process Using Taguchi and PCR-TOPSIS Andhy Rinanto, Hoedi Prasetyo, Adi Nugroho, and Eko Pujiyanto
MI6-760	Investigation of Agel Leaf Fiber/Unsaturated Polyester Composite Cutting Parameters Using CO2 Laser Gesang Nugroho and Heryoga Winarbawa
MI6-675	Business Process Reengineering in a Sago Production Process Taufiq Immawan, Citra Asmarawati, and Windi Nur Cahyo
MI6-884	3D Printing for Fashion Development Djoko Kuswanto, Nike Jhorda Iftira, and One Media Hapinesa

DAY 1 Power and Energy Symposium

ANGSANA ROOM

Code	Title and Authors
SYMPORIUM SESSION 1 13:00 – 14:25	
PE1-105	Cogeneration Power-Desalination in Small Modular Reactors (SMRs) for Load Following in Indonesia Muhammad Oktavian, Diana Febrita, and Mansur Arief
PE1-248	Experimental Study on Fuel Consumption and Energy Efficiency at Soymilk Cooking Using a Mini Boiler and Using a Gas Stove Umi Hanifah
PE1-943	Analysis of the Effects of Overflow Leakage Phenomenon on Archimedes Turbine Efficiency Ahmad Indra Siswantara, Muhammad Syafei, Budiarso Budiarso, Rudias Harmadi, Warjito Warjito, and Dendy Adanta
PE1-664	Simulation of Close-Open Standing Wave Thermoacoustic Engine Toward Variation of Resonator Diameter Sugiyanto Sugiyanto and Joko Waluyo, Adhika Widayaparaga, and Samsul Kamal
PE1-963	The Model of HVAC's Control Technique Based on Occupancy in Smart Building for Energy Saving Chairani Fauzi, Selo Sulistyo, and Widy Widyan
SYMPORIUM SESSION 2 14:25 – 15:50	
PE2-867	The Influence of Bucket Shape and Kinetic Energy on Performance Breastshot Waterwheel Budiarso Budiarso, Jonathan Sahat Sinaga, Dendy Adanta, Warjito Warjito, and Aji Prakoso
PE2-821	Design and Implementation of Solar Based Ice Block Machine in Remote Island. Case Study Maratua Island, Indonesia Bahrul Jalaali, Muhammad Arifin, Krisna Permana, Yunanto Yunanto, and Dyah Murniyati
PE2-793	Effect of Blades Number on Undershot Waterwheel Performance with Variable Inlet Velocity Warjito Warjito, Satrio Arifianto, Budiarso Budiarso, Dendy Adanta, and Sanjaya Nasution

Code	Title and Authors
PE2-670	Short-term Electric Load Forecasting Using Recurrent Neural Network Muhammad Amri Yahya, Sasongko Pramono Hadi, and Lesnanto Multa Putranto
PE2-212	Power Flow Analysis of Power System Topology Development for Advancing Electricity System of Local Interconnection AN Afandi, Irham Fadlika, and Langlang Gumilar
SYMPOSIUM SESSION 3 16:10 – 17:35	
PE3-450	Investigation Flow on Horizontal Axis Wind Turbine with Betz Chord Distribution, Twist, and Winglet Nyoman Ade Satwika, Sarwono Sarwono, and Ridho Hantoro
PE3-848	Blade Depth Investigation on Cross-flow Turbine by Numerical Method Dendy Adanta, Richiditya Hindami, Budiarto Budiarso, Warjito Warjito, and Ahmad Indra Siswantara
PE3-971	Characteristics of Gradual Discharging Process on a Thermosyphon SWH Tank Containing PCM Muhammad Nadjib
PE3-429	Study of Solar and Wind Energy Using as Water Pump Drive-Land for Agricultural Irrigation Maidi Saputra
PE3-887	State of Charge (SOC) Analysis and Modeling Battery Discharging Parameters Moh. Iwan Wahyuddin, Purnomo Sidi Priambodo, and Harry Sudibyo

DAY 1 Remote Sensing and Geomatics Symposium

HELICONIA ROOM

Code	Title and Authors
SYMPOSIUM SESSION 1 13:00 – 14:25	
RG1-941	Euler Poles Determination of Southern Sunda Microblocks Base on GNSS GPS Observations Dina Sarsito, Susilo Susilo, Dhota Pradipta, and Heri Andreas
RG1-949	Quality Analysis of the Geodetic Control Networks for Purposes of Geodynamics Study of Sangihe Island Leni Heliani, Adhy Kurniawan, Fuad Swastiko, and Mohamad Ghaly Kurniawan
RG1-203	Observation Duration and Multipath Analysis on Yogyakarta Opak Fault Monitoring Station Nurrohmat Widjajanti, Afradon Setyawan, Aris Sunantyo, and Parseno Parseno
RG1-771	Movement Detection of Sermo Dam Control Point Based on GNSS Observation Data in 2016 - 2017 Muhammad Iqbal Taftazani and Yulaikhah Yulaikhah
RG1-698	Combination of Gravity Disturbances and Gravity Anomalies for Geoid Determination a Case Study in Semarang City Central Java, Indonesia Laode M Sabri, Leni Heliani, Aris Sunantyo, and Nurrohmat Widjajanti
SYMPOSIUM SESSION 2 14:25 – 15:50	
RG2-486	Satellite-based Estimation of Above Ground Carbon Stock Estimation for Rubber Plantation in Tembir Salatiga Central Java Wenang Anurogo, Muhammad Zainuddin Lubis, Miratul Mufida, Luthfiya Sari, and Wikan Prihartarto
RG2-017	Multi-Sensors Remote Sensing for Mapping and Monitoring Canals on Tropical Peatland Ismail Ismail, Oka Karyanto, and Trias Aditya
RG2-803	Analysis of Concentration of Total Suspended Solid (TSS) in Porong Sidoarjo River Waters Teguh Hariyanto, Cherie Bhakti Pribadi, Akbar Kurniawan, Bangun Sukoco, and Muhammad Taufik

Code	Title and Authors
RG2-413	Cirrus Cloud Correction in Landsat 8 Image Using the Image-Based Approach: A Case Study in Sumba Island, Indonesia Ratna Prastyani and Abdul Basith
RG2-898	Application of IKONOS Imagery for Estimating Population Exposure to Landslide Hazard in Banjarmangu Sub District, Central Java, Indonesia Noorhadi Rahardjo and Hero Marhaento

SYMPOSIUM SESSION 3

16:10 – 17:35

RG3-102	The Implementation of LADM VersionedObject Class in Spatial Data Presentation of 4 Dimensional Cadastre Object (3D Cadastre + Time) Miranty N. Sulistyawati, Trias Aditya, and Purnama Santosa
RG3-179	Spatial Habitat Suitability Modeling of the Roti Snake-Necked Turtle (<i>Chelodina Mccordi</i>) Based on Landsat-8 Imagery and GIS Kurnia Latifiana, Hartono Hartono, Projo Danoedoro, Maslim As-singkily, and Andi Cahyana
RG3-752	Developing Android Application for Precise Geotagging Using RTK GPS Module Dedi Atunggal, Nuaim Ausi, and Catur Rokhmana
RG3-792	The Relationship Between Artificial Nighttime Light (ANTL) and Built-Up Area: a Remote Sensing Perspective Wahyu Nurbandi, Ruwanda Prasetya, and Muhammad Kamal
RG3-949	Testing Spatial Data Deliverance in SQL and NoSQL Database Using NodeJS Fullstack Web App Dany Laksono

DAY 2

Conference schedule

WEDNESDAY, 8 AUGUST 2018

Time	Program	Venue
08:00–08:30	REGISTRATION	Ballroom lobby
PLENARY SESSION III		
08:30–10:00	Dr. Deendarlianto <i>Universitas Gadjah Mada, Indonesia</i>	Ballroom
	Prof. Azhar Zam <i>University of Basel, Switzerland</i>	
	Prof. Rohayu Che Omar <i>Universiti Tenaga Malaysia, Malaysia</i>	
DISCUSSION		
10:00–10:30	COFFEE BREAK	Ballroom lobby
10:30–12:12	SYMPOSIA SESSION IV	Parallel rooms
		
12:12–13:27	LUNCH BREAK	Ballroom lobby
13:27–15:09	SYMPOSIA SESSION V	Parallel rooms
		
15:09–15:39	COFFEE BREAK	Ballroom lobby

Time	Program	Venue
CLOSING CEREMONY		
15:39–16:34	TRADITIONAL DANCE PERFORMANCE <i>Universitas Gadjah Mada</i> 	Ballroom
BEST PAPER AWARDS		
	drg. Ika Dewi Ana, Ph.D. <i>Vice Rector for Research and Community Services</i> 	
16:34–16:44	PHOTO SESSION	

DAY 2 Computer and Information Technology Symposium

LOTUS ROOM

Code	Title and Authors
SYMPORIUM SESSION 4 10:15 – 11:57	
CI7-022	Analysis of Customers' Emotional Preferences Using Kansei Engineering and AHP Ana Hadiana and Abdurrohman P
CI7-074	A Review of Cloud Migration Strategies in the Developing Country Ridi Ferdiana and Guntur Dharma Putra
CI7-625	Data Preservation Process in Big Data Environment Using Open Archival Information System Krisostomus Nova Rahmanto and Mardhani Riasetiawan
CI7-742	Integrated Cloud Storage on Paperless Thesis Examination Fathi Nurdien Ali Rahman, Ridi Ferdiana, and Sri Suning Kusumawardani
CI7-007	Specify of Estimation Using C4.5 Algorithm of Software Project Estimation at the Point of Sales Application with Cocomo II Kadinar Novel, Sfenrianto Sfenrianto, Windu Gata, Kaman Nainggolan, and Mochamad Wahyudi
CI7-764	Numbered Musical Notation and LATEX Document Integration Yohanes Suyanto
SYMPORIUM SESSION 5 13:27 – 15:09	
CI10-495	Real-Time GPU-based SPH Fluid Simulation Using Vulkan and OpenGL Compute Shaders Samuel Gunadi and Pujianto Yugopuspito
CI10-605	Performance of Human Motion Analysis: A Comparison Lyta Ly, Igi Ardiyanto, and Sunu Wibirama

Code	Title and Authors
CI10-866	EEG Classification Using Elliptic Filter and Multilayer Perceptron Based on Gamma Activity Features Rahmat Widadi, Indah Soesanti, and Oyas Wahyunggoro
CI10-406	Performance Evaluation of Scalable High Efficiency Video Coding (SHVC) Transmission Daerawi Daerawi, Kalvein Rantelobo, and Kalamullah Ramli

DAY 2 Computer and Information Technology Symposium

MAGNOLIA ROOM

Code	Title and Authors
SYMPOSIUM SESSION 5 13:27 – 15:09	
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CI9-979	Evaluating Energy Consumption in a Different Virtualization Within a Cloud System I Made Murwantara and Pujiyanto Yugopuspito
CI9-481	The Architecture of Device Communication in Internet of Things Using Inter-Integrated Circuit and Serial Peripheral Interface Method Maemunah M and Mardhani Riasetiawan
CI9-951	Techno Economic Analysis of Spectrum License Price in Indonesia for NB-IoT Deployment Muhammad Rifki Nugroho and Gunawan Wibisono
CI9-569	Smart Traffic System: The Shortest Path to Reach the Location of Traffic Accidents Tati Erlina, Syafdia Okta, and Ratna Aisuwarya
CI9-400	The Implementation of Timestamp, Bitmap and RAKE Algorithm on Data Compression and Data Transmission from IoT to Cloud Kartika Sari and Mardhani Riasetiawan
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DAY 2 Computer and Information Technology Symposium

SUNFLOWER ROOM

Code	Title and Authors
SYMPORIUM SESSION 4 10:15 – 11:57	
CI8-238	A Study on Communication System in VANET Ronald Adrian, Selo Sulistyo, and I Wayan Mustika
CI8-727	An Improved Implementation of Discretization Algorithm for Markov Reward Models Inez Sutanto and Reza Pulungan
CI8-252	Development of Kartini Reactor Code to Support Nuclear Training Center and Safety Analysis Sutanto Sutanto, Ardina Suryana, and Syarip Syarip
CI8-692	Improving Road Traffic Management by A Model-Based Simulation Erwin Harahap, Janaka Wijekoon, Pupung Purnamasari, Deni Darmawan, Rakhmat Ceha, and Hiroaki Nishi
SYMPORIUM SESSION 5 13:27 – 15:09	
CI11-100	Toward Modern IT Audit- Current Issues and Literature Review Bayu Aditya, Ridi Ferdiana, and Paulus Insap Santosa
CI11-699	E-Learning Implementation on Clinical Rotation Nursing Education: a Case Report of Universitas Gadjah Mada Totok Harjanto, Dimas Septian Eko Wahyu Sumunar, and Kintan Ayu Kartika Putri
CI11-725	Drop Out Detection Using Non Academic Data Tio Dharmawan, R. V. Hari Ginardi, and Abdul Munif
CI11-930	The Requirements Analysis of eLisa Business Architecture with Education Enterprise Architecture Perspective Gunadi Emmanuel, Sri Suning Kusumawardani, and Ridi Ferdiana

Code	Title and Authors
CI11-393	A Framework for Improving Recommendation in Adaptive Metacognitive Scaffolding Indriana Hidayah, Teguh Bharata Adji, and Noor Akhmad Setiawan
CI11-578	Software Startup Ecosystem in Indonesia: A Conceptual Framework Anung Asmoro, Lukito Edi Nugroho, and Selo Sulistyо

DAY 2

Electronics, Communication, Control, and Instrumentation Symposium

DAHLIA ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
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EC4-633	Resource Allocation in Cognitive Radio Networks Based on Modified Ant Colony Optimization Muh. Bagus Satria and I Wayan Mustika
EC4-646	Implementation of Digital Signage Based on Embedded System and IoT Using Mac Address as Identifier on Laboratory In-Out Announcer Board Heruwanto Suharto, I Wayan Mustika, and Selo Sulistyо
EC4-974	Regression Analysis for Estimated Distance in Fingerprinting-Based WLAN Outdoor Localization System Sutiyo Sutiyo, Risanuri Hidayat, I Wayan Mustika, and Sunarno Sunarno
EC4-629	A Modified Genetic Algorithm for Resource Allocation in Cognitive Radio Networks Niki Robbi, I Wayan Mustika, and Widy Widyanan
EC4-808	Waterfilling Power Control on Proportional Fair Algorithm to Maintain Fairness and Saves Power for MIMO-OFDMA 2X2 Roy Ginting, Arfianto Fahmi, Nur Andini and Vinsensius Prabowo (Telkom University, Indonesia)
SYMPOSIUM SESSION 5 13:27 – 15:09	
<hr/>	
EC5-855	Linear Oscillation Diagnosis of Process Variable in Control Loop Based on Variational Mode Decomposition Gilang R.R. Dewa, Awang N. I. Wardana, and Singgih Hawibowo

Code	Title and Authors
EC5-916	Stock Control of Single Product Inventory System with Imperfect Delivery by Using Robust Linear Quadratic Regulator Muhammad Luthfi, Sutrisno Sutrisno, and Widowati Widowati
EC5-696	Battery Current Estimation Based on Simple Battery Model with Parameter Update Strategy Bobby Dewangga, Samiadji Herdjunanto, and Adha Imam Cahyadi
EC5-759	Fault Detection on the Battery SOC-OCV by Using Observer Yohannes Chrysostomos Hendro Yuwono, Bobby Dewangga, Adha Imam Cahyadi, and Samiadji Herdjunanto
EC5-794	Optimal Fractional-Order PID for DC Motor: Comparison Study Syaiful Ardy Gunawan, Yohannes Chrysostomos Hendro Yuwono, Gilang Nugraha Putu Pratama, Adha Imam Cahyadi, and Bondhan Winduratna

DAY 2

Electronics, Communication, Control, and Instrumentation Symposium

ORCHID ROOM

Code	Title and Authors
SYMPOSIUM SESSION 5 13:27 – 15:09	
<hr/>	
EC6-944	Auto VTOL System on Quadrotor Using Madgwick Quaternion Kalman Filter and LQR Andi Dharmawan, Angela Aprilia, Ariesta Handayani, and Ahmad Ashari
EC6-932	Moving Robot Path Planning Algorithm Analysis on Dynamic Environment Based Global Difference Method Update on Ant Colony Algorithm Tri K Priyambodo and Tonny Suhendra
EC6-955	An Overview of Fundamental Step Using Wi-Fi Communication for Flight Formation Quadrotors Muhamad Fikri, Ahmad Ashari, Andi Dharmawan, and Bakhtiar Sumbada
EC6-555	Array of Eight Circularly Polarized Microstrip Antennas for IEEE 802.11Ac MIMO WLAN Aloysius Adya Pramudita, Sholihin Sholihin, and Dyonisius Dony Ariananda

DAY 2 Environmental and Earth Science Symposium

CARNATION ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
EE7-187	Seismic Microzonation Based on Microseismic Data and Damage Distribution of 2006 Yogyakarta Earthquake Radhiya Perdhana and Budi Nurcahya
EE7-946	Comparative Analysis of Disaster Information Website Based on Web Usability Evaluation and Quality Content of Disaster Information Indra Riyanto, Ratri Sholihah, and Ahmad Cahyadi
EE7-655	Tsunami Hazard Mapping and Loss Estimation Using Geographic Information System in Gunungkidul Coastal Area, Yogyakarta, Indonesia Hendy Fatchurohman and Muh Aris Marfai
EE7-891	Accident Risk Management Strategy at Un-signalized Intersection Don Gaspar Noesaku da Costa, Siti Malkamah, and Latif Budi Suparma
EE7-911	Modeling (Im)Mobility: The Decision to Stay in Disaster Prone Area Amongst Fishermen Community in Semarang Choirul Amin, Sukamdi Sukamdi, and Raden Rijanta

DAY 2 Material Science and Chemistry Symposium

CARNATION ROOM

Code	Title and Authors
SYMPOSIUM SESSION 5 13:27 – 15:09	
<hr/>	
MC8-010	A DFT study on the corrosion inhibition performance of dibenzo-diaza-15-crown-5 and its heterocyclic analogs Saprizal Hadisaputra, Islah Hasanah Rohimah, Sapriini Hamdiani, and Nuryono
MC8-016	Quantitative Structure-Activity Relationship (QSAR) analysis of 3-substituted 4-anilino coumarin derivatives as anti-tumor Daratu Eviana K. P., Harno Dwi Pranowo, and Winarto Haryadi
MC8-036	Density-functional-theory calculations of vacancies in monolayer hexagonal boron nitride (h-BN) Wardah Amalia, Sholihun, Dian Putri Hastuti, and Pekik Nurwantoro
MC8-037	First principle calculation of mono- and di-vacancies in germanene Dian Putri Hastuti, Sholihun, Wardah Amalia, and Pekik Nurwantoro
MC8-811	Study of glucose binding protein encapsulated gold nanoclusters by molecular dynamic simulation Boy Marsaputra Panjaitan, Karina Kubiak-Ossowska, David Birch, and Yu Chen
MC8-977	Adsorption of oxygen and nitrogen molecules on monolayer germanene: the density-functional-theory study Sholihun, Savira Hanandita, Dhea Amanda, Arief Hermanto, Muhammad Rifqi Al Fauzan, Romy H. S. Budhi, and Ari Dwi Nugraheni

DAY 2 Material Science and Chemistry Symposium

HIBISCUS ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
MC6-289	The effect of blending condition on mechanical properties of cellulose microfiber extraction from bagasse using a modified kitchen blender Romi Sukmawan, Muhammad Waziz Wildan, Lestari Hetalesi Saputri, Rochmadi, and Heru S. B. Rochardjo
MC6-637	Degradation of mechanically surface treated AZ31B magnesium alloy in 3.5 Wt.% NaCl solution Budi Arifvianto, Suyitno, and Muslim Mahardika
MC6-670	Effects of fiber contents on wear resistance of Salacca zalacca Frond fiber reinforced phenolic Heru S. B. Rochardjo and Muhammad Ridlo
MC6-961	Preparation of Cr metal supported on sulfated zirconia catalyst Latifah Hauli, Karna Wijaya, and Ria Armunanto
MC6-973	Characterization of hydrothermal liquid product of Red Meranti (<i>Shorea leprosula Miq.</i>) sawdust for wood preservative Indah Astieningsih Mappapa, Reinaldo Salim, Ahmad T. Yuliansyah, and Arief Budiman
MC6-999	An interplay role between ammonium and halide anions as additives in Perovskite CH ₃ NH ₃ PbI ₃ Mulya Supianto, Suyanta, and Indriana Kartini
SYMPOSIUM SESSION 5 13:27 – 15:09	
MC9-646	The characterization of structure and chemical composition of semiconductor material Sn(Se0.8 Te0.2) prepared by Bridgman technique for solar cell Anggraeni Kumala Dewi and Ariswan

Code	Title and Authors
MC9-659	A comparison of sodium lignosulfonate (SLS) synthesis from black liquor lignin and commercial lignin Nita Ariestiana Putri, Muhammad Mufti Azis, and Suryo Purwono
MC9-663	Chitosan-pectin-stearic acid film for controlled-release of Curcumin Dwi Siswanta, Fithriya Hasanah, and Mudasir
MC9-665	Rapid synthesis of MCM-41 from rice husk using ultrasonic wave: optimization of sonication time Suyanta, Eko Sri Kunarti, Bambang Rusdiarso, Dritta Anies Cahaya, Efa Radnawati, and Mika Kusuma
MC9-977	Application of coal bottom ash zeolite on lignin and methylene blue adsorption Galuh Yuliani, Siska Mutiara, and Agus Setiabudi
MC9-998	Influence of calcium/silica ratio on the formation belite cement clinker from geothermal sludges Cynthia Clarizka, Agus Prasetya, and Indra Perdana

DAY 2 Material Science and Chemistry Symposium

IRIS ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
MC7-283	An Attempt to Establish the Lipase Gene Sequence of Alcaligenes sp. JG3 Using Internal Primer Norman Yoshi Haryono, Winarto Haryadi, and Tri Joko Raharjo
MC7-664	Macro and micronutrients profile of five locally black rice cultivars in Indonesia (<i>Oryza sativa L.</i>) Muh. Nashrurrokm, Ayu Safitri, Puspa Restu Sayekti, Rarastoeti Pratiwi, and Yekti Asih Purwestri
MC7-894	Oviposition-deterrant activity of chitosan/lemon grass essential oil composite film against <i>Bactrocera carambolae</i> Drew & Hancock Aswindu Mukti Kurnia W., Suputa, and Deni Pranowo
MC7-932	AFB1 antibody encapsulation in silica gel as matrix of immunoaffinity column Deni Pranowo, Nuryono, Endang Astuti, Respati Tri Swasono, Ali Agus, and F. M. C. S. Setyabudi
MC7-953	Rapid diagnostic test of Red Sea Bream Iridoviral Disease (RSIVD) in grouper <i>Epinephelus</i> sp. based on serological co-agglutination and molecular study Dwi Sulistiyono, Surya Amanu, Kurniasih, and Yuli Purwandari Kristianingrum
MC7-978	Chemical synthesis of monosaccharide fatty acid esters as antibacterial and antifungal agents Mutmainah, Jumina, and Bambang Purwono

Code	Title and Authors
SYMPOSIUM SESSION 5	
13:27 – 15:09	
MC10-281	<p>The Revised Method of Quantitative Detection of Animal-origin Bovine and Porcine Gelatin Difference Using Surface Plasmon Resonance Based Biosensor</p> <p>Devy Pramudyah Wardania, Muhammad Arifin, and Kamsul Abraha</p>
MC10-722	<p>Highly sensitive safrole sensor based on chitosan modified electrospun polyacrylonitrile nanofibers</p> <p>Novalia Nurbaiti, Siti Astuti Hasanah, Aditya Rianjanu, Trisna Julian, Shidiq Nur Hidayat, Ahmad Kusumaatmaja, Roto, and Kuwat Triyana</p>
MC10-727	<p>Polyethylenimine-modified quartz crystal microbalance and its characteristics for detecting acetic acid</p> <p>Dewi Purwati, Trisna Julian, Shidiq Nur Hidayat, Ahmad Kusumaatmaja, Kuwat Triyana, and Roto</p>
MC10-728	<p>Characteristic of chitosan-coated quartz crystal microbalance for alcohol sensors</p> <p>Agustinus Sembiring, Riowirawan, Trisna Julian, Shidiq Nur Hidayat, Ahmad Kusumaatmaja, Roto, and Kuwat Triyana</p>
MC10-729	<p>Polyacrylamide coated on quartz crystal microbalance electrodes for highly sensitive sensor of acetic acid</p> <p>Ahmad Rizani, Sulis Setyawati Winingssih, Trisna Julian, Shidiq Nur Hidayat, Ahmad Kusumaatmaja, Roto, and Kuwat Triyana</p>
MC10-969	<p>Synthesis and activity test of coumarin-chalcone derivative as a colorimetric sensor for chicken spoilage indicator</p> <p>N. Hidayati Dehani Dwi Linggayani, Bambang Purwono, and Idham Darussalam Mardjan</p>

DAY 2 Material Science and Chemistry Symposium

TULIP ROOM

Code	Title and Authors
SYMPOSIUM SESSION 5 13:27 – 15:09	
MC11-284	The Utilization of Chitosan as Natural Antibacterial for Vegetable Tanned Leather Mustafidah Udkhiyati and Fitriilia Silvianti
MC11-651	Fabrication of copper nanowire coated by silver nanocrystal for protection of oxidation transparent conductive electrode Dedi Mardiansyah, Dyah Uswatun Khasanah, Kuwat Triyana, and Harsojo
MC11-733	Effect of seed amounts on the synthesis of zeolite zsm-5 using coal bottom ash and rice husk as sources of silica and alumina by using seeding method Anggun Lestari, Simparmin Br. Ginting, and Hens Saputra
MC11-868	Synthesis and characterization of Mg(OH)2-impregnated activated carbon adsorbent from coconut shell Andri Saputra, Hary Sulistyo, and Deni Swantomo
MC11-975	Slow release NPK fertilizer preparation from natural resources Windia Hanifah, Chandra Wahyu Purnomo, and Suryo Purwono
MC11-979	The effect of zeolite addition on the mechanical properties of bioplastics based on carboxymethyl cellulose-urea Indriana Kartini, Kukuh Handaru Iskandar, Chotimah, Eko Sri Kunarti, and Rochmadi

DAY 2 Mechanical and Industrial Engineering Symposium

MAGNOLIA ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
MI7-169	Proposed Natural Fiber Bag Design Meeting Customers' Needs Andrean Emaputra, Mega Rif'ah, and Dian Sekarini
MI7-103	Strategic Formulation of a Higher Education Institution Using Balance Scorecard Rahmat Nurcahyo, Ratih Kusuma Wardhani, Muhammad Habiburrahman, and Ellia Kristiningrum
MI7-188	Model Development of Lean Action Plan Selection to Reduce Production Waste in Batik Industry Sri Indrawati, Alfina Khoirani, and Riadho Shinta
MI7-645	Reliability Centered Maintenance on Critical Component in Indonesian Commercial Trains Sri Indrawati, Alfina Khoirani, and Riadho Shinta

DAY 2 Mechanical and Industrial Engineering Symposium

ORCHID ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
MI8-501	Improvement of Shewhart Control Chart for Autocorrelated Data in Continuous Production Process Hasan Bisri and Moses Singgih
MI8-653	Water Tunnel Flow Visualization Due to Canard Deflection Effect on Aircraft to Improve Stall Delay Performance Setyawan Bekti Wibowo, Sutrisno Ir, and Tri Agung Rohmat
MI8-375	A Proposed Model for Aligning Maintenance Strategy to Business Strategies in Engineering Asset Management Winda Nur Cahyo
MI8-308	A Gap Analysis on Implementation of Safety Management System in Airport: A Case Study Susatyo Pramono, Muhammad Mujiya Ulkhaq, Ridwan Raharjo, and Fahmi Ardi
MI8-437	The Implementation of Digital Image Processing Technique to Analyze the Air-Water Stratified Flow Characteristics in a Horizontal Pipe Sugiyanto Sugiyanto, Akmal Irfan Majid, Arif Widyatama, Akhmad Zidni Hudaya, and Deendarlianto Deendarlianto

DAY 2 Power and Energy Symposium

ANGSANA ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
PE4-092	Energy Saving Potency and Maintenance Costs Reduction in Water Treatment Plant (WTP) Pengok PDAM Tirtamarta Yogyakarta Luqvi Rizki Syahputra, Rachmawan Budiarto, and Wahyu Wilopo
PE4-730	Investigation of the Reliability of CF ₃ CHCl ₂ +N ₂ Gas Mixture as a Potential Substitute for SF ₆ Tedy Juliandhy and T Haryono
PE4-156	A Study of Harmonic Spreading Against Distribution Network Reconfiguration in Passive Radial Distribution Systems Muhira Faraby and Ontoseno Penangsang
PE4-168	Life Expectancy of Transformer Insulation System by Reconditioning Yuli Rodiah
PE4-973	Analysis of PLN's Electrical Energy Demand in the Area of Batam-Indonesia Using the Linear Regression Method Husein Mubarok and Ryan Septyawan
PE4-828	Stepper Motor Driven Solar Tracker System for Solar Panel Fahmy Rinanda Saputri and Singgih Hawibowo

DAY 2 Remote Sensing and Geomatics Symposium

HELICONIA ROOM

Code	Title and Authors
SYMPOSIUM SESSION 4 10:15 – 11:57	
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RG4-835	Geospatial Information Utilisation in Indonesian Local Government Heri Sutanta, Diyono Diyono, and Deva Swasto
RG4-836	Progo Watershed Deliniation and River Network Analysis Using DEM SRTM and DEM Contour Hypography of RBI 25000 Bungaran Tambunan and Purnama Santosa
RG4-953	Geospatial Analytics of Pedestrian Safety in Tanah Abang Deny Saputra Yusuf, Kurniawan Pradana, Trias Aditya, Jong Gun Lee, Imaddudin Amin, and Muhammad Rheza Muztahid
RG4-688	The Comparison of Canopy Density Measurement Using UAV and Hemispherical Photography for Remote Sensing Based Mapping Deha Agus Umarhadi, Projo Danoedoro, Pramaditya Wicaksono, Prima Widayani, Wahyu Nurbandi, and Anwar Juniansah
SYMPOSIUM SESSION 5 13:27 – 15:09	
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RG5-946	Temporal Gravity Gradient of South Kalimantan Region Rendra Fauzi and Leni Heliani
RG5-714	Redefinition of the Indonesia Land Agency's GNSS CORS Coordinate for Cadastral Survey Control Points Margaretha Elya Lim Putraningtyas, Leni Heliani, and Nurrohmat Widjajanti
RG5-721	Study of Sea Level Rise Using Tide Gauge Data Year 1996 to 2015 at Semarang and Prigi Stations Maritsa Faridatunnisa and Leni Heliani

Code	Title and Authors
RG5-903	<p>Vertical Accuracy of a Ground Filtered UAV-derived DEM Using Cloth Simulation Filtering Algorithm Muhammad Adnan Shafry Untoro, Ahmad Faizan Bustomi, Deha Agus Umarhadi, and Ridho Dwi Dharmawan</p> <hr/>

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ABSTRACTS

A close-up of a blue microphone with a textured, perforated grille. The microphone is positioned in the foreground, pointing towards the right. The background is a blurred indoor setting, likely a conference or event hall, with rows of yellow chairs and a red-clothed table. A large, dark rectangular object, possibly a screen or a window, is visible in the background.

SPEAKERS



Terahertz research

A potential technology for the future

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Many researchers are increasingly interested in exploring terahertz wave radiation due to its special characteristics such as high-resolution imaging and are used to identify a substance through the THz time domain spectroscopy (or THz-TDS/terahertz spectroscopy). THz Spectroscopy System can be used for the inspection of hidden weapons, food testing without damaging the packaging, detecting the type of material contained in food, cancer detection, pharmaceutical testing and others.

Discussing the use of THz-TDS to test the quality of food is a very interesting study. THz waves can detect foreign material mixed with the food. This can be done by scanning the terahertz emission to the test object. In this spectrum, each object will give different values that can be used to mark or recognize a particular material (fingerprint). Each biological material has its own characteristics in this frequency range. Therefore, the utilization of THz technology is potentially developed to recognize the types of materials.

Detection in the THz spectrum needs to apply certain techniques due to the high frequency of waves which results in smaller dimensions of devices used up to in micrometer or even smaller. Laser beam is widely used to produce THz wave radiation. Using this technique, the efficiency of power will be of particular concern. While at the receiver, the need for low temperature settings, certain atmospheric pressure and other environmental parameters make it necessary to provide a system that has high performance and compact. To realize these conditions, Antenna Propagation and Microwave Research Group (AMRG) in the Department of Electrical Engineering Faculty of Engineering Universitas Indonesia focuses on providing antennas that work in THz wave frequency with efficiency, gain and high directivity to support THz wave detection at room temperature. The high THz wave characteristics provide the advantage of combining antenna devices as a generator and THz wave detection with optical devices, such as mirrors and lenses.

In this THz spectroscopy system that uses an antenna, we have examined several types of antennas. The antenna is designed to work at 1THz frequency using Silicon substrate and gold layer as its radiation element. This antenna dimension is very small that is $6000\mu\text{m}$ long and $300\ \mu\text{m}$ wide. The design result of this antenna shows the antenna can work at 1 THz frequency with bandwidth of 450 GHz.

Perception of audiovisual information in the real and virtual world

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The sounds we hear in daily life are audible because they proceed through a reverberating body: an object that is potentially visible. We do not always see the object that generates the sound, for example when it is dark, when we close our eyes, or when it is outside our visual field. Yet we know, for example, that the footsteps we hear are from a person or that the music we hear is made by someone playing a guitar – ‘objects’ we can see. Sound and vision go hand in hand in the physical world, and we are geared to perceive this. The human brain uses a few simple rules (or better: heuristics) to determine whether audiovisual information emanates from the same object. One such simple rule is the proximity rule. If sound and vision arrive at our senses close together in space and time, the combined information is likely processed as belonging to a single object. Our brain can quickly detect and make assumptions about certain characteristics of the information as well. As regards auditory information, we will see that a sound with a higher pitch is often associated with a relatively small object, or an object higher up in our visual field. A lower-pitched sound is more likely coming from a larger object. Loudness and pitch characteristics of a sound can also tell us, for example, whether the object that generates the sound is nearby or far away. Furthermore, we will see that the identification or memorization of an object improves when our brain can utilize both auditory and visual information from the object, rather than isolated auditory or visual information by itself. The main issue we will discuss here is: How can knowledge about human perception of sound and vision further contribute to the design of the virtual world?

We will start the talk by looking at how researchers study vision, audition, and audiovisual perception, with a short overview of the main findings about audiovisual perception from psychophysical studies and brain research. We will then try to give examples of how such research can be useful to better understand perception of the virtual world (virtual reality or gaming), such as the translation of a 2D physical image into a 3D interpretation in our brain. From an experimental psychologist’s viewpoint, we will argue that often more effort is being made to enhance our visual experience of the real and the virtual world, while the auditory experience often comes second. For example, in the real world we usually have no problem correcting our vision with glasses, but quite often shy away from wearing hearing aids. Likewise, efforts to improve our experience of the virtual world so

far have been mainly focused on enhancing visual graphics or effects, less on improving sound quality or sound effects. We will present examples of recent research, however, that show how sound can contribute to the virtual experience and that it deserves more attention in both research and design. Examples of sound effects from popular games and ways to present sound will be discussed. Overall, we hope the contents of the talk are of interest to a broad audience; questions and discussions are always welcomed.

3D GaN nanostructures: Fabrication, processing, and applications

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GaN nanostructures with vertical 3D architecture, well-designed geometry, high aspect ratio, and large area coverage have been continuously developed as an alternative path towards novel nanodevices for enhanced multiple optoelectronic and electronic sensor systems. Such building blocks offer large surface-to-volume ratio, high-quality material, non-polar surface orientations, and feasibility to use very large-area foreign substrates without devising strain. To manufacture the 3D GaN nanoarrays, both bottom-up and top-down approaches involving different nanolithography techniques can be employed offering homogeneous size distribution and fine morphology. Additionally, 3D processing has been successfully developed to realize nano LEDs, biomedical/chemical sensors, and vertical field-effect transistors.

Keywords: GaN, LED, nanolithography, nanosensors, nanostructures, nanotechnology, reactive ion etching (RIE), transistors

I. Introduction

Since the birth of high-power 2D gallium nitride (GaN) light-emitting diodes (LEDs), immense optimization and investigation have been carried out in the last few years, not only to enhance the material quality and device performance but also to further extend its application realm. InGaN/GaN LEDs have been broadly employed in general illumination and backlight units because of their higher luminous efficacy and longer lifetime compared to conventional light sources. By forming the materials in 3D nanowire (NW) structures, light-switchable sensors can be developed for photoelectrochemical detection of NADH in life sciences. Meanwhile, because of their superior characteristics in switching speed, operation temperature, and power loss, GaN field-effect transistors (FETs) also gain remarkable research interests for power switching applications, in which vertical 3D GaN NW FETs have recently been introduced as a novel device concept [1, 2]. Therefore, by sharing a common material platform, a monolithic integration of multiple 3D GaN-based nanodevices (i.e., LEDs, sensors, and FETs) on a single chip has been considered as an ultimate goal to yield compact smart-optoelectronic sensing systems.

II. Results

Although GaN nanostructures with a vertical architecture have been successfully created, their processing reliability remains a major challenge. Here, we report on the advanced development of versatile 3D GaN processing that has been applied in various nanodevices (i.e., nanoLED arrays, nanoFETs, and biochemical/medical nanosensors). To fabricate the well-ordered high-aspect-ratio nanostructures, a top-down approach consisting of nanophotolithography and hybrid etching was employed. In this case, both GaN NWs and fins, with smooth a-plane sidewalls, fine morphology, and different material stacks, could be realized down to 50 nm feature size from the subsequent processes of SF₆ /H₂ -based inductively coupled plasma dry reactive ion etching (ICP-DRIE) and KOH-based wet chemical etching. As top and bottom surfaces of the structures are distantly separated by about 3.5 – 5 µm, device planarization plays a critical role for the feasibility of top metal contact deposition. Thus, polymer filling with different insulating materials has been carefully investigated (e.g., positive photoresist, spin-on-glass (SOG), and benzocyclobutene (BCB)), in which their results were characterized in scanning electron microscope and confocal laser scanning microscope. In this case, the height of the spin-coated and cured polymer should be adjusted in regard to the targeted process steps. For the photoresist, the revealed etch rate was ~123 nm/min in O₂ - plasma based ICP etching at a pressure of 10 Pa.

Moreover, in FET processing, the Cr gate contact was applied on the NW and fin sidewalls as the third electrode besides top (drain) and bottom (source) electrodes after atomic layer deposition (ALD) of thin SiO₂ or Al₂O₃ gate dielectric. Whereas, for the nanosensors, the filling polymer during planarization has to be removed to realize hanging top contact, so that the freely exposed NW or fin sidewalls can be functionalized with organic molecules as sensitive sensing layers. Besides their detailed process flow, the performances of the developed 3D devices will be discussed.

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Integrated evaluation of landslide hazard zone for land suitability restriction information

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The principal aim of the study was to investigate, develop and test desk study and mapping techniques that enable rapid and reliable methods of landslide assessment to be carried out from regional to site specific for the benefit of infrastructure planning and management. The proposed methodology for risk analysis and assessment in this paper will facilitate determination of risk through scientific analysis of landslide hazards in future. The demonstration of method was based on a case study carried out at Jeli district in Kelantan, Malaysia. New methodology to evaluate the landslide risk and assessment are introduced in this paper as Integrated Site Investigation Procedure (ISIP) and Management of slope maintenance using integration of Geographic Information System (GIS). This new methodology will assist in classification of class and zoning for integration in Malaysia Land Planning Process for development approval. Besides that, the ISIP will help to designing of cost effective solutions for subsurface survey, site mapping, sampling technique, data integration, modelling, prediction and mitigation plan for the particulars area. It is also expected to help non-technical decision-makers to assess the situation before taking appropriate futuristic measure. This new methodology useful for evaluation of landslide hazard for land suitability restriction especially in Malaysia.

Keywords: decision makers, landslide, methodology, risk analysis, system

Fischer indole synthesis as revived tool for the synthesis of alkaloid natural products

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We have previously demonstrated that aryl hydrazides are effective surrogates of aryl hydrazines, undergoing various reactions including the Fischer indole synthesis to afford the corresponding indoles, when treated with enolizable aldehydes and ketones in the presence of an acid. Unlike aryl hydrazines, the aryl hydrazides are readily accessed from aryl halides via the Pd(0) or Cu(I)-catalyzed coupling reaction with *N*-Boc hydrazine. Also reported was that *N*-Cbz-aryl hydrazide can proceed in a Fischer indolization reaction to give *N*-Cbz-indole without the elimination of *N*-Cbz group.

Prompted by our recent interest on the synthesis of 3,4-fused tricyclic indole alkaloids, we set out to study the intramolecular Fischer indolization reaction of the aryl hydrazide that are linked to carbonyl functions by various tether groups as a new synthetic means to the construction of tricyclic indole system. We found that aryl hydrazide with carbonyl function tethered at the C(4) position of the aromatic ring undergoes intramolecular Fischer indolization to afford novel indolophanes. In addition, strategic insertion of a double or triple bond in the tether allowed for an aromatic Claisen rearrangement to proceed in a tandem fashion, providing 3,4-fused tri- or tetracyclic system.

More recently, we have found that aryl hydrazide can be directly coupled to vinyl triflate to generate ene-hydrazide, the key intermediate in the Fischer indole synthesis. Heating in the presence of catalytic amount of an acid effected the [3,3]-sigmatropic rearrangement reaction *en route* to the indole product without scrambling of the regiochemistry. Also disclosed is that the aryl hydrazide with carbonyl function tethered at the meta-position can undergo the Fischer indolization reaction in an intramolecular manner to directly afford the corresponding 3,4-fused tricyclic indole product in excellent yield. Our recent progress in natural products total synthesis utilizing the veneer Fischer indolization chemistry will be also discussed.

Keywords: Fischer-indole-synthesis, natural-products, regioselective-indolization, total-synthesis

Fabrication of Porous Inorganic Membranes and their Application in Desalination and Percrystallisation

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For the last decade, our group has been working on desalination employing inorganic membranes. Our research dealt with the silica, zeolite and carbon membranes. The findings revealed that even assumed highly stable materials such as zeolites are vulnerable in high concentration saline solutions. However, we found that carbon-based membranes are the most stable of all. Very recently, we also demonstrated other way of the inorganic membranes application – the percrystallisation process [1]. In this process the applied vacuum drives a solution through a membrane, causing wetting and formation of a thin-film on the permeate side of the membrane. The wetting of the membrane surface is followed by evaporation of the solvent, providing ideal conditions for continuous nucleation and crystal growth on the membrane surface, resulting in a single-step separation of solute and solvent. The published work showed how the technology was able to process materials like mineral salts, pharmaceuticals, and food products. Those findings show that the work was a significant innovation of classical membrane crystallisation technologies. Membrane crystallisation traditionally utilises transport of either heat or mass to create supersaturation on the feed side of the membrane [2-3], necessitating additional processing steps [4], which are obsolete with the novel percrystallisation process.

Keywords: carbon, ceramic, crystallisation, desalination, membrane percrystallisation, salt

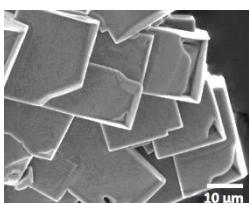


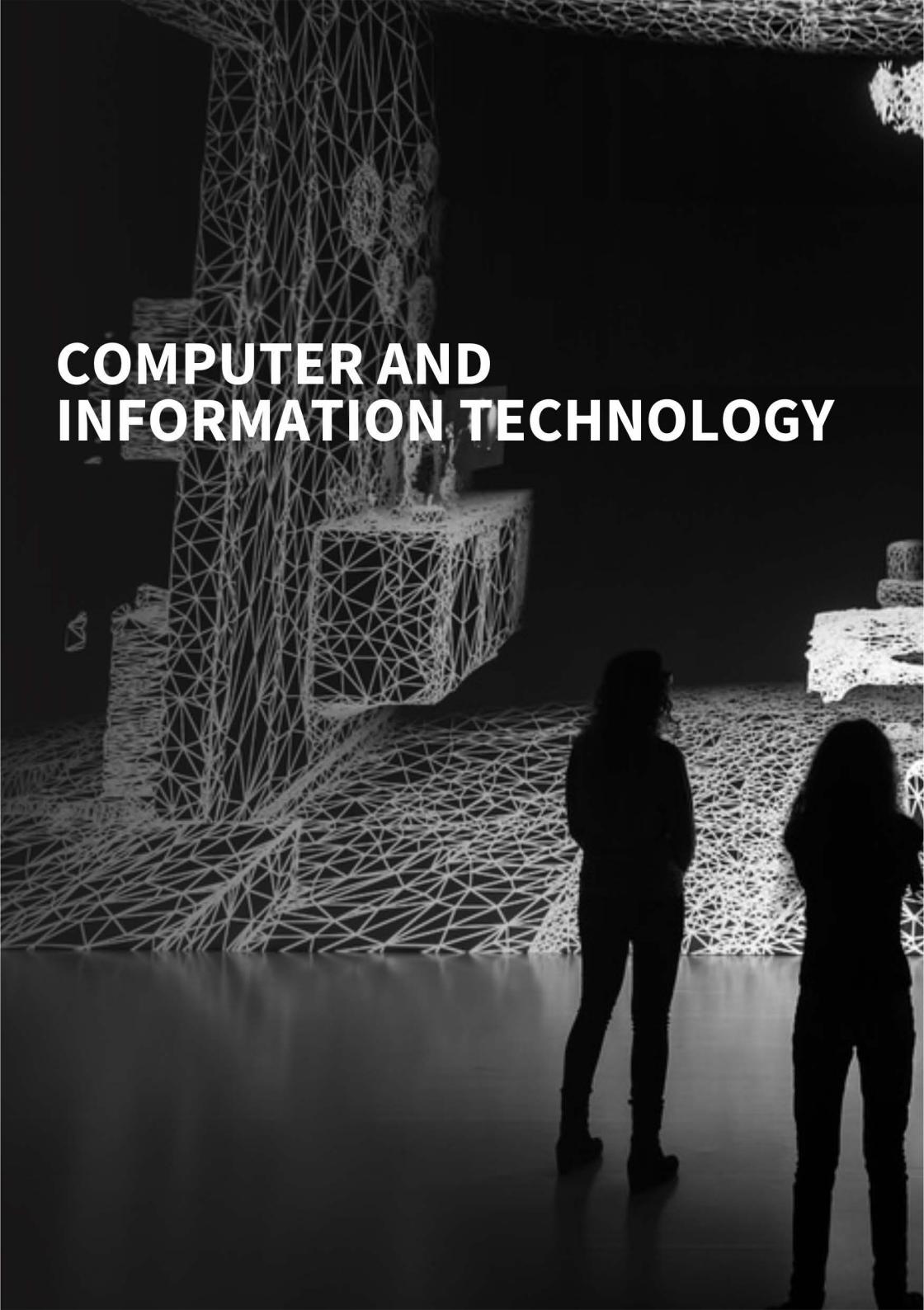
Figure 1

Morphology of percrystallised sodium chloride crystals

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COMPUTER AND INFORMATION TECHNOLOGY





Specify of estimation using C4.5 algorithm of software project estimation at the point of sales application with COCOMO II

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In software development, it is required an appropriate estimate. One of the most commonly used software project estimation models is Constructive Cost Model (COCOMO II). The model is often used to obtain accurate results in estimating important factors such as cost and human resources. However, to obtain the more accurate estimation results, this study proposes a C4.5 algorithm based on COCOMO II estimation results. In this study, software project estimates are used in the Point of Sales (POS) applications. Based on these data with COCOMO II method, it is estimated that the schedule, staff, and cost are also specifying estimation from the result of COCOMO II using a C4.5 algorithm. The accuracy of the estimation results is around 90 % with Algorithm C4.5. The value can be used as a reference for the development of the next POS software project.

Keywords: algorithm C4.5, cocomo ii, decision tree, point of sales, software project estimation

Real time face recognition comparison using fisherfaces and local binary pattern

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Face recognition has been gain

ing popularity by computer vision researchers over last two decades. Face recognition concerns to identify person using facial image set. In general there are three face recognition classes, i.e., holistic based, feature-based, and hybrid methods. Fisherfaces extends Eigenfaces approach using Fisher's linear discriminant to improve classification rate by maximizing the ratio of betweenclass to within-class scatters. On the other hand, local binary pattern employs shape and texture in local pixel neighborhoods to build a global representation of a facial image. To measure both algorithms performance, this paper proposes two testing applications, each for facial images and video. Both methods were implemented and analyzed using three distinct face image dataset and a real time video application. The accuracy, training and testing time for both algorithms were measured in some experiments using k-fold cross validation scheme. From experiment result, it was concluded that Fisherfaces achieved better prediction time compared to local binary pattern, that makes Fisherfaces preferable for real time face recognition applications. In contrast, local binary pattern is more flexible than Fisherfaces, as it can handle classifier addition smoothly. Hence it can be used in dynamic face recognition scenarios, such as web applications.

Keywords: comparison, fisherfaces, local binary pattern, real time, video face recognition

Analysis of customers' emotional preferences using Kansei Engineering and AHP

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Helpdesk application plays an important role in order to support business process in an enterprise such as PT. INTI Indonesia. Helpdesk has function in providing better customers' service in order to help customers have solutions about products they used. This research attempts to develop PT. INTI's helpdesk application based on customers' emotional preferences using Kansei Engineering and Analytic Hierarchy Process (AHP). Kansei Engineering is used in this research to analyze helpdesk application's emotional factors shown by Kansei Words and give a recommendation of helpdesk application for PT. INTI. AHP is applied to analysis in order to reinforce the Kansei analytical result. This research observed four main customers' emotional factors selected from twenty Kansei Words and recommends a conceptual design element for designing helpdesk application based on selected Kansei Word of artistic.

Keywords: analytic hierarchy process, emotional factors, helpdesk, Kansei engineering, Kansei words

A review of cloud migration strategies in the developing country

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According to a recent market study by International Data Corporation (IDC), cloud computing is growing by 19 % about consumption, while the failure rate of the cloud adoption stays in the relatively low value of 1 %. However, the majority of cloud adoptions are only observed in several developed countries such as Japan, Australia, and the United States. Meanwhile, the developing countries are struggling to overcome several issues that hinder cloud adoption, such as unsupportive policies, cloud migration issues, and conservative business culture. This article reviews certain cloud adoption methods that were initially designed or has been properly implemented for developing countries. Questionnaires consisting of 20 assorted questions were employed as data collection method. The results are then validated by drawing a comparison from the best practice methodologies. The article provides insights of several cloud adoption strategies that are most likely to be successful to be implemented in the developing countries.

Keywords: adoption, cloud computing, cloud migration strategy, developing country, IDC

Toward modern IT audit

Current issues and literature review

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Today, IT audit become one of the top two topics that discussed amongst internal auditor professionals and has grown to become an important issue for modern organizations. IT audit concepts have changed over time, although significant changes have been made in early 2000, toward modern IT audit. This paper examines current issues in IT audit. The motivation was to identify the current trends and issues in IT audit. This paper reviews the literature on IT audit that published during the period 2008 to 2017. The literature review identified 46 papers that presented an issue in IT audit practices. The study results suggest that the current issues in IT audit can be classified into 5 main issues, there are benefits of IT audit, IT audit guidance, IT audit object, IT audit process, and issue of IT auditor. This paper has presented how these issues emerged during the past 10 years, along with the development trends. This study results can be used by researchers to conduct further research in the field of modern IT audit. This paper also presents the research directions based on the 5 main issues.

Keywords: IT audit, IT audit issues, IT audit practices, IT audit trends, modern IT audit

A review of contrast enhancement techniques in digital image processing

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Image enhancement has a fundamental piece in digital image processing. Images like satellite images, aeronautical images, oceanography images, medical images and real-life images suffer bad contrast and noise. The purpose of image enhancement is to enhance the contrast and remove the noise to raise image quality. The image enhancement technique especially contrasts enhancement distinct from one field to another depending on its objective. In this paper, a review of various contrast enhancement techniques has been done. The techniques presented begin from conventional to modern techniques. A study shows that the small values of Mean Brightness Error (MBE) and Speckle Noise Strength (SNS) can maintain an average of lighting and enhance the contrast well. By combining several techniques, not only enhances the contrast but also increases the sharpness of the image. Therefore, the selection of appropriate techniques can increase the image quality results. Furthermore, from the results of this review will be used as a reference for researchers to process images that have nonuniform illumination.

Keywords: contrast enhancement, digital image, MBE, nonuniform illumination, SNS

A study on communication system in VANET

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VANET (Vehicle Ad Hoc Network) is one of the new technologies in the communication system. It supports the communication between vehicle and vehicle through the 802.11p. Many research concerns to improve the quality of communication system in VANET. Optimization and effectiveness issues in VANET communication system still open to exploring. There are many problems must be solved. Some researchers used the natural-inspired algorithm to accomplish the issues in VANET environment. Many tools can be used as a VANET simulator. It is very helpful, but only some of them can be used for sophisticated analysis. The VANET's model can be modified based on the research goal. It can support the in-depth analysis or the good graphical user interface features. But it cannot be thoroughly combined now. Each simulator has a different characteristic. It helps to make a realistic channel model. Through this paper, we provided the information about the VANET communication systems and models.

Keyword: channel, communication, simulator, networks, VANET

Development of Kartini reactor code to support nuclear training center and safety analysis

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Development of a 100 kW Kartini research reactor code was carried out to support Nuclear Training Center and reactor safety analysis. The code has abilities of both simulating normal and abnormal conditions of the reactor. It was developed based on interaction among governing equations of mass and energy conservations, fuel rod heat conduction, and point kinetics. For simplicity, the code considers only one type of control rod rather than three types of control rods as used in the reactor. Calculation results of the power and axial coolant temperature distribution at rated power show a sufficient agreement with those of experimental data. Results of the plant dynamics analysis by using the code also show a correct plant's behavior as those of general light water reactors. Rough safety analysis of an excess reactivity insertion was carried out and the calculation results show that the limit of reactor safety is satisfied. It might improve the code by consideration of three types of control rods to decrease the calculation errors. However, the code was satisfied to be used as a tool for both supporting the nuclear training center and safety analysis.

Keywords: Kartini reactor, nuclear training center, safety analysis, simulation code, support

Semi-automated and manual methods for counting cells expressing p75 receptor in endometriotic lesion

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There are several limitations in assessing immunohistochemical staining in cells manually such as wide differences in the qualifications of researchers working with histological samples, infeasibility in counting every single cell, time consuming and level of experience. In order to bridge the gap between experienced and inexperienced researchers, conserve time, and optimize quantitative accuracy, automated and semi-automated methods for histologic tissue analyses have been introduced. These methods make the interpretation of protein expression in immunohistochemistry (IHC) more objective. One such tool is HistoQuest® software, a semi-automated cell analysis program (TissueGnostics GmbH, Austria) that can be used for counting the number of positive and negative-staining cells as well as for quantitatively assessing the relative staining intensity on a histological slide. The aim of this methodological study is to compare the manual method of IHC with a semi-automated method in evaluating endometriosis lesions with IHC stained with p75 receptor antibody. Method. Two independent observers were selected, both are experienced gynecologists; experienced and inexperienced observer. Each received a tutorial about Histoquest® software and then independently set the parameters/tools in Histoquest® prior to independent slide interpretation. The images were arranged using TissueFaxs Plus system (Tissue-Gnostics®, Vienna, Austria) software with the same settings including exposure time and signal amplifications. Quantitative immunohistochemistry analysis was performed by using Histoquest® immunohistochemistry analysis software (TissueGnostics®, Vienna, Austria). Manual counting was set for comparison. Results. Histoquest software was able to identify nuclei stained with hematoxylin perfectly if the nucleus had a 'normal' form which is not pale color in the center. If the nucleus appeared irregular with uneven color, the software failed to identify. The discrepancy between semi-automated cell counting and manual counting by intra-experienced observer was smaller than the discrepancy in intra-inexperienced observer in overall result (95 % LoA -9.76 to 12.8 vs 95 % LoA -63.39 to 49.25). The two observers had very poor agreement. Conclusion. With IHC, cell counting using Histoquest software benefits the experienced observer/user since it provides highly consistent results compared to the manual method, with the additional benefits of being more objective and very much less time consuming. The software cannot be used by the inexperienced observer, as it cannot overcome that individual's lack of knowledge and produces erroneous results.

Keywords: semi-automated counting, manual counting, immunohistochemistry, software, conserve time

EEG-based emotion classification using wavelet decomposition and K-Nearest neighbor

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Research on the correlation of EEG signals to emotions based on high/low arousal and valence, has been done before. Some research using the Eigen-Emotion Pattern Kernel method and the Support Vector Machine. The others using the Higuchi Fractal Dimension (FD) Spectrum, the Multifractal Detrended Fluctuation Analysis (MDFA) and the Hidden Markov Model (HMM), but the accuracy is not too good. This research uses Wavelet Decomposition and k-Nearest Neighbor to improve accuracy. The results show that the optimum k values of the k-Nearest Neighbor parameters for this research are 21. Valence's classification accuracy results using Wavelet and k-NN, compared with previous research has the same relative accuracy, i.e. 57.5 %. While the result of arousal classification accuracy using wavelet and k-NN is 64.0 %, better than previous research.

Keywords: decomposition, EEG, emotion classification, k-NN, wavelet

A framework for improving recommendation in adaptive metacognitive scaffolding

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Metacognitive scaffolding is an important pedagogical support to encourage self-regulated learning, especially in computer-based learning environments. Presently, an e-learning system which is complemented with metacognitive scaffolding has been developed to support algorithm learning. However, academic satisfaction evaluation on the system reveals that the recommendation provided by a virtual pedagogical agent is less helpful. Therefore, this paper proposes a scheme for providing better recommendation. Two types of recommendations are aimed, including goal and sub-goal as well as strategy-use recommendations. Goal and sub-goal recommendation is generated by using an online student modeling approach, i.e. identifying students' level of prior knowledge by using text classification algorithm. On the other hand, for generating the strategy-use recommendation an offline student modeling approach is added to strengthen the suggestion. Implementation of the proposed scheme produces a prototype of the scaffolding. An A/B testing is conducted and the test shows that most of the users prefer to use the improved recommendation system.

Keywords: algorithm learning, learning environment, metacognitive scaffolding, recommendation, student modeling

The implementation of timestamp, bitmap and RAKE algorithm on data compression and data transmission from IoT to cloud

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In the Internet of Things (IoT) system, the environmental data are keeping collected by devices, but not always changed. If the gateway always returns all of sensor data in the data synchronization that asked by platform, a lot of bandwidth would be wasted when most of the data collected by some devices. It is necessary to integrate between the cloud and IoT using data transmission as the limitations of IoT devices. However, for the IoT system, the existing algorithms are not very efficient because the data in IoT system have the different characters like real-time and mutability. To resolve the problem, this paper proposes some methods to reduce the data transmission time using the Timestamp algorithm to record the last time of collected data by the device, sending data from the gateway if the data is different from the data on the platform, the Bitmap algorithm as the device status sync algorithm, and also the lossless RAKE compression algorithm to reducing memory. The results of this study are expected to reduce the time consumption of data transmission and reduce memory usage to increase the life of IoT devices. In this study testing the time of data splintering, time of data compression and data decompression, and also the compression ratio.

Keywords: Cloud of Thing, Data Compression, G-Connect Project, Internet of Things, synchronization

Performance evaluation of scalable high efficiency video coding (SHVC) transmission over Mininet-Wifi

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In the multimedia communication, especially video format, there will be needed the right resources to get desired video quality. Bandwidth availability and compression technique which used in the communication process will also give significant effect to the video transmission. Even H.264/SVC standard was introduced and succeed to overcome those problems, nevertheless it has some weakness while transmitting high resolution video. SHVC, a scalable extension of High Efficiency Video Coding (HEVC) standard, then introduced to give efficiency on reducing bandwidth until 50 % compared to previous standard for the similar video quality. This paper proposed performance evaluation of video transmission with the SHVC standard compared to the H.264/SVC standard over the Mininet-Wifi. We proposed the scheme where video streaming deliver into the static and mobile end users or clients. This quality measurement proves that SHVC gave better compression and make it possible to transmit in the low bandwidth networks.

Keywords: H264/SVC, HEVC, Mininet-Wifi, SHVC, quality, video

E-archives implementation readiness:

A case of the national archives of the Republic of Indonesia

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The implementation of e-archives or e-records systems in public agency is prone to failures and rejections, a similar situation faced by many e-government initiatives. The measurement of readiness level is considered as a necessary step to minimize the implementation failures and users' rejection. This research aims to measure the readiness level of e-archives implementation in Indonesia's National Archives (Arsip Nasional Republik Indonesia) and develop the corresponding recommendations to overcome it. The scope of research is the static archives, both digital-born and digital reborn e-archives. The measurement adopts e-archives readiness measurement frameworks from the International Records Management Trust (IRMT). The adoption was conducted by contextualizing it in the Indonesian context. It is a qualitative research with data collection via series of interviews, desk studies, and researcher's observations. The qualitative data were categorized and analyzed into the set of themes that are related to the level of e-archives implementation readiness. The research finding shows that the readiness level is relatively low, indicating the unreadiness of the National Archives to implement the e-archives initiative. The research then employs Analytical Hierarchy Process (AHP) to develop the recommendations to improve the e-archives readiness at Indonesia's National Archives).

Keywords: AHP, e-archives, e-records, IRMT, readiness measurement, static archives

Adaptive threshold determination based on entropy in active contour without edge method for malaria parasite candidate detection

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Malaria is one of the most serious diseases that often leads to death. The identification of malaria parasites is commonly done by using microscopic images that are divided into two types: thick and thin blood smear. In thin blood smear images, malaria parasite candidates can be easily identified based on blood cell characteristics. However, in the thick blood smear images, the malaria parasite will be difficult to be distinguished from other objects that are also in the blood smear image. There are several approaches to facilitate the identification of malaria parasites in blood smear images, one of which is by utilizing computer-aided diagnosis. This research proposed a scheme to solve the problem of parasite detection in thick blood smear using segmentation approach. The sensitivity of the proposed scheme obtained was 98.04 %, indicating that most of parasites in thick blood smear images have been detected; however, the drawback of the sensitivity result is related to the high number of false positive detections. The main objective of this study is to detect the objects in a complete form in the entire slide images using the segmentation approach.

Keyword: detection, malaria, microscopic image, segmentation, thick blood smear

Resource endowments strategy for sustainable e-government

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Researchers have highlighted that public sectors with strong resources are able to sustain their innovation. E-government is new government innovation to provide electronic-based services. However, most of e-government systems are failed to sustain due resource challenges. Despite many studies have highlighted these challenges, limited studies have focused on how collective resource endowments are able to sustain e-government. Through the use of case study approach, this study investigates how resources were collectively endowed to support sustainable e-government systems within two regencies. This study found that resources for sustainable e-government were endowed through number of Resource channels such as cooperation with central government institutions, other local governments, private companies, and collaboration within local institutions.

Keywords: e-government, endowments, resource, sustainability, strategy

The architecture of device communication in internet of things using inter-integrated circuit and serial peripheral interface method

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The biggest challenge in analysis IoT is a complex combination of communication networks. In addition, limited resources are the cause of the failures that cause communication failure. This communication should be designed to avoid errors in sending or receiving data. Therefore, we need a way to determine IoT device communication method using multiple devices that can work optimally. By default, device communications in IoT devices working serial it is not possible in one multisensor device to work in parallel in the context of transmitting data, normally one device one sensor. This paper describes communication device in IoT using inter-integrated circuit (I2C) and serial peripheral interface (SPI) also using parameters processor, memory, CPU using and power consumption. The experimental results are expected to help optimize the performance of IoT architecture by using the best device communication. Evaluation in this study were conducted by comparing the performance of each of the parameters tested. Then performed the evaluation process to get the best method of communication between devices from Arduino communication to Raspberry Pi.

Keywords: device communication, g-connect project, I2C, Internet of Things, SPI

Multiclass imbalance learning using adaptive synthetic—nominal (ADASYN-N) and adaptive synthetic—KNN (ADASYN-KNN) for sampling methods on laboratory test

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Annually about 1,500 cases of cervical cancer are found in Indonesia, which made Indonesia as the country with the highest number of cervical cancer cases in the world. Cervical cancer screening and HPV testing are done with a Pap smear test. However, this examination requires a lot of time, costly and highly susceptible bias of the observer during the process of investigation and analysis. To overcome these problems, several studies have modeled the machine learning with a variety of approaches have been made. However, these studies are constrained by the limitation of the data amounts and the imbalanced data that caused by the different ratio of each case. This can lead to errors in the classification of the minority due to the tendency of the classification results that focus on the majority class. This study addressed the handling imbalance data on classification of cases Pap test results using the method of over-sampling. ADASYN-N and ADASYN-KNN algorithms were proposed as a development of ADASYN algorithm to handle datasets with nominal data types. This study included SMOTE-N algorithm to deal with the problem of comparison algorithm. As the results, ADASYN-KNN with the preference "0" gave the highest accuracy, precision, recall, and f-score of 95.38 %; 95.583 %; 95.383 %; and 95.283 %. The highest ROC area value was obtained with the ADASYN-KNN with preference "1" of 99.183 %.

Keywords: ADASYN, imbalance class, over-sampling, Pap smear, SMOTE-N

Real-time GPU-based SPH fluid simulation using Vulkan and OpenGL Compute Shaders

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We investigate the potential of Vulkan for fluid animation using smoothed particle hydrodynamics (SPH) method. A simple parallel SPH algorithm is devised and implemented in OpenGL Shading Language (GLSL) compute shader. This GLSL code is converted into latest Standard Portable Intermediate Representation (SPIR-V) format and then implemented with Vulkan and OpenGL 4.6. Two test cases are used to verify that the implementations are correct by examining the visual output. The first test case is dropping a cube of water into a box and the second is a dam break in a closed channel, both at room temperature. And finally, we analyze the performance of both implementations in real-time graphic processor unit (GPU). We found that the most optimum of the work group size is 128, and our Vulkan implementation performs faster than OpenGL for 30 000 or greater particles.

Keywords: hydrodynamics, OpenGL, performance, real-time GPU, simulation, shader, Vulkan

Design of fuzzy simulation for determining the duration of traffic light based on vehicle density level and carbon monoxide level

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The increasing number of vehicles in Malang was proven by data from INRIX survey, a survey institute in the United States established since 2004, the data in 2017 have shown that Malang is the fourth city with the highest traffic congestion rate in Asia. Since the traffic congestion has some adverse effects on the environment, e.g. increased levels of Carbon Monoxide (CO). In this paper, we propose a mechanism design for handling the congestion effects that adversely affect the drivers and the environments. Fuzzy logic as a method which is used to determine the levels of the congestion, CO, and green light duration of traffic light based on certain classification in order to get an optimal decision for the duration of the traffic light. The simulation design has been validated by experts from Department of Transportation (DISHUB) Malang City, the results show that the simulation design is valid and worthy to be implemented for determining the duration of the traffic light.

Keywords: carbon monoxide, congestion, duration, fuzzy logic, traffic light, vehicle

Security system analysis in combination method: RSA encryption and digital signature algorithm

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Public key cryptography or asymmetric keys are widely used in the implementation of data security on information and communication systems. The RSA algorithm (Rivest, Shamir, and Adleman) is one of the most popular and widely used public key cryptography because of its less complexity. RSA has two main functions namely the process of encryption and decryption process. Digital Signature Algorithm (DSA) is a digital signature algorithm that serves as the standard of Digital Signature Standard (DSS). DSA is also included in the public key cryptography system. DSA has two main functions of creating digital signatures and checking the validity of digital signatures. In this paper, the authors compare the computational times of RSA and DSA with some bits and choose which bits are better used. Then combine both RSA and DSA algorithms to improve data security. From the simulation results, the authors chose RSA 1024 for the encryption process and added digital signatures using DSA 512, so the messages sent are not only encrypted but also have digital signatures for the data authentication process.

Keywords: digital signature, DSA, encryption, RSA, security

Do you see what I see? Taking perspective of others using facial images

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Albeit many HCI / emotion recognition studies use facial expressive images, few scrutinize the accuracies of the people (experimenters and participants) in perceiving the expressions representing the intended emotions. The misinterpretation of the expression will put bias in the data and introduce questions on the validity of the studies. The possibility of misinterpretation of the expressions will be the focus of the experiment conducted in this study. The experiment will evaluate the ability of people in taking the perspective of others in spite of their current emotions and gender, and whether the expressions can be universally perceived. This study find that it is relatively safe to use facial expressive images for research as long as the emotions are exclusively within the six basic emotions.

Keywords: emotion perception, emotion recognition, facial images, perspective taking, HCI

Smart traffic system:

The shortest path to reach the location of traffic accidents

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Traffic accidents can affect sufferers in several ways, from light physical wounds to mortality. Even, in some areas, an accident could also cause significant material goods cost. Instantaneous rescue is critical because the harshness of those undesirable properties extremely be determined by how fast police or officer of other related institutions know, react and reach the location of the accident. In this study, a system is built to detect, find location and identify the shortest path to reach the location of an accident. There are three main parts of the system, including an accelerometer, GPS receiver and a GPRS module which are connected to a microcontroller, a program in a web server implementing K-Nearest Neighbor to search for the shortest path from a police station to the location of accidents, and a program installed in the police stations to show the shortest path in a form of a map. By implementing this system, response time to a traffic accident is potentially reduced and the fatality of injuries is decreased.

Keywords: accelerometer, GPRS, GPS, K-Nearest Neighbour, notification system, traffic accidents

Analyzing the performance of machine learning algorithms in anomaly network intrusion detection system

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With the deployment of numerous networked devices over the internet, the protection of organizational and personal computer networks has become vital owing to new malicious attacks which are rapidly increasing. Network intrusion detection systems (NIDS) are among the most recognized and reputed network security tools. Maintaining security, data confidentiality and data integrity are the main goals of the NIDS. In this way, this paper investigates the application and performance of machine learning algorithms in NIDS. Four algorithms namely, Random Forest, Decision Stump, Naive Bayes, Stochastic Gradient Descent (SGD) combined with different feature selection techniques (Correlation Ranking Filter and Gain Ratio Feature Evaluator) are applied to implement the NIDS models using NSL-KDD dataset which is the new version of KDD-Cup99. The comparative analysis conducted based on the performance of these algorithms reveals that the Random Forest performs better than the other algorithms in terms of the predicted accuracy and detection error.

Keywords: intrusion detection system, machine learning, network attack, network security, NSL-KDD dataset

Software startup ecosystem in Indonesia:

A conceptual framework

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This scientific paper aims to extend the theoretical and practical understanding of software startup in Indonesia particularly regarding the conceptual framework of software startup ecosystem. This research was conducted to answer the question of how the conceptual framework of software startup ecosystem in Indonesia is. A qualitative approach was used in this study. Qualitative descriptive, narrative, logical approach was used in the depiction of research related to the software ecosystem in Indonesia. A review of the research was given through literature review and content analysis on the opinions of IT experts and/or practitioners. The content analysis found some findings related to their socio-cultural, institutional, technological, methodological, and educational, startup, and ecosystem aspects. This paper proposed a generalized version of the conceptual framework of startup software that can be used as a basis for further startup research.

Keywords: a software startup, conceptual framework, ecosystem, software, startup

Performance of human motion analysis: A comparison

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Recently, analysis of human motion has been progressing significantly from the studies of computer vision field. Human motion analysis is useful for various area such as sports performance illustration, robotics research, image retrieval, and observational video. To provide a wider outlook towards research of human motion analysis, we review various approaches and works related with performance of human motion analysis. We explain several methods that acknowledges human motion models to understand human behavior. The methods are presented to provide simple understanding on the visual analysis by the three main problems, detecting human, tracking human, and understanding behavior. We discuss many approaches and resume them to present their ability for handling various tasks with different levels of quality.

Keywords: analysis of human motion, computer vision, detecting human, tracking human, understanding the behavior

Data preservation process in big data environment

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Data preservation deals with ensuring that digital data stored today can be read and interpreted tens or hundreds of years from now [1]. As the amount of data that needs to be preserved has been growing significantly, thus a standardized preservation process into big data environment is required. One of the standardized process recognized by ISO 14721:2012 is Open Archival Information System (OAIS). This research proposed a framework for data preservation process in big data architecture by using OAIS main components: Ingest, Archival Storage, Preservation Planning, Access, and Data Management. Based on the analysis, four out of five OAIS main components working in the proposed framework in the big data environment, which are Archival Storage, Preservation Planning, Data Management, and Access.

Keywords: big data, data archiving, data preservation, long-term data, Open Archival Information System

Multilevel wavelet packet entropy and support vector machine for epileptic EEG classification

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Electroencephalogram (EEG) is a bioelectric signal produced by brain activity. The abnormalities that occur in the brain, such as epilepsy, can be seen through a particular pattern on the EEG signal. A recurrent unprovoked seizure occurs in epilepsy patients as a result of excessive brain cell activity. EEG is a non-linear and non-stationary signal, so a visual interpretation is difficult to conduct. One method to measure EEG characteristics is the entropy that quantifies the signal complexity. Several studies have been conducted to classify epileptic EEG signal using entropy as the feature set. Previous studies has shown a promising result for epileptic EEG signal classification. However, to achieve effectiveness for the classification process, we propose a new method to reduce the number of features with a competitive accuracy. In this research, we propose a waveletbased entropy method named multilevel wavelet packet entropy (MWPE) for automatic EEG signal analysis. MWPE is calculated from the wavelet packet entropy (WPE) which performed at some decomposition level. WPE was calculated from wavelet packet decomposition (WPD) which give more informations in every signal subbands compared to discrete wavelet transform (DWT). Using MWPE, we got informations about the distribution of subband energy in every level of signal decomposition. MWPE and support vector machine (SVM) are used as the feature extraction and classifier respectively. The result showed that the method is able to classify three classes of the EEG data set (normal, interictal, seizure). The best accuracy is 94.3% which achieved by using a 1 to 5 decomposition level with biorhogonal 2.8 wavelet, and cubic or quadratic SVM. MWPE provides high accuracy with relatively few features.

Keywords: wavelet packet entropy, multilevel wavelet packet entropy, epileptic EEG, support vector machine

Optimized back-propagation artificial neural network algorithm for smart agriculture applications

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Agriculture is a very important sector in building the national economy. National Development of the 21st century will still be broadly based on agriculture. The agribusiness-based activities and business will become the main trend in national development. However, this development is not in line with the condition where climate change, soil and irrigation factors are uncertain in almost regions. To cope with this problem a reliable technique such as implementing artificial intelligence is required. Several studies have been conducted and one of these studies used artificial neural networks (ANN). This paper discusses about the modified artificial neural networks backpropagation using the Smart Agriculture dataset, using parameters such as temperature, humidity, wind speed, solar radiation and soil water tension.

Keywords: artificial, neural, network, irrigation, precision, agriculture

Three-class classification of EEG signals using support vector machine methods

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Many research on how the human brain works has been done in the last century. The use of electroencephalogram signal generated from quantifying the brain wave have been developed in many areas including the development of brain computer interface (BCI) concept. One type of BCI that interesting for the future use is motor imagery (MI) based-BCI which only requiring imagination of a person to control an object. This study proposed a feature extraction in eight different channels using discrete wavelet (DWT) coefficients. The wavelet coefficient is transformed to frequency domain using discrete fourier transform (DFT) and then average power spectrum is calculated. Level 5 of detail component of the DWT is chosen because from 512Hz sampling frequency (8 – 16Hz), it resemble mu rhythm of brain wave (8 – 12Hz) which affected from motor imagery activity. The classification of three classes, which are imagination of right body movement, left movement, and random word using multiclass support vector machine (SVM) shows a promising result with sensitivity of 96.88 %, 86.12 % and 52.78 % from three different subjects.

Keywords: average power spectrum, BCI, DWT coefficient, motor imagery, SVM

Prediction learning style based on prior knowledge for personalized learning

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The current online learning model still lacks the personalization that is able to accommodate the needs of learners. One of the learning needs is that the learning model should be in accordance with the learning style. Currently the automated detection of learning style have two approaches, namely data driven and literature based. Both approaches focus on retrieving data from the interaction of learners with the system. The interaction of the learners with the system becomes the initial data to determine the learning style. However, the learner interaction approach to this system only has an accuracy value below 80 %. One of the causes of lack of accuracy in learning style detection is that it does not take into account the possession of prior knowledge of each learner. Prior knowledge is the knowledge and skills of the learners who are expected to have the basis of determining learning styles. This is because prior knowledge has four levels: Knowledge of Fact, Knowledge of Meaning, Integration of Knowledge and Application of Knowledge that are closely related to learning style. This study proposes a smart learning model using prior knowledge to detect learning styles. There are three stages used in this research: 1. Generating prior knowledge by using the assessment with Weight Cosine Coefficient (WCC) algorithm 2. Measuring the prior knowledge of each learner, where the result of this measurement is named Level of Knowledge (LOK) and the last ie prediction of learning style possessed by mapping.

Keywords: LOK, personalization, prediction Learning, prior knowledge, WCC

Segmenting retinal vessels with a multi-scale modified Dolph-Chebyshev type I function matched filter

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In this paper, a new algorithm for retinal vessels segmentation is proposed. The algorithm is based on a multiscale modified Dolph-Chebyshev type I function matched filter. Fundus images from the DRIVE and STARE databases are utilized to evaluate the performance of the proposed algorithm. Several performance indicators, such as specificity, sensitivity, and accuracy are used for performance evaluation. Experimental results show that for the DRIVE database, the results of the proposed algorithm are superior to those produced by all compared algorithms. When tested on pathological images from the STARE database, the proposed algorithm also performs better than all competing methods. This indicates that the proposed algorithm is suitable to be used in automatic retinal diseases diagnosis tools.

Keywords: diagnosis tool, fundus image, modified Dolph-Chebyshev function, multi-scale matched filter, retinal vessels segmentation

Improving road traffic management by a model-based simulation

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Road traffic is a supporting medium that is essential to various means of land transportation that connect various locations and even large cities. Smooth traffic is a good parameter of the management of a city, also as a sign to determine the technological and economic development in the city. As the rate of civilization grows, as well as the number of people, the road traffic becomes more crowded, so that, congestion occurs to an alarming level. The solution to breaking down the congestion problem is by applying some methods and traffic engineering. However, implementing some methods and traffic engineering without proper planning will lead to high costs and less optimal results. In this article, we proposed a traffic simulation system called as "LINTAS", as a tool in trying to decipher the traffic jam. The exact method and traffic engineering, before it is tested in a real way, is first simulated through the LINTAS system, so that it can be known its effectiveness. LINTAS are built using the SimEvents toolbox and run on MATLAB-Simulink software. The LINTAS simulator is performed based on the mathematical sciences, especially the field of queueing theory.

Keywords: lintas, matlab, road, simevents, simulation, transportation, traffic,

E-learning implementation on clinical rotation nursing education: A case study of Universitas Gadjah Mada

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E-learning as a contemporary learning method influence the process of transformation from conventional education into digital basis. E-learning enhances the learning opportunities for autonomous and self-directed-learner students. School of Nursing Faculty of Medicine, Public Health, and Nursing Universitas Gadjah Mada (UGM) designed a blended clinical rotation nursing education. The development was intended to overcome obstacle and challenges in clinical rotation education. In the course of e-learning, analysis, design, development, instructional, and evaluation phase passed through. Several opportunities and challenges identified and highlighted. Institutional policies, e-learning and students' competencies enhancement, accessibilities and flexibilities promising to disseminate the program design in the future. In spite of promising challenges, technical issues, limitation in instructors supervision remains problems need to be addressed wisely. Toward program evaluation, clinical instructors assessment based on national nurse competency examination items, students' satisfaction, and institution partners recommendation used as measurement tools. E-learning implemented on clinical rotation nursing education is a rare phenomenon in Indonesia. A case of School of Nursing, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada shown its experiences in the program planning, organizing, actuation, and evaluation. Future studies and initiatives in e-learning should be designed to develop nursing education in clinical rotation, as the accomplishment of learning outcomes would be more feasible.

Keywords: blended learning, e-learning, clinical rotation nursing education, mooc, moodle

Dropout detection using non-academic data

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The common problem in the university is the high dropout rate. The high dropout rate will have a bad impact on the university. Various studies have tried to determine the factors that influence the dropout. Almost all research focuses on academic factors of students as a determinant of potential dropouts. However, there are sometimes cases of dropout students who cannot be determined using academic factors. This raises the hypothesis that the potential dropout students can be determined from non-academic factors. There are 5 non-academic factors criteria that can be used as determinants of dropout, demography, social interaction, finance, motivation, and personal. These criteria give rise to 37 factors that are considered influential in determining the potential dropout. The factors processed into three phases are collecting data, preprocessing data, and modelling. The factor that are independent to other factors are the number of family, the interest in the future study, and the relationship with the lecturer. Based on the result of correlation test there are two factors had correlation, so the modelling done with two combination factors. The best model is using combination of factor the number of family and the relationship with the lecturer using Decision Tree with split criterion is Maximum Deviance Reduction and maximum split is 2 with time for training is 1.7386 seconds.

Keywords: classification, decision tree, dropout detection, education data mining, non-academics

A conceptual model for information security risk considering business process perspective

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Information security risk assessment (ISRA) and modeling has become a prominent topic in the last decade. ISRA methods have been developed by many researchers, showing that this issue is always on the lookout for review. Business process is a new perspective in ISRA domain. In this perspective, risk assessment is based on business processes rather than organization's assets. This research is aimed to conduct a systematic review of the ISRA model developed in recent years. Research papers from 2010 to 2017 were selected and examined in the context of information security risk assessment, modeling, and its relationship with business process management. In addition to the current taxonomy, new aspects were added to analyze these papers, i.e. risk context, adaptive ability, and model purpose. Based on analysis results, research gap in information security risk modeling were found. These are risk model should have comprehensive assessment method that considers vulnerability propagation and resource valuation in different resources level. The risk model should also be able to adapt to business process changes. In this paper, research challenges faced with respect to such issues are outlined and a new conceptual model for ISRA is proposed.

Keywords: adaptive, business process change, information security, ISRA, risk model

An improved implementation of discretization algorithm for Markov Reward Models

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Discretization is one of numerical algorithms to compute transient probabilities of Markov reward models; namely continuous-time Markov chains enriched with reward structures. This algorithm is implemented in MRMC, a tool for verifying properties over probabilistic models. MRMC uses a compressed row representation to store sparse matrices. The representation is customized to meet MRMC's needs to store transient probability and other necessary matrices. It is also used to store transient probability matrices that are constantly produced and used by discretization. However, the representation is not quite compatible for discretization when computing probabilities of high accuracy. In this paper, we propose a modification of MRMC's available compressed-row data structure to accelerate discretization computation. We also compare our method to MRMC's default by computing a series of models that differ by state size, transient matrix density, and accuracy.

Keywords: accuracy, discretization, Markov reward models, performability, transient analysis

INARTE: An Indonesian dataset for recognition textual entailment

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Recognition Textual Entailment (RTE) try to solve variability problem that commonly encountered in natural language-based systems. The basic idea is to detect whether the meaning of a text can be inferred by another text. The need dataset in language other than English is necessary to accelerate research development in RTE. We created RTE dataset for Indonesian by retrieval text from Web and generate text-hypothesis pairs as many as possible. The subset technique is used to decide whether Text (T) entails Hypothesis (H). The initial data used 400 question-answer pairs obtained 1 577 entailment pairs, where 481 entailment pairs obtained from the accuracy above 50 %.

Keywords: entailment, hypothesis, RTE, text, variability

Integrated cloud storage on paperless thesis examination

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The Internet is a technology that motivates the development of digitalization. The impact can distort all aspects of human work into automation. One of technology become a trend is cloud computing. The paperless thesis examination system is one of the systems developed in cloud computing. Nowadays, there are universities which developed and implemented paperless thesis examination system. The thesis documents are saving on the university's internal servers. The development of cloud storage can use as a storage media for thesis documents. Therefore, this paper discusses the design of paperless thesis examination information systems integrated with cloud storage. As a result, this paper proposes a business process that can use for the design of the system.

Keywords: cloud storage, integrated, paperless, system, thesis examination

Modification of grey level difference matrix (GLDM) for lung sound classification

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Texture analysis is one of the methods to see the pixel variety in an image. Texture analysis can be done directly on image pixel value or done using transformation. Texture analysis can be utilized on 1D signal to observe the variation of signal data samples. In this research, texture analysis using GLDM was modified as feature extraction method for lung sound classification. The features were classified using multilayer perceptron (MLP) and support vector machine (SVM) for performance evaluation. The result showed that modified GLDM with distance $d = 10$ achieved the highest accuracy of 94.9 % using five GLDM's features, cubic SVM, and three-fold cross-validation. The result was achieved for five classes of lung sound consist of 99 data. The proposed indicated that texture analysis could be utilized for biological signal analysis, especially respiration sound.

Keywords: texture analysis, GLDM, lung sound, support vector machine, multilayer perceptron

Numbered musical notation and LATEX document integration

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In the previous research we have done the generation of music number notation by using LATEX either from plain text (plain text) or from MIDI file. But separately outside the LATEX document. In this research, the package LATEX is created to integrate music notation in the LATEX script. Thus the music notation can be directly written in the LATEX document. The way to do this is to create LATEX style in order for the user to stay in the LATEX editor when writing the script using the package environment. The package is written in accordance with the LATEX package format. From inside the package, external functions are called LATEX codes. These codes are inserted in the parent LATEX document and compiled into a pdf document. The package has been applied to some of the national songs of the Republic of Indonesia and worked well.

Keywords: integration, Latex environment, Latex package, national song, numbered musical notation,

EEG classification using elliptic filter and multilayer perceptron based on gamma activity features

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Alcohol detection in the community is important to assist in solving the problem caused by alcohol abuse. Machine Learning (ML) in combination with Electroencephalography (EEG) is one alternative solution. ML algorithm is constantly evolving with the aim of improving accuracy or accelerating the detection process. This paper focuses more on developing a faster detection process. The method that can be applied is feature extraction on the time domain. This method speeds up the detection process rather than converting EEG signal to other domain and then searching for its features. Alcoholic detection in this paper consists of three stages: filtering, feature extraction, and classification. Elliptic Highpass filter is used to pass the gamma band EEG signal. The next step, the filtered signal extracted its features only on the time domain. Furthermore, these features are used as input to Multilayer Perceptron (MLP). Based on experiments, features that provide high accuracy are variance and Root Mean Square (RMS) with 96 % and 96.08 % accuracy respectively.

Keywords: alcoholic, EEG classification, Gamma Band, MLP, statistical features

The Implementation of genetic algorithm in smote (synthetic minority oversampling technique) for handling imbalanced dataset problem

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An imbalanced dataset is a condition that has a minority class which is a class has far fewer instance distributions than other classes. The imbalanced condition can affect the performance of standard classifier algorithms that lead to the biased of the results classification or tend to become a majority class. The SMOTE method overcomes the imbalanced masses by creating synthetic instances of minority classes. However, the implementation of SMOTE resulted in overgeneralization because generated instances have the same amount regardless of the distribution of instances. As a result, the boundaries between classes are unclear. The SMOTE-Simple Genetic Algorithm (SMOTE-SGA) method is used to determine the sampling rate of each instance in order to obtain unequal amounts of synthetic instances. The tests were performed using some imbalanced datasets by comparing the classification results measured using G-means and F-Measure. The results of the application of genetic algorithm at SMOTE can improve the classification result by obtaining better G-means and F-measure value.

Keywords: classification, dataset, genetic algorithm, imbalanced, SMOTE

A revisit on blockchain-based smart contract technology

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Blockchain-based smart contract has become a growing field in the blockchain technology. What was once a technology used to solve digital transaction issues turns out to have some wider usage, including smart contract. The development of smart contract can be traced from the numerous platforms facilitating it, however the issue on how well each platform works as oppose to each other has yet been fully explored. The usage of smart contract can be seen from the applications that are built on top of the smart contract platform, such as the tokenization of real world to virtual world assets. However smart contract contains several issues concerning security and codifying which could be solved by various tools that are proposed by existing research. This paper aims to revisit the blockchain-based smart contract technology in order to understand and discuss the research gaps gathered from existing research and to provide guidance for future research.

Keywords: blockchain, platforms, research gaps, smart contract, tools

A persuasive mobile learning system for informal learning of vegetable farmers

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Technological developments have increased rapidly in recent years in various fields. In the field of agriculture, in particular, the use of mobile learning is still fairly rare for the dissemination of knowledge. Lack of information, interest, material conformity, interactivity, and awareness in using mobile learning becomes an issue in the field. Therefore, this research focuses on developing mobile learning system to increase enthusiasm, interest, and awareness of farmers by using instructional design, ADDIE (Analyze, Design, Development, Implementation, Evaluation) and persuasive system design. Based on the experimental results with the Technology Acceptance Model that represent farmers reaction in cognitive, affective and psychomotor aspects, it has been confirmed that from the use of twenty-four hypothetical variables that have been made, the seventeen hypothesis variables are positive. Predictions show that, with 95 % confidence level, seventeen hypothesis variables support behavioral intention variable. Descriptive statistics shows that 70.4 % of farmers agree to continue using mobile learning.

Keywords: m-learning, persuasive system, ADDIE, technology acceptance model

Needs vs. aspirations in inter-agency IT alignment

The case of IT for integrated criminal justice systems in Indonesia

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Inter-organizational IT/IS implementation must deal not only with the technical complexities across different systems, but also the alignment between strategies and expected functionalities between the involved institutions. This paper aims to uncover the aspirational requirements in the implementation of integrated criminal justice systems (ICJS) in Indonesia. It involved four main agencies: police, prosecutor office, court, and prison, as well as some auxiliary agencies. The research is contrasting the aspiration-based design with rational alignment needs as defined in the classic Strategic Alignment Model. The extension of this classic IT alignment framework provides the inter-relationship discourses between business strategy, business infrastructure, technology strategy, and technology infrastructure in the inter-organizational context. This paper found out that multi-organizational IT alignment framework not always suitable in multi-organizational IT implementation. Improving the alignment inside the respective organization may be provide better answer to address the misaligned situation. This paper also found out that a narrow-focused aspiration should be catered to reach the immediate success.

Keywords: aspiration-based design, integrated criminal justice systems, IT/IS Alignment, needs-based design, Strategic Alignment Model

Smart city for development:

Towards a conceptual framework

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The level of urbanization, which may impact on urban problems, could be resolved through city development supported by the advanced information technology to build the smart(er) city. However, generally, a smart city is still developed and implemented sporadically, it does not yet adopt a particular framework. Currently, there is a limited conceptual analysis and integrated template, as well as a limited framework based on the regulations issues in Indonesia. Therefore, it is considered necessary to develop a conceptual framework of the smart city for development. The study was conducted based on synthesized and aggregated literature review to build a new conceptual framework. The analysis of literature showed a complementary existing smart city framework, including city services (basic services, non-basic services, and optional services); city resources (suprastructure, infrastructure, and infostructure); city (enterprise) architecture; and city goals (livability, workability, and sustainability). This research contributes to wider insights of smart city reference model for both Indonesia and other developing countries.

Keywords: city architecture, city goals, city resources, city services, smart city framework

The requirements analysis of eLisa business architecture with education enterprise architecture perspective

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The rapid growth and rapid development of information and communication technology have made many changes to the implementation of eLearning. The eLearning business process as a replica of the conventional learning process in the classroom cannot be maintained. Now, the business process of collaborative learning becomes the orientation of eLearning implementation. The consequence of changing business process orientation is also a change in business architecture. In an educational institution, eLearning business process design needs to involve elements of the institution's internal resources. It aims to anticipate the development of ICT, support the achievement of educational institution goals, and accommodate the diversity of student learning needs. This research proposes the perspective of Education Enterprise Architecture (EEA) business architecture to obtain the priority elements of institutional internal resources for eLisa, Universitas Gadjah Mada. Describing the design of eLisa learning process currently using modeling process data flow diagrams and use case diagrams. The process modeling analysis uses the comparison of instructional processes of eLisa learning with the instructional process of the EEA business architecture. From the comparison of the current eLisa learning process with the EEA instructional process, it can be concluded that the eLisa learning process then requires the involvement of the directorate/internal unit of UGM.

Keywords: business architecture, Education Enterprise Architecture (EEA), eLearning, eLisa, learning process design

An ontology model for clinical pathway audit

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Clinical pathway is implemented to systematically record every intervention given and the development of patient. Hence, it is expected to improve the quality of services and lower the expense cost of the hospital. Ontology has been used to build a clinical pathway in order to gain semantic richness and reasoning ability. In this paper, we propose a generic clinical pathway ontology, which is specifically designed to support clinical pathway audit. It is done to measures a clinical outcome or a process against well-defined standards set on the principles of evidence-based medicine, which aims to improve the care provided. The model consists of five aspects: person, clinical pathway, record, organizational structure, and clinical category. The evaluation of the model is done using SPARQL and SQWRL to demonstrate the consistency of clinical pathway's knowledge and to demonstrate the readiness of the model to reason audit related knowledge. The evaluation shows that the model can provide information and knowledge to support audit program, including clinical pathway events/tasks, conformity of clinical pathway, clinical pathway-related services management, and patient record details.

Keywords: audit, clinical pathway, ontology, SPARQL, SQWRL

Techno economic analysis of spectrum license price in Indonesia for NB-IoT deployment

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Trend of internet of things (IoT) creates new innovation in wireless technology. Low power wide area (LPWA) technology is one of the emerging technology that support IoT paradigm. Low power and long range characteristic of LPWA enables connectivity for low power device in large geographical area. LPWA as wireless communication technology require radio spectrum in its operation. LPWA can run both in licensed and unlicensed spectrum, but LPWA in licensed spectrum can give service assurance. As a limited resource, the use of the frequency spectrum is regulated by the government by applying a licensing system. This research will calculate the price of spectrum license in LPWA according to Indonesian regulation. NB-IoT system will be used as input parameter in calculating the spectrum price in Indonesia. The spectrum price then inserted into economical analysis as a component in operational cost and initial investment. As a result of this research, NPV analysis will be conducted to see profitability of investment in LPWA NB-IoT technology.

Keywords: IoT, LPWA, NB-IoT, spectrum pricing, techno economic analysis

Robust pupil localization algorithm based on Circular Hough transform for extreme pupil occlusion

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Pupil localization has been the core of eye tracking research. Accuracy of an eye tracking application relies on how center of the pupil is localized under various occlusions—such as eyelids and eyebrows. Previous 1 managed to preserve the accuracy of pupil localization when the eyelid covered the pupil up to 70 % occlusion. However, previous algorithm failed to maintain accuracy of pupil localization when the coverage of the occlusion was 70 % or more. To deal with this problem, we propose a robust pupil localization algorithm based on circular Hough transform. The proposed algorithm was tested in 35 images taken from CASIA Iris dataset with various simulated eyelid occlusions. Our method achieved significant accuracy compared with previous state-of-the-art method—yielding 86.75 % accuracy on 90 % eyelid occlusion. The experimental results demonstrate that the proposed algorithm is promising to handle extreme eyelid occlusion in various eye tracking applications.

Keywords: CASIA Iris, Circular Hough transform, eye tracking, eyelid occlusion, pupil localization

Analyzing employee voice using real-time feedback

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People nowadays tend to use social media as a platform to share their reviews, emotions, and opinions, including about their jobs. Thus, a lot of data is available on the web. Therefore, a rapid response is needed to analyse and interpret the data. Unfortunately, many organizations still use annual surveys to assess satisfaction, engagement, and culture in the workplace. Compared to other conventional datasets such as company survey and questionnaire, decision-makers could make decision effectively and efficiently by using the interpreted data. This may be done with the help of sentiment analysis method. In this research, we classify the feedback based on its category and sentiment. Several classification algorithms are used in opinion mining, two of them are Naive Bayes Classifier (NBC) and Support Vector Machine (SVM). This paper aims to classify feedback based on sentiments using NBC and SVM.

Keywords: Data Classification, Naive Bayes Classifier, Sentiment Analysis, Support Vector Machine, Text Mining,

A comparative study of employee Churn prediction model

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Churn phenomenon commonly occurs in customer loyalty towards brand product or services. Customer churn becomes critical issue that any industry would make best effort to avoid. Churn problem may arise within the organization, called employee churn. Employee churn creates myriad and adverse effects to the organization as it correlates with unfairly workload distribution, great deal of money lost, and also extra time needed to find a replace, which may result in the rise of customer dissatisfaction rate. The purpose of this study is to find the best model to predict employee churn. A successful prediction model for employee churn is significantly needed in order to avert various negative impacts for the organization. There are three popular classification models for prediction, namely naïve bayes, decision tree, and random forest. This study will compare performance of the aforementioned models by using Human Resource Information System (HRIS) from one of Indonesia's renowned telecommunication company. The data collected for the study spans for 2 years period, started from 2015 until 2017. The findings from the study suggest that the best classification model is random forest due to its immense accuracy of 97.5 %. The second-best method is naïve bayes with 96.6 %, and the lowest accuracy of classification model is decision tree with 88.7 %. The study concludes that the most reliable and accurate classification model to predict employee churn is random forest.

Keywords: classification, decision tree, employee churn, Naïve Bayes, prediction, random forest

Evaluating energy consumption in a different virtualization within a cloud system

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Cloud computing manages the isolation of processes within Virtual Machines by utilizing resources via hypervisor. In the last decade, specific application such as Big Data that mostly run in the Virtualized environment has attracted many Cloud providers. This opportunity has increased the growth of alternative technology such as Docker and Kubernete that made enhancement on top of a single host virtualization. However, diverse virtualization technology may have different characteristics, which may also affect the consumption of energy. This work provides information on the impact of workload into Cloud computing services by measuring the energy usage of three different virtualization technologies namely Virtual Machine, Docker and Kubernete in an Openstack system, Opensource Cloud computing environment. In order to trigger processes in the system under measurement, we use a workload technique that simulates incoming users to the system. A method of energy measurement without physical powermeter for several Virtualized systems is reported. Our experiment result shows that using similar workloads, for different virtualization technology, consumes a significant distinctive amount of energy.

Keywords: cloud system, computing, energy consumption, management, virtualization

Context based-tourism recommender system: towards tourists' context-sensitive preference conceptual model

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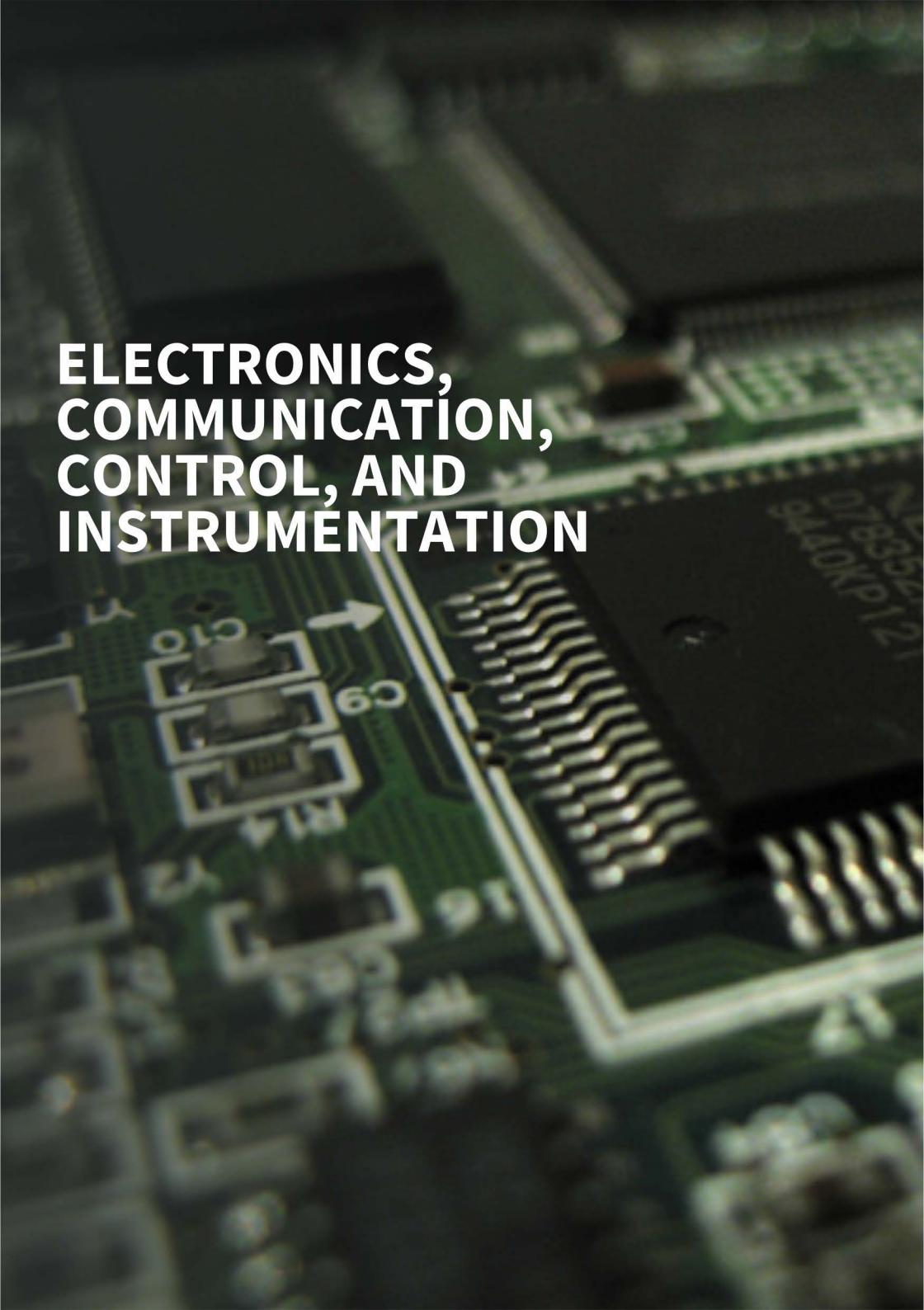
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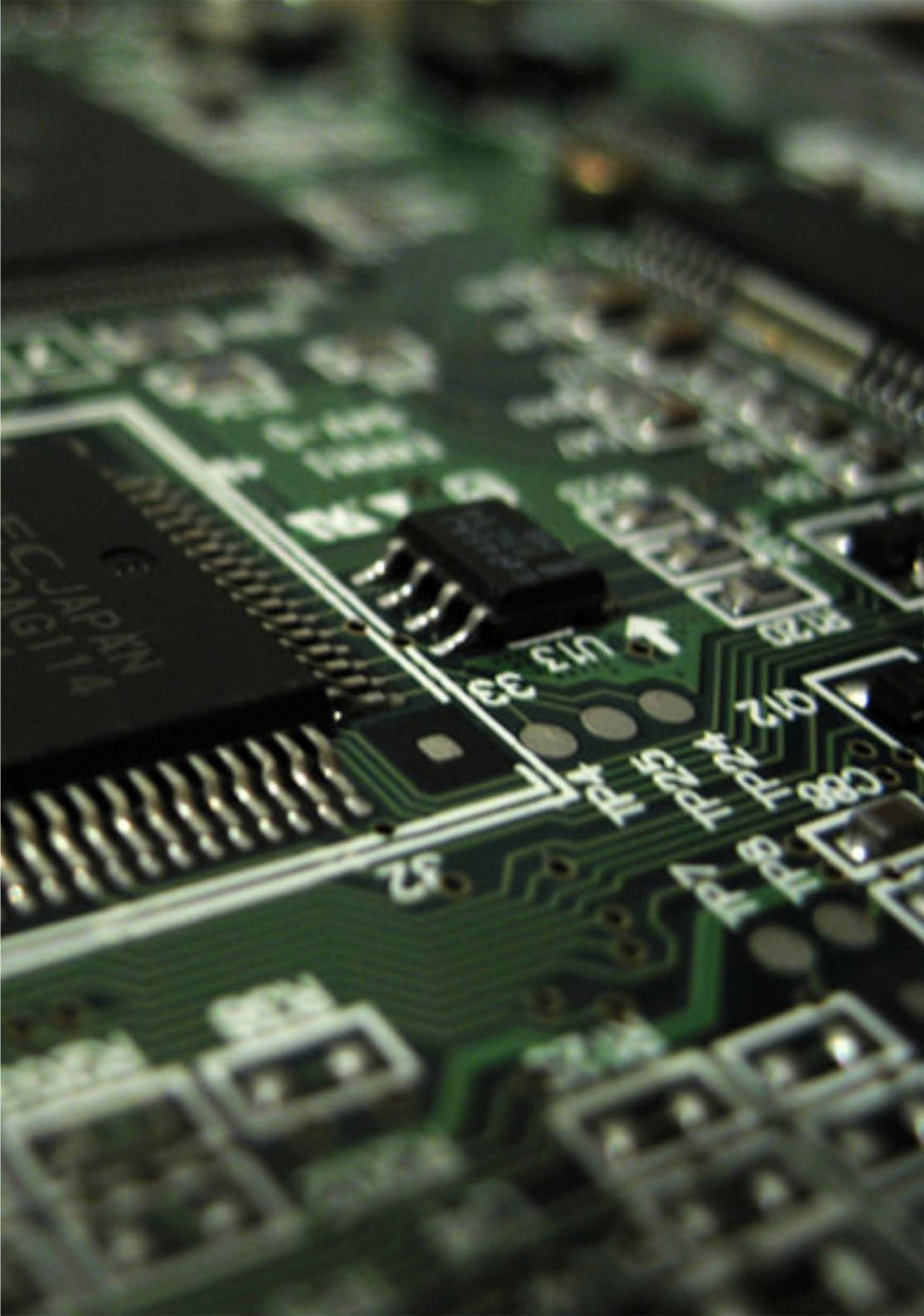
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With the fact that the Internet facilitates access to information, it will lead to create information overload, particularly for travelers. It is hard for travelers to find the appropriate destination, and service providers to recommend the suitable destination. The paper aims to propose a context sensitive preference conceptual model from the tourist's perspectives. Data collection was conducted by examining the literature review. The results show that the proposed solution is to filter information by using a recommender system. The system may need to be conducted by considering the tourists rating, collaboration, and products or services description. Further, the system should consider additional contextual information: location, time, social, and weather. Such a multidimensional context-based recommender system faces problems with the complexity of contextual data with many attributes used for filtering. Therefore, the additional contextual information on a context-based recommender system could be based on the expected contextual preferences. This model is derived from a contextual pre/post-filtering approach, or contextual modeling.

Keywords: context-aware, recommender system, contextual pre-filtering, contextual post-filtering, contextual modeling

ELECTRONICS, COMMUNICATION, CONTROL, AND INSTRUMENTATION





Quality classification of chilli sauce using electronic nose with principal component analysis

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Chili Sauce is food products made from tomatoes, chilli, and additives. The quality classification of chilli sauce is very important to help consumers choose the products by their qualities. In this research, Electronic Nose (E-nose) is used to classify a few quality grades of chilli sauce. E-nose has the ability to analyze the sample based on its aroma. The data acquisition is sampled and data processing is applied through few steps including pre-signal processing using baseline manipulation method, feature extraction using maximum value method and data analysis using Principal Component Analysis Method. The results showed that the electronic nose with 5 sensor array i.e. TGS 2620, TGS 813, TGS 822, TGS 2600 and TGS 2620 give the difference responses from different the quality based on its aroma. The similarity and dissimilarity of sensor responses due to the composition of the chilli sauces explored by multivariate pattern recognition techniques based on the principal component analysis (PCA). It can be concluded that by using the chosen feature in sensor responses of various sauce samples, PCA can be successfully used to reveal the clusters existing in chilli sauces according to their organic composition. PC1 give the accuracy of 9.2 % and PC2 give 5.8 %, so the PCA give accuracy value of 97.8 %.

Keywords: baseline manipulation method, chilli sauce, e-nose, maximum value method, PCA

Effect of the receiver coil rotational motion on induction voltage of wireless power charging

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Wireless power charging has been extensively deployed in charging the battery and devices, but the performance of transmission is limited by transmission factors, and some complex applications influence the magnetic coupling between transmitter and receiver coils. In this paper, an experimental is designed to investigate the effect of the receiver coil rotational motion on induction voltage of wireless power charging. The application of wireless power transmission continuously charges a tire pressure sensor battery is considered as a case-study. In order to charge the battery of tire pressure sensor, a prototype wireless power charging was designed and validated. Based on the prototype, the receiver module of wireless power charging was put on the small rotating wheel, and various of rotational speed was applied to know the effect of rotational motion on its induction voltage. The result experiments show that linear increase of receiver coil rotational speed gives linear increase to the induction voltage of receiver coil, and thus it gives effect both current and power load too. In this work, increasing of speed (every 200 rpm) of receiver coil rotational motion raises the linear increase of induction voltage about 8 %.

Keywords: battery charger, induction voltage, rotational motion, tire-pressure sensor, wireless

Simple of controlling LPG fuel injection on conventional generator set using ECU proposed

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Replacement of the generator set (genset) gasoline fuel using LPG fuel causes problems in the engine rotation speed is not stable. The problem is caused by the influence of the ratio of air and fuel mixture to the internal combustion engine. By using the Electronic Control Unit (ECU), the ratio of air and fuel mixture can be adjusted to the needs of the engine so that the engine speed is maintained. This paper focuses on a simple control testing on the proposed ECU to adjust the ratio of air and fuel mixture and frequency output in the genset. Control the amount of air is done by adjusting the butterfly valves via a servo motor. Controls the amount of fuel injected into the engine using an injector. Control of servo motor and injector using ECU based microcontroller Cortex-M3. Setting the duration of injection using second degree polynomial function obtained based on regression analysis on injection mapping. Using the second degree polynomial function on the ECU mapping can improve the frequency stability of the LPG-fuel genset. Controls of the angle of the servo motors controlled using PI and PID controls. The use of PI and PID control for controlling the speed of the engine of genset can maintain response time according to the characteristics when using gasoline. In 3 scenarios of dynamic conditions, the effect of PI and PID controls gives a good effect in maintaining the output frequency in the generator.

Keywords: ECU, generator set, LPG, PID, polynomial

Electronic nose coupled with chemometrics for monitoring of tempeh fermentation process

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Tempeh is a traditional Indonesian food made from fermented soybeans using *Rhizopus* sp. Tempeh has a large opportunity in the global industrial scale, so monitoring the production process of tempeh is needed. In this paper, the electronic nose is used to study the tempeh fermentation process and to study the stages of this process using Linear Discriminant Analysis (LDA) method. The results of LDA show that there are six stages of the fermentation of tempeh. The stage-1 to the stage-5 is a process of fungus growth, while the stage-6 is a process of decay. The stages of the tempeh fermentation process are classified using four classification methods: LDA, Support Vector Machine (SVM), K-nearest Neighbors (KNN), and Random Forest (RF). The highest accuracy of classification results obtained RF with an accuracy of 97,33 %. The results show good agreement that electronic nose can be used as a standard tool for testing quality of tempeh.

Keywords: *Rhizopus* sp., electronic nose, fermentation, LDA, simulated annealing algorithm, tempeh, voltaic organic compound

Array of eight circularly polarized microstrip antennas for IEEE 802.11ac MIMO WLAN

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An array of eight circularly polarized microstrip antennas is proposed as MIMO antennas for IEEE 802.11ac MIMO WLAN system. The proposed antennas design is implemented at access point side. The eight antennas are split into two groups of four antennas. The antennas belong to the same group are set with the same polarization while the antennas belong to the first group have different polarization from the one of the antennas in the second group. This array of antennas having two different polarization has been investigated. The results show that setting the adjacent elements with different polarizations, such as right-hand and left-hand circular polarizations, allows the suppression of the mutual coupling between antennas. The highest mutual coupling is -26.8 dB. Each antenna element covers 480 MHz bandwidth. We calculate and estimate the MIMO capacity that is supported by the antenna. It can be shown that 1 Gbps capacity can be reached using the proposed antennas configuration.

Keywords: antenna, circular polarization, microstrip, MIMO, WLAN system

A new blood pressure technology based on the flipping of magnetic dipole moment

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The research background gives information that blood pressure type: non invasive, continuous, and also precision is prospective useful. The aims of this research is to produce a new technical of blood pressure. The homemade equipment set-up (called magnetic-coil equipment) is built by placing permanent magnet (strength: $(18\pm2)\times10^3$ gauss) and two series of receiver coils in $7\times7\text{ cm}^2$ dimension (with 2.000 turns of coil wire 0.1 mm diameter). Output of receiver coils is connected to an amplifier (500 times to voltage) and a filter (20 Hz). Then, output of amplifier is connected to an oscilloscope and also a voltmeter. That set-up is based on the flowing speed of blood (in brachialis artery) of 0.5 m/s and also the transversal relaxation time of blood of 0.2 s. The experiment testing is placed an arm's sample between 2 magnetic poles, then a hand is placed inside of receiver coils. Electromotive force induction is produced by magnetic dipole moment of proton in hydrogenic atoms flipping. That electromotive force (by magnet-coil equipment) is seen qualitatively by oscilloscope and measured quantitatively by the voltmeter. Electromotive force output values (of 12 samples) are 0 volt up to 11 volt. Those electromotive force are equivalent to systole and diastole on blood pressure of sample, so systole and diastole are measured by sphygmomanometer reading in mmHg. The conclusion is the equivalent graph electromotive force induction versus blood pressure as exponential function.

Keywords: electromotive force induction, hydrogenic atom, magnetic coil, magnetic dipole momet, transversal relaxation time

Multiband optically transparent antenna from Indium Zinc Tin Oxide thin films with half-circular shaped

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A multi-band optically transparent antenna based on indium zinc tin oxide (IZTO) was investigated. A half-circular shaped structure (HC-S) was used to produce multi-band frequencies. The IZTO's antenna was deposited on a glass substrate that has relative permittivity ϵ_r , substrate thickness H_2 , and loss tangent $\tan \delta_2$ of 2.3, 0.8 mm, and 0.028, respectively. The IZTO antenna has patch thickness (h_2) of 100 μm and it was simulated using Momentum simulation in Advanced Design System (ADS). The results show that the antenna is capable of working in multi-band at 12.0 GHz, 15.5 GHz, 17.9 GHz, with a bandwidth of 0.5 GHz, 1.4 GHz, 1.5 GHz, and gain of 2.33 dBi, -3.15 dBi, -0.56 dBi, respectively. This antenna has slightly lower performance compared to the antenna with the copper patch. However, it has the advantage of >85 % transparency well as able to work in multi-band operating frequencies.

Keywords: antenna, half-circular, IZTO, multi-band, optical-transparent

A modified genetic algorithmfor resource allocation in cognitive radio networks

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Cognitive radio network (CRN) has a capability to sense and occupy the channel; hence, the deployment of cognitive radio users is randomly dispersed. Nonetheless, the resource allocation of the user to a random mechanism is still inefficient; thus making the users occupy the channel and later potential to cause interference among them. In this paper, we propose a modified genetic algorithm as a method for resource allocation in the cognitive radio network. In this work, the chromosome represents the channel interface index. The objective is to find the optimal channel allocation of the nodes in the network. We have modified an encoding scheme and the fitness function of GA to assign the best channel combination of the cognitive radio network. The simulation results showed that the allocation channel using modified GA is capable of improving the network throughput.

Keywords: CRN, metaheuristic algorithm, modified genetic algorithm, network, resource allocation

Resource allocation in cognitive radio networks based on modified ant colony optimization

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Cognitive Radio Network (CRN) is a set of a heterogeneous network that comprises the number of the users dynamically accessing the spectrum. A major issue in cognitive radio network is related to the resource channel allocation for the users in the network environment where the impact of unreliable resource allocation may lead to the increase of interference among the users. In this paper, we proposed the solution of resource allocation for cognitive radio network using the modified Ant Colony Algorithm -- a metaheuristic approximation inspired from the behavior of the colony of ants in foraging. Our proposed solution relies on the pheromone intensity in the path used by ants to make decision of the channel selection. The objective is to obtain the optimal solution of channel allocation by Cognitive Radio Users. From manual validation using MS Excel, the result showed that the ants could improve the channel allocation and attain the fairness in the Cognitive Radio environment, and then the throughput is increased.

Keywords: ant colony system algorithm, channel allocation, cognitive radio environment, CRN, throughput

Implementation of digital signage based on embedded system and IoT using mac address as an identifier on laboratory in-out announcer board

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The rapid development and utilization of information technology, mostly in the use of digital signage and Internet of Thing (IoT) have penetrated into all areas where the implementation has so many benefits and convenience. Hence, the implementation of IoT-based digital signage for in-out lecturer announcement board and staff is deemed important to be done, particularly in supporting the concept of smart laboratory applied in the Laboratory of Electronic Systems Department Electrical Engineering and Information Technology, Faculty of Engineering UGM. The implementation of IoT-based digital signage for in-out lecturers and staff members of the Electronic Systems Laboratory is developed by means of WEB-based interface, while for the identification of laboratory members existence it uses Raspberry P as an embedded system by utilizing user-owned device mac address connected to the laboratory Wi-Fi hotspot. The in-out status is always updated automatically according to the connectivity of laboratory member's devices with Wi-Fi hotspot.

Keywords: announcer board, digital signage, embedded system, IoT, mac address

Metal Oxide semiconductor based electronic nose as classifications and prediction instrument for nicotine concentration in unflavored electronic juice

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This study aims to apply electronic nose as an instrument to measure the concentration of dissolved nicotine in unflavored e-juice. The electronic nose used in this study consisted of six Metal Oxide Semiconductor (MOS) gas sensors. E-nose response data were analyzed using statistical methods to create predictive models. The Linear Discriminant Analysis (LDA) and Partial Least Square (PLS) models show that MOS based electronics noses can be applied to predict the concentration of dissolved nicotine in e-juice.

Keywords: E-juice, E-nose, LDA, MOS, PLS

Battery current estimation based on simple battery model with parameter update strategy

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A current sensorless technique may reduce overall power losses in Battery Management System (BMS) as well as cost needed to produce mass BMS. In this work, current estimation algorithm is constructed based on a simple battery model by utilizing internal capacitance update using a set linear piecewise function of Open Circuit Voltage (OCV). To verify the effectiveness of the constructed current estimation algorithm, pulse-load experiment and varying-load experiment are conducted. From each experiment, current estimation is compared to current-sensor readings. The result show that the current estimation manages to track the current-sensor readings from pulse-load experiment and varying-load experiment with an RMSE of 0,103 A and 0,176 A respectively.

Keywords: BMS, current estimation, current sensorless, linear piecewise function, model parameter, OCV

Fault detection on the battery SOC–OCV by using observer

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A Battery is utilized as an energy supply in many applications including electric vehicle. It is used for process such as charge and discharge. Utilization of batteries needs effective processing called Battery Management Systems (BMS). It provides an optimal operation such that battery has a longer lifetime. If the battery operation is not optimal it will result in error which may lead to a serious damage or failure. This failure can be anticipated by performing a fault detection on the battery. The purpose of this paper is to detect a fault on the battery SOC–OCV characteristics, i.e., a change of SOC–OCV curve by using an observer designed for simple battery model. A simulation is performed to demonstrate the proposed observer to detect SOC–OCV fault occurring when the battery is discharged with a constant current. The results show that the proposed observer can be utilized to detect the battery SOC–OCV fault.

Keywords: BMS, fault detection, observer, OCV, simple model battery, state of charge

An output feedback controller in the presence of measurement error

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In the presence of measurement error, a conventional approach to feedback control is to exploit state feedback control and observer simultaneously. However, a large gain in observer often has a tradeoff between tracking error and estimation error. Thus, static output feedback controllers to control a system directly without the observer are proposed. To this end, Linear Matrix Inequality (LMI) was introduced to include a signal to noise ratio (SNR) type constraint efficiently in the development of the controller. Three different static output feedback controllers from using matrix inequality and some approximation are developed. Numerical simulation shows that the method with the smallest matrix dimension provides the best performance in terms of finding the stabilizing the stabilizing controller, which implies that the proposed design may be sensitive to numerical errors.

Keywords: LMI, measurement error, output feedback control, robustness, SNR, stability

Calibration of capacitive moisture sensor (SKU:SEN0193)

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The new model of a soil moisture sensor is capacitance type sensor which designed from two parallel-plates, in which, soil being measured is located between both electrodes and act as a dielectric material of the capacitor. The sensor model is claimed with a number of advantages especially to solve the problem on the application of conductance type sensors. SKU:SEN0193 is one of a low cost soil moisture sensor which is available on the commercial market. Before applied, it is necessary to know the performance and characteristic of the sensor for local soil application. The purpose of this research is to calibrate the soil moisture sensor for soil humidity measurement. For this, the sensor coupled with such signal conditioning circuit is connected to an Arduino microcontroller and LCD for data acquisition system. The sensor responses to varied moisture of soil samples are compared to the gravimetric methods. In this research, the sensor is calibrated for sandy loam soil texture obtained from Bangka Regency. The result showed that soil moisture content readings by SKU:SEN0193 is not affected by different volume of soil and soil temperature, but is little affected by ambient environmental temperature conditions. There is direct relationship between the soil moisture content (y) and the sensor response (x), sensor performs well so it can be used to measure the moisture content of sandy clay soil sample.

Keywords: arduino microcontroller, capacitive sensor, calibration, moister content, soil moisture sensor

Optimal fractional-order PID for DC motor: comparison study

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This paper presents a comparative study of optimization methods for fractional-order Proportional–Integral–Derivative (FOPID) controller. Those methods are Nelder–Mead, Particle Swarm Optimization (PSO), and genetic algorithm. The FOPID controller needs to regulate the step response of the DC motor at the desired state. Numerical simulation and analysis are presented to verify the best method. The PSO gives the best result in term of settling time, robustness, and less overshoot.

Keywords: fractional-order calculus, fractional-order PID, genetic algorithm, nelder-mead, PSO

Water–filling power control on proportional fair algorithm to maintain fairness and saves power for MIMO–OFDMA 2×2

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The energy consumption level becomes a new consideration in resources management scheme. These works proposed powers transmit allocation using water–filling method combined with proportional fair allocation algorithm on Multiple Input Multiple Output (MIMO) 2×2 OFDM system. Water–filling power allocation is a scheme that try to optimize the energy consumption level by giving more transmit power to user that has bad channel condition, and less power to user that good channel condition. The purpose of this water–filling scheme is to decrease the energy consumption level of the system. This water–filling power allocation performed on the system after proportional fair allocation algorithm. The proposed system (water filling–proportional fair algorithm) is compared with basic proportional fair algorithm with Equal Power Allocation (EPA). Both are tested on varied user and cell radius. Simulation shows that, proposed water–filling scheme give improvement in fairness by 4.12 % and decrease transmitted power by 11.84 % or 4.74 watt.

Keywords: EPA, MIMO, proportional fair, power transmit, water–filling power control

Linear oscillation diagnosis of process variable in control loop based on variational mode decomposition

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Controller tuning fall and harmonic external disturbances are big problems in industrial automation and control systems. One of the indicators that represent the problems is the presence of linear oscillations in the process variables. Diagnosis of linear oscillations in the process variables becomes an important step before increasing performance of control loops. On the other hand, the industry is being stretched towards Industry 4.0 era. The evolution of industry has had a significant impact on various aspects including the diagnosis of linear oscillations. Diagnosis of linear oscillations which were originally intended only to find out the presence of linear oscillations changed to a diagnosis method with the Industry 4.0 paradigms. This paper presents a diagnosis method for linear oscillation of process variable in a control loop based on variational mode decomposition. The proposed method will be implemented on a set of industry data to provide validation. The results show that the proposed method can diagnose the multiple linear oscillation of process variable into two different problems, i.e. controller tuning fall and harmonic external disturbances.

Keywords: controller loop, process control, process variable, linear oscillation, oscillation diagnosis

Stock control of single product inventory system with imperfect delivery by using robust linear quadratic regulator

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In advanced inventory management problem, the received product will be not always entirely accepted due to the imperfect delivery process. The accepted delivered product volume can be represented by acceptance rate that is unknown/uncertain for the future delivery process. Then, a mathematical model and control method that can handle this problem is needed in order to control the product stock level in the warehouse. In this paper, we formulate a dynamical linear system with random parameter in the matrix coefficient to solve the inventory control problem with imperfect delivery proves and apply the Robust Linear Quadratic Regulator (RLQR) to find the optimal decision i.e. the optimal volume of the product that will be purchased at any review time period so that the inventory level will follow some set point decided by the decision maker with minimal effort (cost). To illustrate the model and its optimal decision, a computational experiment was performed with randomly generated inventory data. From the result, the optimal volume of the product for each review time period was determined where the product stock level was followed the desired set point.

Keywords: dynamical linear system, imperfect delivery, inventory control, product stock level, RLQR

Moving robot path planning algorithm analysis on dynamic environment based difference method update on ant colony logarithm

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The algorithms is one of important thing at mobile robot path planning. It's commonly used to solve a problem in path planning, especially when the environtment is so complexity, where the object can be move dynamically (target or obstacle). The path's must be collision-free (safe path), the shortest-path, and the time required by the robot to reached distination (best time). The ACO (ant colony optimization) is one of algorithm can be used to get a shortest-path in path planning algorithm, ACO have renewal processes (pheromone updating) to optimize result (search process), and it's used in this research for searching process. The pattern of target movement in this research with liniers and sinusoidals motion pattern and simulation use Netlogo 5.3.1 simulator software can be done, an agent-based free application developed by Uri Wilensky at the Center for Connected Learning and Computed-based Modeling at Northwestern University. In this research using two different renewal process (4 grids and 8 grids) for upgrading process araround the best patch, where is the 8 grids is more suitable for use at complex environtments with large number of obstacles especially in terms of time required algorithm to finding a shortest path.

Keywords: ACO, grid map, mobile robot, netlogo 5.3.1, path planning algorithm

Auto VTOL system on quadrotor using Madgwick Quaternion Kalman Filter and LQR

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Quadrotor as one kind of Unmanned Aerial Vehicle (UAV) can fly manually using remote controller or autonomously. Quadrotor that flies autonomously will get interference that affects the sensor readings. This condition causes the system cannot reach steady state and requires a long settling time when controlled. Sensory readings error can be reduced using Kalman Filter, but Kalman Filter has heavy computation. So Kalman Filters can be combined with Madgwick Quaternion fusion that has light computing. The output of Madgwick Quaternion fusion can be optimized for processing using Kalman Filter. Therefore, it takes Madgwick Quaternion Kalman Filter approach to reduce read error from the fusion sensor then the result becomes an input state for LQR control to maintain quadrotor balance. The results of this research indicate that quadrotor can overcome the noise and reach steady-state quickly. The system responses show that it takes rise time for 0.4 seconds, 0.3 seconds, and rise time for 1.6 seconds to stabilize roll, pitch, and yaw motion respectively. These results mean that the quadrotor control system has a reasonably fast response. The control system is also capable of eliminating excessive overshoot.

Keywords: autonomous, control, overshoot, sensor fusion, UAV

An overview of fundamental step using Wi-Fi communication for flight formation quadrotors

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A quadrotor is one of Unmanned Aerial Vehicle (UAV) that has a capability to flight in the restricted area. Quadrotor as the flying robot attracted the interest from various groups such as researchers, hobbyists, and military for doing particular tasks. Although a single quadrotor is capable of overcoming multiple missions, however, a multi quadrotor has advantages for overcoming communication failures. Multi quadrotor in its application is identical with a formation that required leader-follower, behavioral structure, virtual structure, multiple-input–multiple–output approaches for communication between quadrotor. In this study, communication system and multi quadrotor established using AR.Drone 2.0. A study of a formation based on connection has made by AR.Drone. Wi-Fi communication types designed as the communication which is subsequently tested with various flight movements to study the responses that obtained from each AR.Drone. The test results in the study showed that communication system built on multi quadrotor had been done. There is conformity between AR.Drone 1 and AR.Drone 2 motion due to navigation data is taken from a roll, pitch, and yaw parameters.

Keywords: formation strategy, quadrotor, quadrotor single, UAV, Wi-Fi communication

Radio frequency to lightwave signal using integrated antenna and optical material for electro optic alteration

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An Electro optic alteration can be one device using an integrated antenna. It is a direct conversion from Radio Frequency to light wave signal in a Radio over Fiber link. The integrated antenna can have dual function. First as the receiving antenna and second as the electro optic alteration. It uses several optical materials to give electro optic effect. The simulation uses a gold patch antenna and copper ground design as the integrated device. This paper gives a comparison between a conventional bowtie antenna and an integrated antenna using optical material. Both are designed for 4 GHz. A modified bowtie antenna is designed for integrated antenna. Its design has a gap between the bowtie slot, along the substrate. The electrical field is compared and analyzed using a formula based on the simulation results. The impact of impedance mismatch in the integrated antenna gives a minimized formula that can give one and a half better electrical field for electro optic alteration. The simulation gives better bandwidth 115,83 % and gain 133,43 % than the conventional.

Keywords: beamwidth, electrical field, electro optic, impedance mismatch, Integrated antenna

Regression analysis for estimated distance in fingerprinting-based WLAN outdoor localization system

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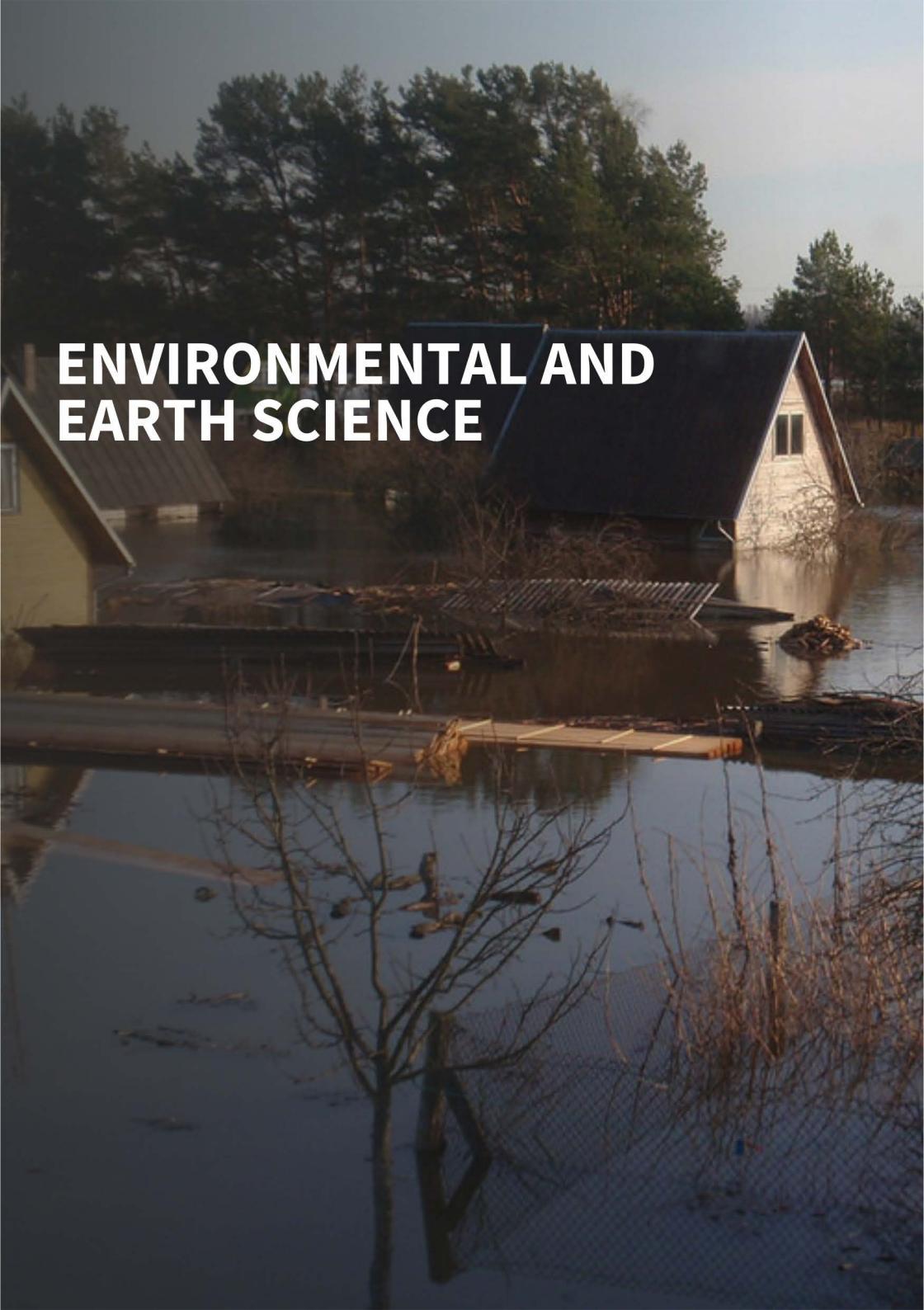
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Wireless local area network (WLAN) localization techniques are evolving in line with technological developments and the number of wireless device users. The existing localization techniques have several methods, with varying degrees of accuracy, and are generally applied to indoors. The targets sought in existing localization techniques find positions of user's mobile device. In this paper describes the regression analysis method for fingerprinting-based WLAN outdoor localization system. The position being searched is the location of the access point, rather than the user's mobile device like any other localization research. With a signal fingerprinting system, the empirical data obtained from field measurements are stored in the database. The database consists of a data point table, which includes received signal strength by the finder (RSS_{fnd}) and the distance between the finder against the access point (D_{real}). Measurements were made at a range of 0 meter to 100 meter and divided into eleven measurement points. Regression models used for analysis are linear regression, exponential regression, and polynomial regression. Based on the regression line and the value of R^2 can conclude the most precise regression technique to estimate the distance between the finder against the target of an access point. Linear regression yields R^2 value of 0.8133, exponential regression of 0.8641, and polynomial regression of R^2 value of 0.9951. Based on the amount of R^2 obtained, the polynomial regression is the most precise regression model compared to other regression models. The system in this paper offers a more effective and efficient method of WLAN outdoor localization, only one measurement of received signal strength (RSS) has been able to estimate the distance between the finder against the target of an access point. The system in this paper does not require an anchor or reference node when estimating distances as needed in other research.

Keywords: estimated distance, regression analysis, RSS, signal fingerprinting, WLAN outdoor lolization

A photograph of a residential area severely affected by flooding. In the background, several houses with dark roofs are partially submerged in water. A small boat with a single occupant is visible in the middle ground. The foreground is dominated by bare, leafless trees standing in the floodwater.

ENVIRONMENTAL AND EARTH SCIENCE



Flood insurance rate map for non-structural mitigation

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December 2014 flooding in Kelantan river basin caused severe damage to economic and social infrastructure and dealt a serious blow to Kelantan state economies. Mitigation of flood disaster can be successful only when detailed knowledge is obtained about the vulnerability of the people, buildings, infrastructure and economic activities in a flood risk area. Therefore, to identify a community's flood risk, pre-disaster financial instrument will be introduced as non-structural mitigation measures known as flood insurance rate map. This instrument will be developed based on geospatial technology using satellite images, topographic surveys, cadastral map, type of community building such as residential or commercial and households' income. Flood hazard maps and flood insurance rate map will provide the flood risk zone and flood insurance rate and premium coverage for the affected community. In addition it helps to determine the type of flood insurance coverage is needed since standard homeowners' insurance doesn't cover flooding. Flood insurance rate map will provide affordable insurance for property owners, based on the lower the degree of risk state in flood hazard map, the lower the flood insurance premium. These insurance rate map are valuable to communities because it creates safer environments by reducing loss of life and decreasing property damage, allows individuals to minimize post-flood disaster disruptions and to recover quicker.

Keywords: flood hazard, flood insurance, geospatial technology, Kelantan, mitigation

Value change analysis of *batik* wood craft in Krebet tourism village

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Krebet Village is one of the villages located in Bantul Regency, D.I Yogyakarta. As one of the centers of wooden batik industry, Krebet Tourism Village is not only a tourist destination but also has wooden batik products that become the leading commodity of the village. The profession as a wooden batik industry craftsman in Krebet Tourism Village becomes the main livelihood for most of the villagers even extends to the surrounding villages. Wooden batik production activities performed by craftsmen from the manufacture to marketing of wood batik, where the way this product marketing varies between craftsmen one and the other. This study aims to analyze the value chain activities and identify marketing distribution of wooden batik products from Krebet Tourism Village. The analysis used descriptive analysis from structured interview data to 46 wooden batik business owners in Krebet Tourism Village. The results show that the actors involved in the value chain are raw material suppliers, raw material distributors, wooden batik industries, product distributors and retailers. Differences in the value chain in some wooden batik workshops have an impact on the different ways of product marketing which further contributes to the pattern of distribution of wooden batik commodity and earnings turnover.

Keywords: *batik* wood craft, commodity, craftsman, Krebet Tourism Village, value change analysis

The improvement of solid waste management in Cibodas botanical garden through environmental economic valuation using the travel cost method

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Cibodas Botanical Garden (CBG) is believed to have high environmental value for its function as conservation area and beautiful scenery. However, prior to this research, there is lack of economic valuation to determine the total value of CBG, including its environment. The local government, on the other hand, needs such environmental economic valuation to execute better decisions related to the CBG. This study aims at providing the mostly-needed economic valuation through the application of Travel Cost Method. The Travel Cost Method (TCM) is a method to calculate the economic value of products or services that do not own market value. This method utilises total cost of consumers who travel to certain places, preferably tourist destinations. The cost spent by consumers are considered as their willingness to pay (WTP) for the visited destination(s). In this study, TCM is used by preparing questionnaires for Cibodas visitors, analysing the results of the questionnaires, calculating the total economic value (TEV) of Cibodas, determining the consumer surplus, and proposing environmental programs at CBG. At the end, it was calculated that the TEV of Cibodas Botanical Garden is Rp. 113,072,52,700 with average WTP of the visitors Rp. 202,484 per visitor and the consumer surplus of Rp. 32,344 per visitor. Also, this study reveals that solid waste management improvement at CBG can be funded by potential income from the consumer surplus.

Keywords: Cibodas Botanical Garden, economic valuation, environmental value, solid waste management, travel cost method

Nett Present Value (NPV) analysis for projection of feasibility of coastal sand dune tourism in Parangtritis village

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Sand dune in Parangtritis Village has a speciality of being formed in humid climates. The initiation of barchan coastal sand dune as a new tourism based on eco-tourism has to consider many aspects to maintain sustainability of sand dune. It needs some informations on economic valuation to determine the capacity of tourism objects. The research's aim is to know the projection of barchan coastal sand dune tourism's feasibility until 2045. The economic valuation approach by calculating NPV as the cost and benefit analysis earned by Barchan sand dune tourism. The method of economic valuation is chosen because it is able to convert ecosystem services into currency value. The results are obtained based on the calculation of NPV, it shows positive value so that coastal barchan sand dune tourism is feasible to continue until 2045 with estimated profit reached IDR648.000.000. The calculation results show a decrease efficiency in 2017. The level of efficiency can be increased again through management optimization based on the characteristics of the tourism, which are something to do, something to see and something to buy at barchan coastal sand dune.

Keywords: eco-tourism, nett present value (NPV), projection of feasibility, sand dune, sustainable tourism

The contribution of health, education, and economy on the improvement of the quality of women (a multi temporal-spatial analysis in accordance with gender development index) in Central Kalimantan Province

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Gender Development Index (GDI) is the index introduced by UNDP to measure the quality of human resources with respect of gender aspect. The objective of this research is to identify the influence of health, education, and economy to the women as well its distribution to map the areas prioritized for gender inequality alleviation. The methodology of this research employs quantitative descriptive analysis, spatial comparative analysis, and temporal comparative analysis. The result shows that the gender equality achieved by Central Kalimantan was GDI far below the national average, hence there needs to be efforts to push gender equality in certain districts, such as Katingan, Murung Raya, and Barito Utara. The influence of health factor, represented by Life Expectancy Index is more significant compared to other factors such as education and economy.

Keywords: Central Kalimantan Province, gender aspect, gender development index (GDI), gender inequality alleviation, quality of women

Design of mine drainage system in coal mine

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Mine planning for increasing mine production in the future can result in a wider pit and increase the volume of surface water within the pit. Large amounts of water in the pit cause disruption of excavation, loading and hauling activities, therefore the design of mine drainage systems is required. The objective of the study was to analyse statistically the parameters of the mine drainage system, and to design a mine drainage system, including open channel, sump (pumping and piping systems), and settling ponds. The research method is to process rainfall data, determine the catchment area (CA), calculate runoff discharge, determine the open channel dimension, calculate the volume of sump, and design the settling pond. The results of this study are the drainage system design to support the increasing of coal mine production.

Keywords: catchment area, discharge, drainage system, mine, rainfall, runoff

Bismuth/Hydroxyapatite-Modified carbon screen-printed electrode for heavy-metal ion detection in aqueous media

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Square-wave voltammetric stripping analysis is attractive for environmental monitoring and trace metal ion determination. The sensitivity is a result of analytes preconcentration steps on the electrode and advanced measurement procedures, where metal analytes are stripped away from the electrode at appropriate potential scan. Screen-printed electrode (SPE) has great advantages for *in situ* assays of heavy metal ions. Modification of SPE with bismuth (Bi) film improves the amalgamation of metal ions and the addition of hydroxyapatite (HA) increases the ion sorption, and enhances the current response due to the large porous structure and surface active sites for the metal ion binding. The ionization of the functional groups on the electrode surface upon contact with the aqueous system further assists the cation binding. The analytical performance of Bi and HA-modified SPE for simultaneous detection of Cd(II) and Pb(II) ions by square wave anodic stripping voltammetry (SWASV) was evaluated. Under the optimized electrochemical working conditions, calibration graph is linear for 240 s deposition time, in 0.1 M acetate buffer at pH 7.6 with the detection limit of 16.8 ppb for Pb(II)). Two peaks corresponding to Cd(II) at -0.8 V and Pb(II) at -0.6 V can be discerned suggesting that Bi-HA modification had increased the current responses.

Keywords: bismuth, carbon-screen, heavy-metal ion, hydroxyapatite, printed electrode

Multi-channel Analysis of Surface Wave Method for Geotechnical Site Characterization in Yogyakarta, Indonesia

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On May 26th 2006, Yogyakarta earthquake happened with 6.3 Mw. It was causing widespread destruction and loss of life and property. Shear wave velocity is one of the most influential factors of the ground motion. The average shear wave velocity for the top 30 m of soil is referred to as V_s^{30} . In this study, the V_s^{30} values were calculated by using multichannel analysis of surface waves (MASW) method. The Multichannel Analysis of Surface Waves (MASW) method was introduced by Park et al. (1999). Multi-channel Analysis of Surface Waves (MASW) is non-invasive method of estimating the shear-wave velocity profile. It utilizes the dispersive properties of Rayleigh waves for imaging the subsurface layers. MASW surveys can be divided into active and passive surveys. In active MASW method, surface waves can be easily generated by an impulsive source like a hammers, sledge hammer, weight drops, accelerated weight drops and explosive. Seismic measurements were carried out 44 locations in Yogyakarta province, in Indonesia. The dispersion data of the recorded Rayleigh waves were processed by using Seisimager software to obtain shear wave velocity profiles of the studied area. The average shear wave velocities of the soil obtained are ranging from $200 \text{ m} \cdot \text{s}^{-1}$ to $988 \text{ m} \cdot \text{s}^{-1}$, respectively.

Keywords: earthquake, geotechnical site, multi-channel analysis, shear wave velocity, surface wave method

Optimization of operational techniques in waste management case study: Lhokseumawe city

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The high volume of waste that is not followed by properly waste management method, makes the waste management in Lhokseumawe not optimal. This problem is shown by the level of waste service is only about 38 %, while the waste that is not transported will be cumulative in any places. This is showed that the level of waste service is below of the minimum service standard that is 60 % to 90 %. It is necessary to improve the waste management, especially in the utilization of waste to reduce the waste and landfill load. This research aims to evaluated and analysis of waste management in Lhokseumawe by two waste reduction scenarios, that are waste bank scenario and recycle scenario. The method that were used in this research are material balance analysis, lifetime of landfill, and cost analysis. The result showed that waste reduction by scenario 1 and scenario 2 can reduce of waste in landfill about 49.8 % and 51.02 %. The lifetime of landfill by the waste reduction can be used for 28 yr from the lifetime 18 yr. Investment cost estimated that required in scenario 1 and scenario 2 are smaller than the investment cost of existing, respectively Rp. 746,646,860, Rp. 755,530,822 and Rp. 1,202,644,444.

Keywords: Lhokseumawe, service standard, utilization of waste, waste management, waste reduction

Design and modification of horizontal-flow roughing filter as water treatment at UGM retention pond

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UGM Retention Pond as flood controller has its water supply from Belik River. Based on water quality monitoring results by the Environment Agency (BLH) of DIY in 2012 to 2016, the water status at the upstream area of Belik river has already contaminated before it flows to the retention pond. This study aims to make UGM Retention Pond not only as flood control, but also as a water treatment. The function can be fulfilled with the innovation of rough filter water type applied to horizontal flow, i.e. Horizontal-flow Roughing Filter. Mass balance analysis on the retention pond was calculated based on the assumption of pond as a complete-mix reactor with BOD_5 of 20.9 mg L^{-1} and TSS of 102 mg L^{-1} with discharge (Q) of $2.54 \text{ m}^3 \text{ s}^{-1}$. The maximum target output produced for BOD_5 was 3 mg L^{-1} and TSS was 50 mg L^{-1} so the target of filtering efficiency was 94 %. The analysis results showed the most optimal Horizontal-flow Roughing Filter was elongated beam-shaped design with length dimensions of 44.6 m, width of 2.5 m, and height of 1.7 m. Filter media used in the form of pebble (gravel) with size of 24-16 mm and assumed to have permeability coefficient $k = 0.1 \text{ m s}^{-1}$.

Keywords: horizontal-flow roughing, retention pond, water filter, water supply, water quality monitoring

Gravity satellite data analysis for subsurface modeling in mount Merapi-Merbabu, Java, Indonesia

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Mount Merapi and Mount Merbabu are active volcanoes that lies in Java Island. Java island is part of Indonesia region. This island was subduction product of Eurasian and Indo-Australian plates, caused the island consist of many volcanoes. A regional gravity study was carried out over Mt. Merapi-Merbabu by TOPEX/Poseidon satellite data. The data was corrected by free air correction and become free air anomaly. Then, that anomaly was corrected by Bouguer and Terrain corrections, become Complete-Bouguer Anomaly. This study present subsurface density model beneath Mt. Merapi and Merbabu to identify the magma chamber.

Keywords: gravity, modelling, satellite data, TOPEX/Poseidon, volcanoes

Kite Aerial Photography (KAP) for rip current identification in Parangtritis beach

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Rip current is being the major cause of the deadly accidents in Parangtritis Beach. That occasion can be prevented by putting the big attention at the location which rip currents are located. Rip current location can be identified by remote sensing data or aerial observation, and one of them is using Kite Aerial Photography (KAP). This platform is low cost, and can be performed in coastal area due to the massive winds there. KAP has been widely used as the platform for mapping, and some of them are implemented in coastal area. This study aims to find out the ability of Kite aerial photography to identify the rip current location in Parangtritis Beach. By the several flight tests, the photo mosaic of Parangtritis Beach has been generated after the KAP has flown at the minimum $3 \text{ m} \cdot \text{s}^{-1}$ of the wind speed. KAP can be the great potentials in coastal monitoring, especially for rip current monitoring because it is low-cost, low-energy and provides actual information.

Keywords: coastal monitoring, kite aerial photography (KAP), Parangtritis Beach, remote sensing data, rip current

Thermal comfort and settlements quality for eco-settlement based management in Yogyakarta

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The aims of this research are to know the settlement quality and thermal comfort and to study the prospect of eco-settlement based settlement planning and management in Yogyakarta City. The research method is quantitative method by combines structured interview, field survey, and secondary data analysis. The settlement quality was obtained through satellite imagery processing and structured interview with purposive sampling technique. The thermal comfort of the settlement was obtained through temperature humidity index (THI) analysis, where the data was taken at the temperature and relative humidity on systematic random sampling (grid). Data analysis was done descriptively by looking at spatial aspect. The results of this research showed that the distribution pattern of settlement quality is spreading. The result of thermal comfort analysis showed that THI value was 27 to 29. It also showed that the whole area was include in the uncomfortable category. The direction of settlement arrangement based on eco-settlement in the study area was divided into ecological, socio-economic, and institutional aspects. The ecological aspect emphasis on the direction of green open space planning, environmental sanitation management, and waste management. The settlement arrangement of eco-settlement concept should be supported by a compatible institutional system and program.

Keywords: eco-settlements, green open space, satellite imagery processing, temperature humidity index, thermal comfort of settlement, quality of settlement environment

Spatial analysis of coral reefs and its degradation patterns in Bunaken national park

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This article will analyze the spatial pattern as well as the degradation pattern of the coral reefs in the Bunaken National Park. Bunaken National Park is a marine national park located in the province of North Sulawesi, the park was built as means of conservation as well as providing a region for tourism. The national park contains different type of marine and land ecosystem, one of the many types of ecosystem that are in the national park is coral reefs. Coral reefs in Bunaken National Park provides different kinds of function and benefits whether for the marine habitats that lives around the ecosystem, as well as for the local people who live in the islands of the national park. Remote sensing could be used as a tool to identify the spatial pattern and the type of ecosystem that habits inside shallow sea water. The main issue with this method is that the research cannot be conduct directly to identify which type of ecosystem specifically (such as coral reefs, seagrass, etc), as well as its condition. Therefore, data collecting is necessary to observe and identify the ecosystem and its condition specifically. This study uses satellite image from Landsat 8 OLI as the main secondary data to be processed. The satellite image will be processed by using an algorithm of shallow water analysis that was introduced by Lyzenga in 1981. Since data verification and data observation is needed for this study, the research observes the pattern of the different type of ecosystem and its condition that spreads around Bunaken National Park. The verification and observation process was done by GPS, there were 300 different samples from the data that were collected around the Bunaken National Park. The sample that was collected in the study area will be used to classify the satellite image that has been processed by shallow water algorithm, on which could identify: seagrass, bleached coral reefs, deceased coral reefs, and healthy coral reefs around the national park. The results of this study show the spatial pattern of the coral reefs is located usually around the islands in the Bunaken National Park. The results show that the coral reefs are mostly located around the islands in the National Park. The map results show that the healthy coral reefs are usually located in the outermost layer around the shallow water ecosystem. The bleached reefs are usually located in the middle section of the shallow water, between the healthy coral and the islands itself. Most of the reefs that died and bleached are in the southwest of Bunaken Island, and the Northwest of Nain Island.

Keywords: coral reefs, degradation pattern, remote sensing, shallow water analysis, spatial analysis

Landuse change monitoring and population density analysis of Penjaringan, Cengkareng, and Cakung urban area in Jakarta Province

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Rapid landuse change in an urban area is inevitable. Jakarta as the capital city of Indonesia is experiencing rapid landuse change. Jakarta is the centre of administration, economic activities, and entertainment pull people coming in to Jakarta. The dynamics of demography in Jakarta influences landuse change strongly. This research use three districts in Jakarta to see how landuse change over period of time. They are Penjaringan, Cengkareng, and Cakung subdistrict. By combining landuse data, demographic features, and spatial data, such as satellite imagery, landuse change can be monitored and explained. The most significant landuse changes are industrial area and settlements. Both landuses are expanding. Meanwhile open spaces are decresing in size. This happens due to high demand of settlements caused by migrants coming in to work in industrial are. the result of this phenomenon is slum area in the city and lack of opened green spaces that can degrade environmental quality.

Keywords: dynamic of demography, Jakarta Province, landuse change, population density, urban area

Petrogenesis and depositional environment of paleozoic Sedili and Pengerang volcanics in East Johor basin, Peninsular Malaysia

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Volcaniclastic rocks in East Johor Basin are found in a relatively great abundance comprising Sedili and Pengerang Formations excluding the metamorphics, siliciclastics, and granites. Since the volcaniclastic rocks are found in a different formation, this study aims to find out the characteristics of each rock. Geology, petrography, and geochemical analyses were elaborated to reveal the petrogenesis and depositional environment in the studied area on the basis of fieldwork data and 24 samples collected from outcrops. The Sedili and Pengerang Formations are dominated by acidic rocks of rhyolite, rhyodacite, ignimbrite, and lava classified into calc-alkaline magma series which indicates a subduction-related product. Moreover, those acidic rocks are grouped into active continental margin. Eventhough volcanic rocks in Sedili and Pengerang Formations exhibit similar characteristics, they are different in several major contents. Therefore, it is inferred that both Sedili and Pengerang Formations were deposited in different phase. Coincidentally, depositional environment of both formations is also distinct. Sedili Formation were deposited in the subaerial to shallow marine, meanwhile, Pengerang Formation is interpreted to be deposited in deeper depositional setting.

Keywords: Volcaniclastic Rocks, Sedili and Pengerang Formations, Petrogenesis, Depositional Environment

Assesment of new geosites in Gunungsewu karst area, Wonogiri Regency, Central Java, Indonesia

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Wonogiri Regency located in Central Java Province, Indonesia, has geological appearance of karst area which also known as Gunungsewu Karst. Gunungsewu Karst has an area of 1,802 km² and lies in the Southern Mountains zone. The existence of Karst gives the morphology such as the endocast cave. As one of the karst phenomenon, Gunungsewu has the largest and longest caving system in Java. Purpose of this study is to introduce cave locations (endokarst) that can be explored further with scientific approach of analysis using Kubalikova and Analytical Hierarchy Process (AHP). The scientific method used is a series of literature studies to combine secondary data, field observation data, and compilation and evaluation. The new caves consist of Goa Jomblang, Goa Platar, Goa Ngantap, Goa Kencono Princess, and Goa Gilap and the assessments obtained for each of these geosites are as follows: 55.5 %, 59.5 %, 64.6 %, 82.3 %, and 90.3 %. Based on the equations, several recommendation is made and furthermore such development is deemed necessary to develop the charm of Geopark Gunungsewu.

Keywords: cave location, caving system, new geosite, Gunungsewu Karts, karst area

Sand transport characterization on the foredune area of Parangtritis, Indonesia

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The aims of the research is to determine the characteristics of sand deflation on Parangtritis foredune area, and identify the impact of deflation process to tourism activities or vice versa. Data required in this research are wind direction and its speed, the sand mass collected from sand sampler, sand grain size, roundness and sphericity, and interview from tourists. Sand that transported by wind collected by sand sampler with dimension of 0.76 cm height and 1 cm width. Sand transport rate or deflation process calculated by Bagnold's formula. The results showed that the deflation process is bigger at day time observation than at night, it is average $2.42 \text{ g} \cdot \text{m}^{-1}$ per second during the day and $0.03 \text{ g} \cdot \text{m}^{-1}$ per second during night. Each samples location have different deflation characteristics of material that transported. Grain diameters ranging from 0.318 mm to 0.395 mm with dominance texture is medium sand. Sphericity and roundness of sediment material was on a scale of 0.5 and 0.7. This natural process that occurred in the research area didn't knowing well either by local community or tourists. Therefore need some proper management for support the continuity of deflation process for supplying material to the main sand dune area of Parangtritis.

Keywords: Bagnold's formula, deflation process, foredune area, Parangtritis, sand transport

Relation of lineaments and volcano-stratigraphy of tertiary volcanic rock in Kulon Progo mountains area, Yogyakarta-Indonesia

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The structural lineaments developed in the Kulon Progo Mountains, which is mainly composed of Tertiary volcanic rocks. The direction and distribution of this lineaments density differs from one area to another. This research was conducted to reveal the geological factor of controlling the variation of existing lineaments density. Lineaments delineation is done on the whole area on the satellite image of Kulon Progo Mountain area. From the lineaments map is then made a lineaments density variation map. Lineaments density variation map that are overlaid by volcanic rock distribution, based on the results of field studies, will result in a relationship between the geological structure density and the existing rock types and facies of volcanic rocks. The result of alignments density analysis shows high density values (3 to 6) $\text{km} \cdot \text{km}^{-2}$ especially located at proximal volcanic rock facies. Low density values of (1 to 3) $\text{km} \cdot \text{km}^{-2}$ are mainly located in medial and distal volcanic rock facies.

Keywords: facies, lineament, lineament density, medial facies, proximal facies, structure

The development of cave passage in Donomulyo, Malang, Indonesia

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The cave passages formed in Donomulyo Sub-District are formed in epigenic and hypogenic conditions in coastal areas. The dominant factors form the morphological condition of the cave passage that is the existence of structural factors, underground water flow, and tectonism that affect the condition of the passage. Structural factors form the existence of linement that affect the cave passage. Underground water flow forms a passage due to the change of vadose, epipreatic, and phreatic conditions. The existence of tectonism leads to the removal of limestone into several levels of cave passage development, in addition, there is the collapse of blocks, plates, talus, and sheets. The development of the cave passage level is also related to surface physiographic, which is connected to five levels with marine terrace, including 244 masl to 325 masl (level 1), 182 masl to 244 masl (level 2), 111 masl to 181 masl (level 3), 30 masl to 110 masl (level 4), and 0 masl to 29 masl (level 5). The development of fifth level shows that the level limit is located in the Sengik Cave, the fourth level is located in the Jebrot Cave, and the second level is located in the Banyu Cave, these three caves are the output of the underground rivers

Keywords: cave level, cave morphology, karst, surface physiographic, underground rivers

Analysis of Java island's ozone layer and ultra violet index variability based on satellite data

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The ozone layer has a very important role in our atmosphere because it can protect every living on the surface of the earth against harmful Ultra Violet-B radiation. This study aims to discuss and analyze the linkages of ozone layer and ultra violet index (UVI) in Java Island and using of FFT to find the period that dominates the ozone layer and UVI variation. The results obtained are characteristic of ozone layer and UVI as well as linkage of UVI to ozone layer in Java Island. Using data of the Ozone Monitoring Instrument (OMI) sensor on AURA satellites from 2005 to 2016 has been obtained monthly, seasonal and annual characteristics for ozone and UVI and the period dominating the variation of the ozone layer and UVI. The ozone layer varied between 238 DU to 277 DU, the annual variation pattern peaked in October and the minimum in January. The UVI varies between 7.8 and 13.6. The annual variation of UVI peaked in October and the minimum in June. Linear regression of the UVI with ozone in December, January and February (DJF), showed a negative correlation coefficient of 0.77 which means there is a strong correlation between decreasing ozone concentration with increasing of UVI. Variability of Java Island's ozone layer is dominated by six month, 12 month and 28 month cycles. While UVI most dominated by the cycle of six months and 12 months.

Keywords: Java Island, ozone layer, ozone monitoring instrument, ultra violet index, satellite data

The tropopause height analysis in equatorial region through the GPS-RO

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This study was performed to analyze the variation level of tropopause height in vertical resolution using radio occultation (RO) data from GRACE database. The analysis was conducted for data collected in the year of 2016 and latitudinal variation of study in a range of 30° S to 30° N for an equatorial region with an interval of 5°. The CPT and LRT technique is used in this analysis to identify the tropopause height due to well performance in the previous study. The analysis shows that the tropopause height location varies in the latitude of an equatorial region with the highest level reach up to 19.1 km and the lowest is 16.4 km over the year of 2016. Therefore, from the analysis that shows the correlation of highest tropopause layer at near of equatorial plane for northern hemisphere while lower tropopause layer at southern hemisphere.

Keywords: equatorial region, northern hemisphere, radio occultation, southern hemisphere, tropopause height

The impact of climate variability on tobacco productivity over Temanggung regency

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Indonesia is among the most affected regions by climate variability and change. Located between the Pacific and the Indian Ocean, Indonesia is mostly influenced by some climate variabilities, such as the monsoon, El-Nino Southern Oscillation (ENSO), and Indian Ocean Dipole (IOD). These climate variabilities affect significantly on the Indonesian rainfall that further increase the chances of crop failure, specifically on the tobacco yield over Temanggung Regency which is known as the producer of good quality tobacco in Indonesia. Tobacco needs a sufficient dry condition prior to the harvest stage due to maintains its productivity and leaf quality. This ideal condition could be achieved when the dry season, typically in the mid of the year for Temanggung, is not affected by any wet climate variability. Moreover, based on this study, it was found that there was the most remarkable decline in tobacco productivity in 2016 since the required dry condition was interrupted by the prolonged significant rainfall which depicted by strong mid-year negative-IOD indices. The analysis utilized the dataset of tobacco productivity, daily rainfall intensity, and the indices of monsoon, ENSO, and IOD for the period of seven years, from 2010 to 2016. This study concludes that the climate variabilities give a huge contribution to the profitable tobacco cultivation. Furthermore, efforts to adapt and to mitigate the impacts of the climate variability in Indonesia, specifically for the agriculture sector, is needed by way of increasing the various stakeholder's knowledge that involved in policy planning and decision-making as well as involving the farmers in the training on climate adaptation and mitigation.

Keywords: climate variability, good quality tobacco, mitigation, Temanggung Regency, tobacco production

The nature of carbon flux in various ecosystem types in the Biduk-Biduk karst region, Berau district, East Kalimantan

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Biduk-Biduk Karst Region has great potential to absorb and store organic carbon in vegetation and soil as well as to absorb inorganic carbon through the process of dissolution. The area has important economic value in supporting the REDD Program in Berau District. The purpose of this study is (1) to identify the amount of carbon stocks in various ecosystems; and (2) to identify the amount of carbon uptake in various ecosystems in the study area. Carbon stocks are computed based on four carbon sinks, i.e., above ground biomass, underground biomass, litter, and soil organic matter using the standard measurement method of SNI 7724: 2011. Carbon sequestration is calculated based on the input of carbon from the atmosphere to ecosystems through litter fall and karstification process and the output of carbon from the ecosystem to the atmosphere through soil respiration. Litter fall is measured using the litter trap method. Karstification is measured with standard limestone tablet method. Soil respiration is calculated with the closed chamber method. The results show that the ecosystems in the Biduk-Biduk Karst Region have a potential carbon stock of $4,800.92 \text{ t} \cdot \text{ha}^{-1}$ with the largest value in the secondary tropical forest. Ecosystems in the Biduk-Biduk Karst Region have a potential carbon sequestration of $37.33 \text{ t} \cdot \text{ha}^{-1}$ per year with the largest contribution in the primary tropical forest. The largest proportion of the carbon sequestration constituent comes from litter fall.

Keywords: Biduk-Biduk Karst Region, carbon flux, carbon sequestration, karstification, litter fall

Sustainability of rainwater harvesting for supplying domestic water demand in Yogyakarta City

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Rainwater harvesting (RWH) is an innovation in urban areas for utilizing the roofs of buildings and rainwater that are rarely exploited by urban communities. Demand of domestic water in urban areas such as Yogyakarta City is always increasing, so alternative sources of water is important to maintain the water resources sustainability in Yogyakarta city. Supply of water requirement through RWH system will observe with scenario simulation so it will know the impact of application of this system in Yogyakarta city. The Sustainability Index (SI) is using to determine the functional performance of the water supply system through three parameters such as reliability, resiliency, and vulnerability. At general, the performance of the RWH system is good from the overall roof in the settlement area in Yogyakarta City. This study observes SI value in various scenarios to meet domestic water demands.

Keywords: demand of domestic water, rainwater harvesting, supply of water, sustainability index, urban area

Water quality and sustainability of Merdada volcanic lake, Dieng, Indonesia

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The volcanic lakes in Dieng Plateau offer some unique phenomena, which interest not only tourists but also scientists. However, as the land use changes, the lakes are now facing environmental degradation especially from agricultural practices. This research aim to study the impact of agricultural practices on the environmental degradation of the lakes especially the water quality, and analyze sustainability of the lakes to support water needs. Merdada Lake, one of the lakes in Dieng Plateau was selected as the focus of this research. Method conducted on this research are field survey to collect the physical parameters temperature and conductivity also chemical parameters like pH, Nitrate, BOD, phosphate, and coliform. A complementary data was acquired using interviews method for defining the sustainability of the lake. Base on observation, water level of the lake is gradually decreased, especially during the dry season. At the same time, the agricultural practices in the surrounding area led to soil erosion, which involved surface runoff that transporting sediments into the lake. This research found that the practices of potato cultivation pumped out the water from Merdada Lake and distributed over the plantation area. This practice caused a dramatic decrease of the water surface. Beside that, the agricultural practices had several adverse effects on the volcanic lakes in Dieng Plateau especially eutrophication and decrease of water quality in Merdada Lake where nitrate is over from water quality standard class II. Coliform also has an over expected value, range from 3 to 11 MPN per 100 mL.

Keywords: environmental degradation, Dieng Plateau, Merdada Volcanic Lake, water sustainability, water quality

Macroinvertebrate benthic community as rapid quality assessment in Winongo, Code, and Gajahwong streams inside Yogyakarta City District, Special Region of Yogyakarta Province

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Streams in Yogyakarta City are classified as urban river, they receive huge amount of organic matter daily from anthropogenic waste. Growing urbanization affected water ecosystem causing water quality and benthic community changes. Macro-invertebrate benthic immediately respond to physic-chemical changes of the stream. Aims of this study are studying urbanization alter macro-invertebrate benthic community, and water quality in Winongo, Gajah Wong, and Code streams of Yogyakarta City. Samples were collected at December 2015 and January 2017 in Winongo, Gajah Wong, and Code streams inside the administration area of Yogyakarta City using sediment Dredge. Collections perform by dividing each stream into three parts with five replications. Macro-invertebrate benthic were filtered using stratified filter mesh 60, 40, and 20. Results shown that macro-invertebrate benthic diversity decreasing from 2015 to 2017 in these three urban streams. There were not much species founded in Yogyakarta City Streams, indicates riparian ecosystem lack of natural habitat. All riparian zone are damage by anthropogenic activities. Their density also decreasing probably because riparian floodplain embankment caused water velocity faster, leave little sediment for benthic organism. Chironomids larvae dominate in all stations in each river, and the most abundant in Code. They were abundant because streams in Yogyakarta City accept high input of organic matter. They classified as tolerate groups where their abundance indicates water pollution. High waterfall during 2016 most probably caused water quality better in 2017 than 2015. Dissolved oxygen were higher, water pH are closer to neutral. Thus it cannot be used as indicator.

Keywords: domestic waste, tropical streams, urban streams, water pollution, Yogyakarta city

The hydrogeological mapping of the southwestern part of Serang regency, Banten, Indonesia

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The development of Serang City as the central government of Banten Province leads to persistently increasing demand for clean water in the area and its surroundings. This study aimed to perform the hydrogeological mapping of the southwestern part of Serang Regency. The study area covered four districts, namely Baros, Padarincang, Paburuan, and Ciomas. These four districts are the clean water source of Serang City that also functions as a buffer zone designed for the development of freshwater fishery and wetland agriculture. Hydrogeological mapping in the study area is expected to be one of the inputs in planning the use of water resources. The method used in this research included analyses of drill data, geophysical measurement results, the findings of previous studies, hydrological map scale 1:250.000, and geological map scale 1:100.000, as well as geomorphological mapping and field survey. This research produced six classes of hydrogeological units that covered areas with scarce groundwater productivity up to those with high groundwater productivity.

Keywords: buffer zone, hydrogeology, hydrogeological mapping, groundwater, Serang Regency

Spatial distribution of dominant ions in the groundwater in Banyumodal groundwater basin, Central Java, Indonesia

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Groundwater basin is an area with hydrogeological limits where it is happened all of hydrogeological processes. Banyumodal Groundwater Basin is one of groundwater basin with unique characteristic because of receiving water source from surroundings area, that would influence probably to the water quality. This study was conducted to: (1) know the spatial distribution of dominant ions concentration in the groundwater; (2) analyze surroundings factors that influence the spatial distribution of dominant ions in the groundwater. To realize the objectives, it was carried out the removal of groundwater samples in the observational wells that were determined by purposive sampling. The analyzed elements were Ca^{2+} , Mg^{2+} , Na^+ , K^+ , SO_4^{2-} , HCO_3^- , CO_3^{2-} , Cl^- and Fe^{2+} . The concentration of the dominant ions was realized in the form of Stiff Diagram and then was plotted in a map, so that it could be known the distribution. To analyze the process of mixing between the groundwater and water from the other sources with different chemical characteristics, it used the Piper Diagram, whereas to analyze the surroundings effects to the ionic concentration, it was conducted the analysis of quantitative descriptive. The study results showed that the groundwater from the northern part of Banyumodal Groundwater Basin has higher concentration of dominant ions compared with the southern ones. Viewed from each ion, the ionic concentration of Ca^{2+} and HCO_3^- are higher than other dominant ions and have more varied values, so that the change of chemical characteristics of the groundwater would tend to be determined by the concentration change of them. Type of rocks is the most influencing factor to the concentration of dominant ions in the study area. Nevertheless, the domestic waste has also little effects related to the sanitary condition in around of samples location of the groundwater.

Keywords: Banyumodal Groundwater Basin, dominat ions, groundwater, Piper Diagram, Stiff Diagram

Clay mineralogy of landslide occurrences in hydrothermally altered area: A case study of Durensari Area, Purworejo, Central Java

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Landslide is one of the geological phenomena that can be found frequently in Indonesia, where several areas are damaged due to landslide occurrence. One of it is located in Durensari area, Bagelen, Purworejo, Central Java as the study area. The study area is characterized by the presence of altered volcanic rocks formed by tertiary eruption followed by hydrothermal alteration that clay minerals that could enhance the landslide occurrence. This study is conducted to identify hydrothermal clay minerals that could enhance landslide in the study area. Field mapping is done as field observation, as well as the clay minerals are identified from 10 samples using X-Ray Diffraction (XRD) as the study method. The observation has resulted that there are at least ±25 landslide occurrence points in the study area, which have association with alteration type which consist of several clays, named by smectite, kaolinite, and illite assemblages as argillic alteration and chlorite, smectite, illite, and kaolinite assemblages as propylitic alteration. The research concluded that the replacement process of primary minerals by clay minerals and the presence of smectite affect the landslide occurrence in the study area, where moderate to large landslide is associated with Argillic alteration, meanwhile small to moderate landslide is associated with propylitic alteration.

Keywords: clay, hydrothermal altered area, landslide, mineralogy, minerals

Hydrograph modeling with rational modified method

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Water as vital natural resource for human living, could bring negative effects such as flood and landslide. Best management effort to handle the negative sides of the hydrological process is called "model". One of them is Modified Rational Method (MRM). MRM is a development of rational method by adding the principle of surface hydrological balance or kinematic wave in order to route the flow. Obtained output model not only peak discharge, but also hydrograph unit. Modification in the calculation of peak discharge's value at C value (coefficient runoff) and A (pixel area). Model validation is based on three flood events, i.e. January 21, January 22, and February 10, 2016. Each event has different rainfall characteristics. The other parameter is the land characteristic (soil texture, manning roughness coefficient, and saturation coefficient). The calculation of discharge on each pixel, then performed a search using kinematic wave. The result of this modeling is a DRO hydrograph. Separation of DRO and baseflow on the observation hydrograph using data taken from modeling result shows that the flow through the outlet when the discharge is recession is the base flow. The modeling results is calibrated using observed hydrograph. All the calculation process is done by using PC-Raster. The accuracy value is quite good, i.e. 10 % to 30 %. Based on the modeling results show a different response between direct runoff and base flow, with time to peak faster than time recession.

Keywords: hydrograph modelling, kinematic wave, modified rational method (MRM), peak discharge, surface hydrological balance

Seismic microzonation based on microseismic data and damage distribution of 2006 Yogyakarta earthquake

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The 2006 Yogyakarta earthquake caused an extensive damage to various areas of Yogyakarta regions. The damage distribution indicates the role of local site effects during the earthquake as the damage extended from Bantul Regency in Yogyakarta Province to Klaten Regency in Central Java. Microzonation based on the damage distribution is then carried out using Horizontal-to-Vertical Spectral Ratio (HVSР) technique. From this technique, amplification factor and predominant frequency can be obtained and then spatially mapped. Inversion can also be conducted to the HVSР curves to infer the geological condition of the study area.

Keywords: earthquake, HVSР technique, microseismic, seismic microzonation, Yogyakarta

Tsunami hazard mapping and loss estimation using geographic information system in Gunungkidul coastal area, Yogyakarta, Indonesia

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The southern coastal area of Java Island is one of the nine seismic gaps that prone to tsunamis. The entire coastline in one of the regencies, Gunungkidul, is exposed to the subduction zone in the Indian Ocean. Also, the growing tourism industries in the regency increase its vulnerability, which places most of its areas at high risk of tsunamis. This research aims to model tsunami inundation and estimate the loss that caused by tsunami. Detailed DEM generated from UAV photogrammetry. Based on the model, several inundation scenarios were combined with land use map to estimate the loss.

Keywords: geographic information system, Gunungkidul, loss estimation, tsunami hazard mapping, tsunami inundation

Accident risk management strategy at un-signalized intersection

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The increasing of traffic sign and/or light violations is a commonly views in many countries. Even it was occurred intentionally which indicates that drivers accept its possible consequences. The constant fatality index of motorcyclist strongly indicates that determinant variables behind their risky behaviour and/or accident involvement should be further investigated and managed systematically. Accordingly, this paper focuses on motorcyclist accident risk management, particularly at un-signalized segment, by combining the aggregated-individual and expert expectancy approaches. Therefore a questionnaire and braking manoeuvre test were undertaken at closed circuit course. The result shows that speeding behaviour was caused by trip purpose and triggered by perception about their braking and hazard detection abilities. In addition, only 24 % of 56 % of riders who believed that their braking capability was above average could apply high braking capability so that most riders might involve in crash due to the average critical crossing gap choice at the monitored intersection. This explains that their speed choice should be deal with their braking capability. However, the overlay policy at the monitored intersection indicates that the unbalanced between mobility and safety still to be a latent issue, which virtually could be bridged by using a standardized braking capability.

Keywords: accident, light violation, risk management, traffic sign, u-signalized intersection

Modeling (Im)Mobility: The decision to stay in disaster prone area amongst fishermen community in Semarang

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The existing literature on population immobility, especially immobility associated with climate change-related disaster, are very finite. Consequently, the understanding to population immobility in disaster prone areas is still low. This article adds to the literature on population immobility by modeling decision to stay in disaster prone area amongst fishermen community in Tambak Lorok, Semarang. The survey was conducted to the residents of Kampung Tambak Lorok Semarang, which is prone to three disasters simultaneously i.e. sea level rise, land subsidence, and tidal inundation. The study sample was 235 heads of households selected using proportional sampling area technique. This study constructs three factors: place valuation, disaster adaptation, and stakeholders intervention. These three factors used as explanatory variables for modeling the decision to stay. The study employed a Confirmatory Factor Analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyses the data and examines the logical relationship between those three factors in staying decision. Our results suggest that the place valuation and disaster adaptation significantly influence the decision to stay, while stakeholder interventions are influential but not significant. We concur that residents with positive place valuation and good disaster adaptation tend to stay although threatening by disaster. More broadly, this study contributes to our understanding to population immobility in disaster-prone area by modeling the decision to stay.

Keywords: confirmatory factor analysis, disaster prone area, fisherman community, Kampung Tambak Lorong, modelling immobility

Comparative analysis of disaster information website based on web usability evaluation and quality content of disaster information

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Disaster is one of the most important researches because every country in the world has their own disaster potential. Disaster assessment improves over time due to technological and information advancements; and it is very reliant to a long period of data record. Disaster information is already available online in various websites, and is presented in form of map, data, video and multimedia contents. Each country has different disaster information standards, the Web Usability and quality of disaster-related content. This research objective is to find good model WEBUSE and quality content both national and international disaster website. National disaster website includes: Geospatial Information Agency (*Badan Informasi Geospasial/BIG*), Meteorological, Climatological and Geophysical Agency (*Badan Meteorologi Klimatologi dan Geofisika/BMKG*), National Disaster Management Authority (*Badan Nasional Penanggulangan Bencana/BNPB*); while international website includes: National Oceanic and Atmospheric Administration (NOAA) and United States Geological Survey (USGS). Usability comparison method uses the WEBUSE questionnaire with four categories, content organization and readability, navigation and links, user interface design, and performance and effectiveness; while the disaster-related content quality is measured using scoring method, with four categories, the geospatial information, data quality, product, and accessibility, according to United Nations Office for Disaster Risk Reduction (UNISDR). The usability level analysis for all five websites are classified as "good", with USGS achieving the highest score of 0.703. As for the disaster-related quality content analysis result, USGS fulfills all categories.

Keywords: disaster information, disaster potential, quality content, web usability evaluation, WEBUSE



MATERIAL SCIENCE AND CHEMISTRY

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The influence of physico-chemical properties on heavy metals content on the illegal land fill Kadisoka, Sleman, Special Region of Yogyakarta

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The Influence of Physico-chemical properties on heavy metals content on the Illegal Land Fill at Kadisoka, Sleman, Yogyakarta has been carried out. The aims of this research are to evaluate the metal concentration in the soil, analyze the physico-chemical properties including water and ash contents, pH, electrical conductivity, total organic carbon, cation exchange capacity; and to find out the maximum heavy metals content the soil samples. Soil samples were divided into three samples based on places where they were taken in the land fill area, namely sample I, II and III. Heavy Metals content in the solution were measured by Atomic Absorption Spectrophotometer (AAS). The results showed the highest heavy metal content in soil was Zn. Sample II had the highest Zn value at $1.199 \text{ mg} \cdot \text{kg}^{-1}$, whereas sample I had the lowest total Zn content of $708.54 \text{ mg} \cdot \text{kg}^{-1}$.

Keywords: AAS, heavy metals, Illegal land fill, physico-chemical properties

The revised method of quantitative detection of animal-origin bovine and porcine gelatin difference using surface plasmon resonance based biosensor

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We have previously reported the surface plasmon resonance (SPR)-based biosensor ability for quantitatively differentiating bovine and porcine gelatin has been done by us before, however it has some inaccuracies. By improving the method of detection, the results of this study show that the difference between bovine and porcine gelatin was more distinguishable. The sensor response models acquired were nonlinear as in the previous study, however, they show a different characteristics. The sensitivities of the sensor obtained are higher than those of the previous ones, i.e. 3.04 σ and 4.29 σ for bovine and porcine gelatin concentration change of 0.1 %, respectively. And the sensor's LOD and LOQ towards both gelatin concentrations were 0.22 % and 0.74 % (w/w), respectively.

Keywords: biosensor, bovine gelatin, food halalness, porcine gelatin, quantitative detection, surface plasmon resonance (SPR)

Microstructures and functional group properties of nano-sized chitosan prepared by ball milling

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Nano-sized chitosan has been prepared by ball mill (High Energy Milling) with 1500 rpm to determine its microstructures and functional group properties. A nanopowder sample was prepared in the various milling time of the precursor. The milling time were 60, 120, 180, 240, 300 and 360 minutes. The Scanning Electron Microscopy (SEM) images indicated that the microstructures and grain size of as-prepared chitosan changed by increasing the milling time. The average particle size of as-prepared chitosan was (16.50 ± 0.49) nm. The Fourier Transform Infra-Red (FTIR) spectra showed that a -OH bond shifted to high wavenumber after milling. The new C=X groups formed during the milling process, because of the ordered microstructures in the nano-sized chitosan granules were destroyed after ball milling. The surface area of the nano-sized chitosan was high, the particles tend to agglomerate since the ionic electrostatic could not prevent to form the agglomeration. The ball milling treatment was an effective method to reduce the grain size of chitosan, and microstructure properties will not automatically change during the milling process.

Keywords: chitosan, ball mill, functional group, microstructure, SEM

An attempt to establish the lipase gene sequence of *Alcaligenes* sp. JG3 using internal primer

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Alcaligenes sp. JG3 is a local strain bacterium from Indonesia, isolated from cultivated corn field of Central Java. This bacterium is able to produce lipase with fairly high activity. In order to do lipase gene sequence characterization, two set of primer pair were used in this study (primer Fjg3 5'- ATGACCGAGCTGACTGTAG-3', Rjg3 5'-TCAGGAGGGTAAATCCAC-3' and internal primer Fi 5'-TGACCCATGACCAGGCAGGAA-3' and Ri 5'-TTCGCCTGGTCATGGGTCA-3'). The complete lipase JG3 gene sequence consists of 1081 bp from start codon ATG to the stop codon of TGA. Lipase JG3 had high similarity to other lipase from genus *Alcaligenaceae* which was up to 90%. However, the 3D protein visualization analysis indicated that this lipase JG3 also has the characteristic of ABC transporter protein.

Keywords: *Alcaligenes* sp. JG3, internal primer, lipase, PCR

The utilization of chitosan as natural antibacterial for vegetable tanned leather

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Leathers which made from natural fibers, provide an excellent environment for microorganisms to grow. Currently used in leather industry, anti1microbial agents (biocides) are generally harmful to human health and the environment, therefore their usage has been or shall be restricted or even banned. This study tend to develop the eco-friendly biocide that substitute for toxic chemicals, specifically tested for vegetable tanned leather. Due to their large surface area and ability to retain moisture, vegetable tanned leather has higher opportunity of biodeterioration than other type of tanned leather (e.g. mineral tanning agents). In this experiment, chitosan, a natural biopolymer, was chosen considering its ability to inhibit the bacterial growth. The results showed that chitosan coating in application used impregnation method in drum using 1% (chitosan/leather ratio (w/w), formic acid) for 2 hours was successfully achieved the bacterial growth inhibition.

Keywords: biocide, chitosan, leather, vegetable tanned leather

Comparison the effect of using different fatliqour to the formation of chromium (vi) in leather production

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Restrictions and control on the use of fatliquor especially the sulphited oil during leather production is required due to its effect on chromium change valence (from Cr(III) to Cr(VI)). Utilization of the other oil sources such as vegetable or mineral oil is worthed to be a substitute material. The aim of this study is to quantify the potential release of Cr(III) and Cr(VI) from different fatliquors and find the alternative fatliquor. The results showed that the use of 10 % mineral oil and sulphited oil affected the Cr total and formation Cr(VI) in the leather, while using 6 % condensed tannin (*Mimosa*) as antioxidant is effective in reduce the Cr total and Cr(VI) contents in the leather.

Keywords: chromium, fatliqour, leather, vegetable tanning agent

The effect of blending condition on mechanical properties of cellulose microfiber extraction from bagasse using a modified kitchen blender

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The extraction of microfibers from plant fibers can be obtained through specialized expensive equipment that demands high energy input but delivering low production yields, resulting in highly costly microfibers. This situation confines the use of cellulose microfibers to the laboratory and not for industrial applications. The goal of this study is to extract microfibers from sugarcane bagasse (SCB) by using a kitchen blender. Earlier studies have demonstrated that paper sheets made of blender-extracted microfibers after 10 min blending have mechanical properties modulus comparable with commercially available cellulose microfibers extracted by a high-pressure homogenizer. By reducing the volume of aqueous suspension, resulting in higher tensile modulus to those of sheets made from commercially available cellulose microfibers. The FTIR analysis demonstrated that the treatments resulted in the gradual removal of lignin and hemicelluloses from the fiber. Morphological characterisation identified that the diameter of the fibers varied between 20 nm to 12 μm . Finally, the high enough strength and comparable mechanical properties (modulus) of SCB microfibers to those of commercially cellulose microfibers, confirming their suitability in the manufacturing biomaterial composites.

Keywords: blender, cellulose microfiber, microfiber extraction, sugarcane bagasse

The influence of Cu dopant concentration on the optical properties of Fe₃O₄/SiO₂/TiO₂ nanocomposite

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Fe₃O₄/SiO₂/TiO₂ dopped Cu with magnetic properties had been succesfully syntesized and characterized. The research was began with the synthesis of magnetite and magnetite covered by silica by co-precipitation and sonication method, and the preparation of Cu-doped TiO₂ using sol-gel method followed by calcination. The concentrations of Cu were 0 %, 1 %, 3 %, 5 %, and 7 % (FST0, FST1, FST3, FST5, and FST7). The Fourier Transform Infra Red spectrophotometer (FTIR), X-Ray Diffractometer (XRD), Scanning Electron Microscope-Energy Dispersive X-ray spectrophotometer (SEM-EDX), UV-Specular Reflectance Spectrophotometer (SR-UV), and Transmission Electron Microscope (TEM) were used to characterize the nanocomposite and external magnetic bar was used to separate the nanocomposite in an aqueous media. The Cu concentration affected the band gap energy (Eg) and the optimum result was 2.832 eV in FST7. The best magnetic properties was material FST0. The time needed for separate this material with aqueous medium was 372 second.

Keywords: Cu dopant, Fe₃O₄/SiO₂/TiO₂, magnetic properties, nanocomposite, optical properties

Determination of risk of radioactive in chemical fertilizer using gamma ray spectrometry

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Fertilizer is one factor that is very influential in the success of agriculture. There are two types of fertilizer circulating in Indonesia today that is organic fertilizer and inorganic fertilizer (chemical). The used of chemical fertilizers allows the distribution of natural radionuclides into the environment. This study was conducted to determine the risk of radioactive index of chemical fertilizer in Indonesia using gamma ray spectrometry. There are 6 types of samples of fertilizers ie urea, ZA, KCL, NPK, TSP and Phosphate. Radioactive risk index value that is found in the overall sample of fertilizer is below the limit recommended by the ICRP.

Keywords: agriculture, chemical fertilizer, determination, gamma ray spectrometry, risk of radioactive

Study of glucose binding protein encapsulated gold nanoclusters by molecular dynamic simulation

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Protein encapsulated gold nanoclusters has attracted great attention for their excellent fluorescent properties and potential biomedical applications. Glucose Binding Protein (GBP) has a high sensitivity and selectivity to glucose binding that makes them ideal for biosensor development. It is anticipated that GBP encapsulated gold nanoclusters could be a promising glucose sensor. Here we investigated the growth of gold nanoclusters in GBP using Molecular Dynamics (MD) simulation. To facilitate the nucleation of gold nanoclusters at specific sites, cysteine mutations were introduced in GBP. It is found that nucleation site of gold nanoclusters inside mutant GBP are different from those in native GBP. Gold nanoclusters were formed near the mutated cysteine and tyrosine residues. Glucose remained in binding site of a mutant GBP with gold nanoclusters although no conformational change was observed in MD simulation, similar to a native GBP. This work suggests the possibility of growing gold nanoclusters in designed site within GBP and a new glucose sensor based on mutated GBP protected gold nanoclusters.

Keywords: biomedical applications, glucose binding protein, gold nanoclusters, molecular dynamic simulation, protein encapsulated

In silico approach in evaluation of Jack Bean (*Canavalia ensiformis*) canavalin protein as precursors of bioactive peptides with dual antioxidant and angiotensin i converting enzyme inhibitor

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Nowadays, there are many lifestyle disease which cause public health problems worldwide. These diseases include cardiovascular problems, as well as their major factors such as hypertension. Hypertension is one of noncommunicable disease in the world implies the importance of further study of antihypertensive peptides as one of alternative means for hypertension management. On the other hand, antioxidant is an important compound that also very important to contribute to human health. Jack bean is one of underutilized legume in Indonesia, although it contains high protein. Jack bean tempeh and fried jack bean are two common products using jack bean as a raw material in Indonesia. The protein in jack bean especially globular proteins such as concanavalin A, concanavalin B and canavalin can be hydrolyzed to several bioactive peptides that can be beneficial for human health. Several functional properties of bioactive peptides are correlated to reduce the potency of hypertension and also as antioxidant. So far, there is a limited investigation for using *in silico* approach for evaluating several potential proteins in jack bean as precursors of bioactive peptides. The purpose of this research is evaluating several proteins in jack bean as precursors of ACE inhibitory and antioxidant bioactive peptides using *in silico* approach, and thus to establish the rationale for choosing the appropriate substrates proteins in preparing ACE inhibitory and antioxidant peptides. Based on our pre-preliminary results, we can conclude that specific protein from jack bean e.g. canavalin has potency as precursors of ACE Inhibitory and antioxidant bioactive peptides using *in silico* analysis.

Keywords: ACE Inhibitor, antioxidant, bioactive peptides, enzyme, *in silico* analysis, jack bean

Ultrasound-assisted synthesis of some mono-carbonyl curcumin analogs and their synergistic effect with ferulic acid on α -amylase inhibition

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Some curcumin analogs from dimethylaminobenzaldehyde derivates were synthesized using a green method (ultrasound-assisted technique) compared with conventional method. The improvements were achieved by reduce time reaction from hour to minute and increasing the yields. The product were treated as an inhibitor for α - amylase activity. The highest α -amilase inhibiton of 3 compound of some mono-carbonyl curcumin analogs is 77.06 %, 76.59 %, and 78.34 % on line series curcumin analog A, B, and C with IC_{50} 23.64, 1.36, and 5.93 μ g/mL. Meanwhile the highest α -amylase inhibiton of combination curcumin C with ferulic acid is 95.94 % with IC_{50} 13.38 μ g/mL. The synergistic effect from curcumin analog A with ferulic acid with the value of combination index (CI) 0.33 can be a competitive inhibitor for α -amylase activity with 80.94% inhibition and IC_{50} 6.69 μ g/mL. It may be predicted that this curcumin analogs is a potent inhibitor of α -amylase and a candidate drug for treatment of diabetes and obesity.

Keywords: curcumin analogs, ultrasound, synergistic effect, ferulic acid, α -amylase

Antibacterial activity of TiO₂-Ag-nanoparticle under visible light

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A visible active antibacterial agent, namely TiO₂-Ag-Nanoparticle has been prepared, characterized, and examined to combat *E. coli* bacteria in the present of the visible light. The preparation was carried out by reduction of AgNO₃ solution over TiO₂ photocatalyst under UV light exposure. The TiO₂-Ag prepared was characterized by means of XRD, SEM and DRS instruments. The activity as antibacterial agent has been tested for disinfection of *E. coli* bacteria in the contaminated well water. The antibacterial assay was carried out by visible light irradiation of the contaminated well water in the present of TiO₂-Ag, as well as TiO₂ for comparison, for various period of time. The antibacterial performance was represented as the number of the bacteria determined by Most Probable Number (MPN) method. Their XRD patterns probe that the Ag doping leads to the crystalline of TiO₂ partially destroyed and the average particle size of TiO₂ in TiO₂-Ag is larger than TiO₂ bare, and no peaks of Ag metal appeared, implying that the Ag silver is very small or nanoparticle that may be inserted into the TiO₂ crystal lattice. Based on the DRS spectra it is observed that TiO₂-Ag has visible light absorption meanwhile TiO₂ only can absorb the UV light. The antibacterial assessment demonstrates that the TiO₂-Ag has high performance in the bacterial inactivation under visible light, meanwhile very low activity is shown by TiO₂. Moreover, the increase of Ag loaded gives a rise in the bacterial inactivation but further increase leads to the inactivation slightly reduced. The extension time of the visible light exposure is found to promote more effective antibacterial process up to maximum level, and no effect was observed with the much longer time.

Keywords: antibacterial, contaminated water, *E. coli*, TiO₂-Ag, visible light

Rapid diagnostic test of red sea bream iridoviral disease (RSIVD) in grouper *Epinephelus Sp.* based on serological co-agglutination and molecular study

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Red sea bream iridoviral disease (RSIVD) infection is known as a contagious disease in the marine aquaculture commodities mainly on grouper (*Epinephelus sp.*) cause a highly mortality rate. Symptoms of disease were weak, darker skin and swollen spleen of fish. Aim of study was to create and apply a rapid diagnostic test and supported by a molecular analysis. Field trials on a mass mortality outbreaks was identified in the city of Tanjungpinang, Indonesia. Serum anti RSIV was obtained by immunizing of the vaccine RSIV intraperitoneally with graded doses per week was 0.5 ml, 1 ml, 2 ml and 3 ml, to boost antibody titers. In the fifth week, serum was harvested via the auricular vein, serum was purified to obtain immunoglobulin G (IgG) then was coupling with protein A of *Staphylococcus aureus* at the same volume (kit co-agglutination RSIVD). Field samples of spleen were taken from the normal fish and suspected fish then crushed and suspended with PBS pH 7.2, and centrifuged at 8.000 rpm for 15 minutes. Fifty microliter of kit co-agglutination RSIVD and 50 μ l of spleen supernatant were reacted on the sterile glass object. The results showed sandy agglutination after 10 minutes for positive infected spleen, and no agglutination in the samples of healthy fish (negative) as well as in control with PBS (negative). Confirmation testing by polymerase chain reaction (PCR) using primer forward 1-F (5'-CTC-AAA-CAC-TCT-GGC-TCA-TC-3') and reverse 1-R (5'-GCA-CCA-ACA-CAT-CTC-CTA-TC-3') had 570 bp of band. Sequencing results showed the similarity of 99 % identity with RSIV. Testing with kit co-agglutination RSIVD had the advantages such as cheap, fast and an accurate in diagnosing the disease red bream iridoviral (RSIVD).

Keywords: co-agglutination, grouper, PCR, RSIVD, sequencing

Preparation of Cr metal supported on sulfated zirconia catalyst

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Catalyst of Chromium (Cr) metal supported on sulfated zirconia (SZ) was prepared by wet impregnation method. This study aim to determine the optimal concentration of Cr metal that impregnated on SZ catalyst. Preparation of catalyst was conducted at different concentrations of Cr metal (0.5 %, 1%, 1.5 % (w/w)), impregnated on SZ catalyst, then followed by the calcination and reduction process. Catalysts were characterized by FTIR, XRD, XRF, SAA, TEM, and acidity test. The results showed the Cr/SZ 1 % had the highest acidity value of 8.22 mmol/g which confirmed from FTIR spectra. All the crystal phase of these catalysts were in monoclinic. The specific surface area increased with the increasing of Cr metal concentration on SZ catalyst and the isotherm adsorption-desorption of N₂ gas observed all the catalysts as mesoporous material. The impregnation process formed particles agglomeration.

Keywords: catalyst, chromium, concentrations, metal, sulfated zirconia

Synthesis and biological evaluation of chalcone derivatives as antioxidant and sunscreen agents

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Three series of chalcone have been synthesized by ultrasonic method. The Chalcone derivatives obtained were elucidated with FTIR, GCMS, 1H and 13C NMR. MS data showed the molecular ion of the three chalcones as calculated. The purity of three chalcones have been obtained as 97 %, 100 %, and 98 % for chalcone 1, chalcone 2, and chalcone 3. the three chalcones have been screened for antioxidant activity using DPPH scavenging method and sunscreen agent using spectrophotometry method. Chalcone 1 showed good free radical scavenging test with IC₅₀ 25.5 µg/mL. The result indicated that chalcone 1 could be the potential candidate as antioxidant activity. Chalcone 3 showed as the highest SPF with value 22.29. The chalcone 3 could be the candidate as sunscreen agent.

Keywords: antioxidant test, chalcone, DPPH, sun screen agent, ultrasonic method

Synthesis and heme polymerization inhibitory activity (HPIA) assay of chalcone, flavone and flavanone derivatives

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The compound of chalcone, flavone and flavanone had been synthesized as candidate of antimalarial compound. Synthesis of chalcone 1 was conducted from the 2,4-dihydroxyacetophenone and 4-methoxybenzaldehyde as starting material using base catalyst KOH via Claisen-Schmidt Condensation. The synthesis flavone 2 was carried out by cyclization 1 using I₂ in DMSO. The synthesis flavanone 3 was conducted by cyclization 1 using NaOAc as a base catalyst. An in vitro antimalarial activity of the compound 1, 2 and 3 have evaluated with the chloroquine diphosphate as a positive control in various concentration and their antimalarial activity assay were carried out according to the Basilico method. The IC₅₀ value of compound 1, 2, 3 and a positive control were 0.25; 0.62; 1.33 and 0.35 mM. Respectively, the compound 1 showed as the IC₅₀ value with highly potential.

Keywords: chalcone, flavanone, flavone, HPIA assay, synthesis

Synthesis and activity test of coumarin-chalcone derivative as a colorimetric sensor for chicken spoilage indicator

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Chemosensor of coumarin-chalcone (**2**) derivative has been synthesized and tested for chicken spoilage indicator. The compound (**2**) was synthesized from reaction of 3-acetyl-2H-chromen-one (**1**) and vanillin with reflux and ultrasonic irradiation methods. The compound (**2**) exhibited quick and obvious color in sensor label for amines from yellow to dark yellow. Application to detect spoiled chicken showed that color of compound (**2**) changed at 12 h and 6 d in room and chiller temperature respectively. Thus, compound (**2**) can be used efficiently for decayed chicken detection.

Keyword: amine, chicken, sensor label, spoilage coumarin-chalcone, ultrasound

Characterization of hydrothermal liquid product of red Meranti (*Shorea leprosula Miq.*) sawdust for wood preservative

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In this research, Red Meranti sawdust and water were mixed in a hydrothermal reactor equipped with thermometer and pressure indicator. Experiments were conducted at variation of temperature of 200, 240 and 300 °C; water to biomass ratio 1:10. The mixture was heated to the target temperature at an initial pressure of 1.0 MPa and then held for 30 min. After separated the liquid product was applied for Sengon wood preservatives. Hence, the Sengon wood was tested for absorption, retention, weight loss, and termite mortality. Based on experimental results, the liquid product at temperature of 270 °C generated the highest absorption, retention and termite mortality, that was $98.3291 \text{ kg} \cdot \text{m}^{-3}$, $10.8479 \text{ kg} \cdot \text{m}^{-3}$ and 72.67 % respectively. Analysis on the liquid product by GC-MS indicated that phenol compounds and organic acids is able to control microbial growth and preserve wood.

Keywords: hydrothermal, Red Meranti, sawdust, subcritical, wood preservative

Slow release NPK fertilizer preparation from natural resources

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Preparation of Natural multi-nutrient Slow Release Fertilizer (NSRF) aims to reduce environmental burden from several waste and increase the efficiency of fertilizer in releasing nutrient content. In this study, slow release fertilizer was prepared from all natural components from waste which are dried chicken manure (N source), struvite (P source), and palm empty fruit bunch ash (K source). The equal weight of the three main nutrient sources was used with the addition of starch powder as the binder by 10 %, 15 % and 20 % of the total nutrient mixture. The mixture of all nutrient with binder was granulated using pan granulator. Dried NSRF granule was tested using sand bed release method to observe the release profile of the contained nutrient. Based on the results of a 30-day leaching study, it was found that increasing concentration of binder will reduce the release of the nutrient from NSRF granules.

Keywords: empty fruit bunch ash, NPK, NSRF, slow release fertilizer, struvite

Application of coal bottom ash zeolite on lignin and methylene blue adsorption

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The amount of coal combustion byproducts, such as fly ash and bottom ash, generated by coal-based thermal power plants has been increasing at an alarming rate, hence creating huge problems on their treatments and disposals. One of the promising approaches for proper utilization of these byproducts is the conversion of fly ash and bottom ash to zeolites. In this research, zeolites was prepared from coal bottom ash (RBA) by relatively simple and cheap conversion process using NaOH at 90 °C for 24 h. Prior to this, the RBA was pretreated using H₂SO₄ for 4 h. The resulted zeolite was characterized using X-ray diffraction (XRD), X-ray fluorescence (XRF), Fourier transform infrared spectroscopy (FTIR), and scanning electron microscopy (SEM). XRD results confirmed the formation of sodium aluminosilicate hydrate predominated upon the bottom ash and NaOH 5M ratio of 1:8. XRF results also indicated the domination of Al₂O₃ and SiO₂ in the zeolite composition. FTIR spectra showed characteristic zeolite peaks at 900-1100 cm⁻¹, 400-500 cm⁻¹ and 550-660 cm⁻¹ for Si-O, Al-O, and Si-O-Al absorptions, respectively. The synthetic zeolite was then applied as adsorbent for lignin and methylene blue in aqueous solutions. It was found that the Qmax for lignin and methylene blue were 16.13 mg · g⁻¹ and 34.13 mg · g⁻¹, respectively. When fitted using Langmuir and Freundlich isotherm models, the methylene blue adsorption data fitted Langmuir isotherm while those of lignin fitted Freundlich isotherm. It was concluded that the chemical interaction between zeolite and methylene blue may lead to the chemisorption mechanism to prevail.

Keywords: adsorption, coal bottom ash, lignin, methylene blue, zeolite

Chemical synthesis of monosaccharide fatty acid esters as antibacterial and antifungal agents

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Synthesis of glucose laurate (GLC12), fructose laurate (FRU12), and galactose laurate (GAL12) as antibacterial and antifungal agents have been carried out. The synthesis of GLC12, FRU12, and GAL12 was done by reacting lauroyl chloride with glucose, fructose, and galactose respectively in the presence of pyridine at 90-95 °C in 40 minutes. The products were identified by FTIR and GC-MS for lauroyl chloride, FTIR, GC-MS, ¹H-NMR and ¹³C-NMR for GLC12, FRU12, and GAL12. Antibacterial and antifungal activity test was done at GLC12, FRU12 and GAL12 using the well diffusion method towards Gram-positive bacteria (*S. thypimurium* and *E. coli*), Gram-negative bacteria (*S. aureus* and *B. subtilis*), *Candida albicans* fungus, DMSO as a negative control, and 4-isopropyl-3-methylphenol 1 % as a positive control. The result showed that lauroyl chloride, GLC12, FRU12, and GAL12 were successfully synthesized in 95.37 ; 55.19; 85.54; and 82.78 % yields, respectively. The results of activity test showed that GLC12 was active as antibacterial and antifungal compound against Gram-positive bacteria and *Candida albicans* fungus. FRU12 and GAL12 showed antibacterial and antifungal activity to all tested bacteria (Gram-positive and Gram-negative) and fungus. The highest activity was shown at concentration of 12.5 % for all bacteria and fungus.

Keywords: antibacterial, antifungal, carbohydrate esters, chemical synthesis, monosaccharide fatty acid esters

Extraction of condensed tannins from tropical plants as affected by leaves maturity, maceration time, and centrifugal force

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Condensed Tannin (CT) are secondary metabolites of plant that synthesized along the phenylpropanoid pathway. It is known to suppress CH₄ emission in the rumen through protozoal defaunation as well as direct effects on methanogen bacteria. Recent studies have been reported to have anthelmintics activity to overcome gastrointestinal nematodes, appertain to the *Haemonchus contortus*. To obtain merits of CT, its can be applied in flour or infusion form. Infusion considered as a convenient alternative of CT application. Evaluation method to produce optimum levels of CT need to be done in order for the merits of CT obtained optimally. The aim of this study was to evaluate the effect of leaf maturity, maceration time, and centrifuge force on CT levels produced in infusion leaf as feed additive. Mature and immature leaves selected from *Morinda citrifolia* (CF), *Muntingia calabura* (CA), *Azadirachta indica* (AZ), *Hibiscus rosa-sinensis* (RS) and *Hibiscus tiliaceus* (HT). The results of this research showed that leaf age had significant effect on CT, except on AZ and RS. Normally, CT content of immature leaf is higher than mature leaf. CA has highest levels of CT, can be predicted because lots of glandular trichomes in their mature leaves as a place to store secondary metabolite compounds. Optimum levels of CT from maceration occurring at 2 h of immersion except on HT that requiring 4 h of immersion. Meanwhile, 372 g is the most effective centrifuge force in producing optimum CT, except in CA which requires 2.318 g. Based on this study, it can be concluded that leaf age, maceration time, and centrifuge force have a significant influence in producing infusion with maximum CT at each stage of extraction. It is important for infusion production to be expected contain CT in optimal amounts. This research is expected to be the first step in providing multifunctional feed additive for livestock.

Keywords: centrifugal force, condensed tannin, leave maturity, maceration time, tropical plants,

Analysis of Dexamethasone in "Jamu" Indonesian traditional Medicine using ^1H NMR-Based metabolomics

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Traditional medicine is a blend of natural ingredients such as botanicals, animal, mineral, extract or Galenic that used to maintain good health and to treat disease. *Jamu* is the Indonesian traditional herbal medicines. *Jamu* is commonly found mixed with active pharmaceutical ingredients such as Dexamethasone to get more benefit. ^1H NMR based metabolomics appears as the sophisticated method to detect dexamethasone in traditional herbal medicine. Extraction was done using ultrasonicator and methanol-*d*4 as the solvent which contained TMSP 0.01% as internal standard. ^1H NMR spectroscopy analysis of supernatant was applied to compare the metabolism profiles. Spectra of analysis showed the herbal medicine spectra did not contain Dexamethasone indicated by no signal of Dexamethasone observed. The ^1H NMR spectra was binned to perform multivariate analysis, i.e. principal component analysis and partial least squares discriminant analysis. Results proved that traditional herbal medicine and Dexamethasone were clearly separated, indicating sample did not contain active pharmaceutical ingredients (Dexamethasone). It can be concluded that ^1H NMR metabolomics and multivariate analysis was an adequate method to detect active pharmaceutical ingredients in traditional herbal medicines.

Keywords: Active pharmaceutical ingredients, Dexamethasone, Jamu, Metabolomics, ^1H NMR Spectroscopy, Multivariate Analysis

Influence of calcium/silica ratio on the formation belite cement clinker from geothermal sludges

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Cement industry is seeking alternative raw material and process to reduce the energy consumption and environmental impacts from conventional cement manufacture. This paper describes process of belite cements synthesis. Geothermal sludges, an undesired waste from Dieng Geothermal Power Plant as amorphous silica source and calcium hydroxide were used to form belite cement at elevated temperatures. Experimental results showed that principal phase of belite cement (larnite or $\beta\text{-Ca}_2\text{SiO}_4$) was formed at temperature as low as 800 °C. Thus, the geothermal silica is shown to be very promising starting material for the low-temperature production of belite cement.

Keywords: belite, Ca/Si ratio, cement, geothermal sludges, silica

An interplay role between ammonium and halide anions as additives in perovskite $\text{CH}_3\text{NH}_3\text{PbI}_3$

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Methylammonium lead trihalide perovskites have emerged as attractive materials for solar cell applications. The major eminence of this materials can be crystallized via various solution methods to produce the solid state of thin films. However, the crystallinity of perovskite depend on the composition of perovskites. Here, we study NH_4Cl and NH_4Br as precursor additives for improving crystallinity of perovskites. Perovskite was synthesized by mixing precursor solutions of $\text{CH}_3\text{NH}_3\text{I}$ and $\text{Pb}(\text{Ac})_2$ with or without additives NH_4Cl and NH_4Br using the one-step spin-coating method. By characterizing the thin films using XRD, SEM and UV-Vis spectrophotometer, we found anion Cl and Br performed an important role toward crystallinity, morphology, and optical absorption of perovskites, respectively. Meanwhile, ammonium has assisted to facile remove the residual DMSO solvent confirmed by FTIR. These results shed light on using ammonium halides as potentially dual side additives in synthesis of perovskites.

Keywords: additives, ammonium bromide, ammonium chloride, interplay role, perovskite

A DFT study on the corrosion inhibition performance of dibenzo-diaza-15-crown-5 and its heterocyclic analogs

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The corrosion inhibition efficiency of the dibenzo-diaza-15-crown-5 and its heterocyclic analogs containing O, N, S, P atoms were investigated by density functional calculation at B3LYP/6-311G(d,p) level of theory. The corrosion inhibition efficiency of the studied crown ethers were evaluated using the quantum chemical parameters such as the frontier orbital energies (E_{HOMO} , E_{LUMO}), ionization potential (I), electron affinity (A), the absolute electronegativity (χ), hardness (η), softness (σ), the fraction of electron transferred (ΔN), the initial molecule–metal interaction energy ($\Delta\Psi^0$), binding energy (ΔE), and the second order interaction energy (E^2). The calculation results indicated that sulfur (S) heteroatom exhibited the highest corrosion inhibition performance, whereas phosphorus (P), nitrogen (N) and oxygen (O) offered lower inhibition performance. The results of this study will contribute to design crown ethers potential as corrosion inhibitors.

Keywords: corrosion inhibition, crown ether, DFT method, heteroatom, performance

Synthesis, characterization and anticancer activity of N-Acetyl pyrazolines from veratraldehyde

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N-acetyl pyrazoline derivatives **A-B** containing methoxy and chloro/hydroxyl substituent were synthesized and evaluated for their anticancer activities. The precursor chalcones **A-B** which were obtained from condensation reaction between veratraldehyde and acetophenone derivatives were reacted with hydrazine hydrate in the presence of glacial acetic acid to give pyrazolines **A-B** with excellent yield and purity. All the synthesized compounds were characterized using GC-MS, FTIR and NMR spectrometers. Cytotoxicity evaluation of pyrazolines revealed that pyrazoline **A** has moderate activity against breast cancer cell line MCF7 (IC_{50} 40.47 μ g/mL) and T47D (IC_{50} 26.51 μ g/mL) and cervical cancer cell line HeLa (IC_{50} 31.19 μ g/mL), while pyrazoline **B** is inactive against all tested cancer lines ($IC_{50} > 100$ μ g/mL). Thus, the presence of chloro substituent on N-acetyl pyrazoline **A** is preferable to increase anticancer activity.

Keywords: anticancer, chalcone, N-acetyl pyrazoline, synthesis, veratraldehyde

The opportunities of oil palm fronds to become a commercial liquid smoke

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The purpose of this study is to review the diversification process of oil palm fronds into commercial liquid smoke products. The pyrolysis process of oil palm fronds at 250 °C for 2 hours was performed to produce crude liquid smoke and followed distillation process at 125 °C, 150 °C, 175 °C and 200 °C for 15, 30, 45, and 60 min to separate tar as a contributor dark color in liquid smoke. By titration, the results were respectively 5.15 % of acetic acid and pH = 2.3 as distilled liquid smoke and accordance with FAO standard. The composition of organic acid, carbonyl and phenolic compounds respectively were 45.46, 23.08, 29.60 percentages in distilled liquid smoke and classified as refined liquid smoke. These results indicated that liquid smoke generated from oil palm fronds has a good prospect as a commercial product and suitable for food preservative in the further study based on chemical characteristics.

Keywords: chemical characteristics, commercial liquid smoke, distilled liquid smoke, oil palm frond, refined liquid smoke

Synthesis of dehydrozingerol and the activity test as fruit flies attractant

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Synthesis of dehydrozingerol (4-(4-hydroxy, 3-methoxy-phenyl)-3-butene-2-ol) has been done. First step in dehydrozingerone (4-(4-hydroxy, 3-methoxy-phenyl)-3-butene-2-one) synthesis was crossed aldol condensation between vanillin and acetone with 1:5 mol ratio, for 5 hours with good yield (96%). And dehydrozingerol has been synthesized by hydrogenation reaction of dehydrozingerone (4-(4-hydroxy, 3-methoxy-phenyl)-3-butene-2-ol) with NaBH₄ in wet THF solvent in mild condition.

Keywords: (E)-coniferyl alcohol, dehydrozingerol, fruit flies attractant test, NaBH₄, synthesis

Quantitative structure-activity relationship (QSAR) analysis of 3-substituted 4-anilino coumarin derivatives as anti-tumor

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Study on anti-hepatoma and anti-coloncancer activity of 3-substituted 4-anilino coumarin derivatives by using quantitative structure-activity relationship (QSAR) has been done. The structures and the activities data were reffered from Luo et al. Experiment [1]. The molecular and electronic molecule properties were obtained from DFT/BPV86 6-31G basis set calculation method. The QSAR analysis were shown by Multi Linear Regression (MLR). The best models obtained are, Anti-colon cancer activity: $\text{Log IC}_{50} = 0.767 + (-1.768 \times qC15) + (2.182 \times qC17) + (0.208 \times \log P)$ n = 23; $r^2_{\text{train}} = 0.778$; $r^2_{\text{test}} = 0.8307$ $r^2_{\text{overall}} = 0.7559$; $F_{\text{cal}}/F_{\text{tab}} = 4.890$; SEE = 0.193 Anti-hepatoma activity: $\text{Log IC}_{50} = 0.34 + (0.717 \times qC2) + (1.012 \times qC17) + (4.961 \times qC18) + (0.385 \times \log P)$ n = 27; $r^2_{\text{train}} = 0.747$; $r^2_{\text{test}} = 0.8223$ $r^2_{\text{overall}} = 0.6922 F_{\text{cal}}/F_{\text{tab}} = 4.249$; SEE = 0.197. The models were used to calculate the inhibitory activities of anti-coloncancer and anti-hepatoma of 17 newly designed 3-substituted 4-anilino coumarin derivatives and resulted compound 4-[(3-nitro-5-phosphanylphenyl)amino]-2-oxo-3-(3H-1,2,4-triazol-3-yl)-2H-chromene-6-carboxamide and 3-{{[6-(formylamino)-2-oxo-3-(1H-tetrazol-5-yl)-2H-chromen-4-yl]amino}benzamide had much better anti-coloncancer and anti-hepatoma activity, respectively, rather than the synthesized derivatives.

Keywords: anti-cancer, coumarin, derivatives, MLR, QSAR

Effect of silver concentration towards formation of AgPt nanofern films as SERS substrates

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This paper reports the preparation of silver-platinum (AgPt) nanoferns on ITO surface using liquid phase deposition technique with various concentrations of silver nitrate in synthesis solution. The different morphologies of AgPt thin films were grown on the surface using 0.1 mM to 0.8 mM of silver concentration. This silver effect on the growth of AgPt on the surface was studied using FESEM and UV-Vis characterization. It was found that the optimum silver concentration in synthesis solution supplied the appropriate Ag⁺ ion to grow the nanoferns structure on the surface. AgPt films were then carried out to sense 1.0 M of creatinine concentration to learn their performance as surface-enhanced Raman scattering (SERS) substrate. The sensitivity of SERS substrate towards creatinine detection was studied by observing the change of Raman spectra of the creatinine on ITO surface and creatinine on AgPt films surface.

Keywords: AgPt nanofern, concentration, creatinine, SERS substrate, silver

Degradation of mechanically surface treated AZ31B magnesium alloy in 3.5 wt.% NaCl solution

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Surface mechanical attrition treatment (SMAT) has so far been used as a technique for improving mechanical and tribological properties of magnesium and its alloys. However, the effects of the SMAT on corrosion and degradability of these materials are still rarely reported in open literature. In this research, the degradation behavior of AZ31B magnesium alloy after receiving the SMAT was characterized. The degradation behavior of the Mg alloy was determined from the weight losses after an immersion test for 24 h in 3.5 wt.% NaCl solution. During the test, the pH of the solution was also monitored. The results obviously showed higher corrosion rates of the Mg alloy that had been treated by using the SMAT. Interestingly, the degradation rate of the Mg alloy decreased once a longer duration of SMAT was applied. Meanwhile, the pH of NaCl solution increased up to 12 and 13.9 once the non-treated and the SMAT specimens were immersed into the solution, respectively. In addition, the energy dispersive X-ray spectroscopy (EDS) analysis confirmed the presence of corrosion products in all the Mg samples that were similar to those revealed in the literature.

Keywords: AZ31B magnesium alloy, degradation, EDSNaCl solution, SMAT

The role of reduced graphene oxide concentration as ablated material on optical properties of graphene quantum dots

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We report the synthesize of Graphene Quantum Dots (GQDs) using ablation method with reduced Graphene Oxide (rGO) solution as a starting material. We have varied the concentration of rGO as following: 0.5, 2, 5 mg/ml and then have ablated them using 800 nm Ti-Sapphire femtosecond laser to obtain GQDs. From the UV-Vis data, we observed that the more concentration of rGO is being ablated, the more secondary absorption peak at 255.1 nm appeared. This secondary absorption peak is a characteristic of n-π* bonding due to the presence of oxygen defect which occurs as a result of the interaction between the laser and the water in rGO solution. We conclude that the population of oxigen defect in GQDs is increasing, following the increase of rGO concentration and could alter the optical properties of GQD. On the other hand, using Tauc's plot, we confirm that the increase of rGO concentration as the ablated material does not alter GQDs optical band gap. However, it will slightly reduce both, direct and indirect Oxygen defect related optical band gap.

Keywords: laser ablation, optical properties, quantum dots, reduced graphene oxide, Ti-Sapphire femtosecond laser,

The characterization of stucture and chemical composition of semiconductor material Sn (Se_{0.8} Te_{0.2}) prepared by bridgman technique for solar cell

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This study aims determine the characterization of structure and chemical composition of crystal Sn(Se_{0.8} Te_{0.2}). The growth of crystal Sn(Se_{0.8} Te_{0.2}) is obtained by preparation outcome through Bridgman Technique. Hence, characterized by using XRD (X-Ray Diffraction) for to determine the crystal structure, SEM (Scanning Electron Microscopy) to determine the surface morphology, and EDAX (Energy Dispersive Analysis of X-ray) to determine the chemical composition. The four samples are characterized results indicate that crystal Sn(Se_{0.8} Te_{0.2}) has orthorhombic structure with the results of the samples I and III have the highest intensity. SEM characterization result for sample I and III indicate that the formation of crystalline Sn(Se_{0.8} Te_{0.2}) is characterized by the presence of grains. Based on the results of EDAX, it is known that the crystal Sn (Se_{0.8} Te_{0.2}) contains elements of Sn, Se, and Te with a percentage of the chemical composition of the sample I is Sn = 39.85 %, Se = 36.09 %, and Te = 2,57 %. Comparison the molarity of the sample I is Sn: Se: Te is 1: 0.90: 0.10.

Keywords: bridgman technique, crystal Sn(Se_{0.8} Te_{0.2}), EDAX, SEM, semiconductor, XDR

Fabrication of copper nanowire coated by silver nanocrystal for protection of oxidation transparent conductive electrode

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Silver is relatively low-abundance in nature and copper have characteristic instability to oxidation. The most potential candidate should combine high performance with abundance in nature and good stability. In this article, we demonstrated a material with silver nanocrystal coating on to CuNWs by facile galvanic replacement. The analysis of scanning electron microscope, X-ray diffraction, energy dispersive X-ray, and mapping were used for investigating that silver nanocrystal has coated on the CuNWs. This research also studied how the effect of Ag nanocrystal coating to the stability of TCEs CuAgNWs by IV-meter analysis.

Keywords: CuAgNWs, Conducive transparent, Cu nanowires, conductivity, fabrication

A Comparison of sodium lignosulfonate (SLS) synthesis from black liquor lignin and commercial lignin

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Sulphonation of lignin has been considered as a promising step to produce lignosulfonate which may serve as dispersant, flocculant, and surfactant. The aim of present study was to compare the synthesis of sodium lignosulfonate (SLS) from different lignin feedstocks namely commercial lignin and lignin isolated from black liquor (BL) of pulp and paper industry. A novel technique to isolate lignin from BL was introduced with the aid of CO₂ and coagulant of alumunium sulfate. The FTIR spectra of BL lignin showed similarity with commercial lignin which indicates that the isolation of BL lignin with the present technique did not alter the chemical structure of lignin. Furthermore, sulphonation of commercial and BL lignin with NaHSO₃ solution has been conducted to obtain SLS powder. In general, the FTIR spectra of SLS from commercial and BL lignin were similar to their parent lignin. However, absorption peak which corresponds to SO₃ vibration was lightly detected on both samples which indicated the insertion of SO₃ functional group into the lignin structure. The ability of SLS to increase the oil mobility for Enhanced Oil Recovery (EOR) was measured from the interfacial tension (IFT). Our results showed that the IFT values of SLS solution from commercial lignin and BL lignin were 0.3759 mN/m and 0.2675 mN/m, respectively. Further formulation of SLS from BL lignin with octanol and PFAD solution may lower the IFT value to 0.0186 mN/m.

Keywords: black liquor, FTIR, IFT, lignin, sodium lignosulfonate, surfactant

Chitosan-Pectin-Stearic acid film for controlled-release of curcumin

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The release of curcumin from chitosan-pectin-stearic acid films was studied in the variation of the pH of the buffer solutions, the addition of ethanol in the buffer solution, the amount of loaded curcumin, the amount of stearic acids in the films. The chitosan-pectin films were prepared by adding the 1 % acetic acid solution of chitosan into the 1 % pectin aqueous solution, then isopropanol solution of stearic acid. The films were characterized using FT-IR spectrophotometer. The study of curcumin release was performed by soaking the film in buffer-ethanol solutions for 6 hours and measuring the released curcumin by UV-Vis spectrophotometer. The kinetics of releasing curcumin was analyzed using Korsmeyer-Peppas equations. The result showed that the releasing of curcumin was influenced by the amount of loaded curcumin, the amount of stearic acid in the film and buffer pH of the solution. The optimum releasing rate at buffer pH 7 in 40 % ethanol solution was obtained when the amount of curcumin loaded and stearic acid were c.a. 55.5 and 136.4 mg/g film, respectively, which the curcumin release achieved 66.04 %. Releasing kinetics of the curcumin followed a Korsmeyer-Peppas model with a rate constant (k) of 7.5270 and n of 0.378. The curcumin release mechanism was mainly based on diffusion mechanism.

Keywords: chitosan, curcumin release, FT-IR spectrophotometer, pectin, stearic acid

Macro and micronutrients profile of five locally black rice cultivars in indonesia (*Oryza sativa* L.)

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Five black rice cultivars have been determined for its macronutrients and micronutrients. The nutrients composition is important information to support the development of black rice as functional foods. This study aimed to measure the content of total carbohydrates, proteins, and lipid; and the amounts of vitamins tocopherol and β -carotene and mineral Ca, Fe, and Zn of whole rice, refined rice, and rice bran. The samples were obtained from farmer who planted the black rice cultivars of Wajo Laka, Toraja, Cempo Ireng 'Seyegan', Melik 'Bantul' and Wedomartani. Micro-Kjeldahl, soxhletation and spectrophotometric methods were performed to measure the contents of macronutrient and micronutrient respectively. All quantitative data was analysed statistically by using Two Way Anova ($p<0.05$) with SPSS-23 program. Results showed that carbohydrate, protein, and lipid contents in five rice cultivars were varied in the range of 61.80–65.58 %, 7.13–9.10 % and 1.98–3.23 %, respectively. The carbohydrate content was found in refined rice which varies in range 62.71–67.89 %, while protein and lipid content in rice bran vary in the range 10.95–11.48 % and 5.70–6.86 %. The highest mineral content of Ca, Fe, and Zn were found in rice bran is 30 $\mu\text{g/g}$. The content of tocopherol and β -carotene of five local black rice varying sequentially of 0.651–1.618 % and 4.98–14.64 $\mu\text{g/g}$. Therefore, the macronutrients and micronutrients contents vary among the five black rice cultivars. The highest carbohydrate content was found in refined rice while protein, lipid, minerals (Ca, Fe, and Zn) and the highest micronutrients tocopherol and β -carotene contents is in the rice bran components.

Keywords: black rice, functional food, macronutrient, micronutrient, mineral

Rapid synthesis of MCM-41 from rice husk using ultrasonic wave: Optimation of sonication time

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Ultrasound waves with 48 KHz of frequency were applied for the synthesis of MCM-41 using rice husk as the silica source. The effect of sonication time (30, 60, 90, 120, 150, 180, and 210 min) on the crystallinity of calcined MCM-41 was investigated. Characterization using XRD and FTIR indicated that the ordered structure of MCM-41 could be synthesized by ultrasonic wave. Sonication time at 150 min was found to be the optimum condition. The nitrogen adsorption-desorption isotherms informed that the mesoporous material produced at the optimum condition has $794.73 \text{ m}^2 \cdot \text{g}^{-1}$ of surface area, 3.02 nm of BJH pore diameter, 1.17 nm of wall thickness, and $0.68 \text{ ml} \cdot \text{g}^{-1}$ of pore volume. While based on the TEM image, the material has hexagonal or a honey-comb structure.

Keywords: MCM-41, rice husk, sonication time, synthesis, ultrasound waves

Synthesis of curcumin analogs under ultrasound irradiation for inhibiting α -amylase

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The α -amylase is one of the essential enzymes that is responsible for hydrolyzing polysaccharides and oligosaccharides into monosaccharides. The amount of glucose in the blood stream may cause severe health problems such as obesity and diabetes. The level of glucose in the blood can be lessened by inhibiting the activity of α -amylase in hydrolyzing complex carbohydrate into reducing sugar. Curcumin has biological properties because of its special characteristic of structure. Mono-ketone analogs curcumin show a better pharmacokinetics than curcumin itself. Curcumin analogs **1** and **2** were synthesized under ultrasound irradiation at room temperature for 15 to 30 min and the yield of each analogs is 82.40 % and 77.52 %. Analog curcumin **1** and **2** were tested the inhibitory activity towards α -amylase enzyme with quercetine as a positive control. The inhibitory activity of α -amylase is determined by measuring the descent of iodine-starch complex. Quercetine gives 101 % inhibition activity at concentration 0.5 mg/mL whereas analog **1** shows an inhibition activity 116 % at concentration 0.25 mg/mL and analog **2** gives 74 % inhibition activity at concentration 0.5 mg/mL. Hence analog **1** has a potential as an inhibitory agent of α -amylase which performs a better activity than quercetine.

Keywords: curcumin, irradiation, synthesis, ultrasound, α -amylase,

Effects of fiber contents on wear resistance of *Salacca zalacca* frond fiber reinforced phenolic

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In the last decades, natural fiber composites have received much attention as important structural materials for lightweight components in automotive, and space industries because of low density, high specific strength, and environment friendly materials. Some natural fibers, however, still not applied in more useful structure, one of which is the frond fiber of snake fruit (*salacca zalacca*). This fiber is usually just burned or fired as the agricultural waste. The present paper presents the result of development of frond salacca fiber as the wear component of natural fiber reinforced phenolic. In this composite, the fiber and the phenolic are in the form of powder. The variation of fiber volume fraction was used as the main factor in the tribology characteristics of the composite. The specific wear and also the hardness are then compared to that of the existed commercially available motor bike brake pad as comparison.

Keywords: composite, phenolic, powder form, salacca zalacca fiber, wear resistance

Enhancement of EAPR system using aeration process on the removal of heavy metal (Cu and Fe) in the wastewater and up-take by vetiver grass (*Vetiveria zizanioides* L.)

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This study was aimed to determine the effect of electro-assisted and oxygen injection system to improve the effectiveness of the copper and iron removal in wastewater by phytoremediation system. The electro-assisted phytoremediation (EAPR) system was run with Vetiver grass (*Vetiveria zizanioides* L) as accumulator plant and 2 V of constant DC power supply using 2D cathode-pot electrode and air diffuser configuration on the aeration by air flow rate of 10 L/min. The effectiveness of phytoremediation, phyto-aeration and phytoremediation on the wastewater treatment was compared and evaluated by measuring the decreasing of heavy metal concentration in the wastewater and accumulated in plant. Plant stress was monitored by the observation of phytomorphology changed and measurement chlorophyll content using UV-Vis Spectroscopy after the acetone extraction and heavy metal concentration was measured by Flame-Atomic Absorption Spectroscopy (Flame-AAS). The results showed that the decreasing of Cu and Fe concentration in the wastewater as much as 86.5 % and 99.3 %, higher than that phyto-aeration (82.35 % and 99.20 %) and phytoremediation (15.0 % and 56.0 %). The uptake profiles of heavy metal by plant indicated the enhancement ability of electro-assisted and aeration system to the phytoremediation has different results. For example in the root part, the heavy metal absorption occurred most often as follow in phytoremediation > phyto-aeration > EAPR-aeration. Contrary results show in the EAPR-aeration system that the metal concentration quiet high translocation from root to shoot part by enhancement of electro-assisted and aeration system. High chlorophyll content and chlorophyll ratio in the plant under the EAPR-aeration system shows higher tolerance of plant to the heavy metal concentration.

Keywords: aeration, copper (Cu), EAPR, iron (Fe), phytoremediation, vetiver grass (*Vetiveria zizanioides* L)

Selection of polyanions as complexation agent in the formation of nanochitosan by polyelectrolyte complex method

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Aqueous dispersion of nanochitosan was prepared by polyelectrolyte complex (PEC) method with various mixing ratios of chitosan and polyanions, i.e. chitosan-glucomannan, chitosan-hyaluronic acid, and chitosan-Arabic gum. The formation of nanochitosan was carried out by adding the polyanion solution dropwise into the acid solution of chitosan. The aim of the study was to determine the best polyanion among the variations tested in this study, with respect to the targeted particle size and the stability of the dispersion over time. Particle size distribution was observed by Particle Size Analyzer (PSA). The result indicated that Arabic gum gave the smallest average particle size, i.e. (192.5 nm), at chitosan/polyanion mass ratio of 3:1 and pH value of 4.

Keywords: Arabic gum, chitosan, glucomannan, hyaluronic acid, polyelectrolyte complex

Antioxidant activity of sweet swimming extract (*Cinnamomum burmanii*) to overcome rancidity on cooking oil

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Most Indonesian people use cooking oil as a medium for conducting heat. Cooking oil is generally derived from plants that are rich in unsaturated fatty acid content that serves as a compound preventing the occurrence of arteriosclerosis (narrowing blood pembuu). In addition, cooking oil contains many nutrients needed by the body such as vitamin A, vitamin D, vitamin E, vitamin K, linoleic, linolenic and arcoidonate. A combination of vitamin A and vitamin E in cooking oil can reduce 40% of the risk of hypertensive patients suffering from stroke and 25% of high blood pressure decreases. Cinnamon (*Cinnamomum burmanii*) is blended to powder and then extracted. The cinnamon cinnamon samples, then weighed 25 grams and wrapped in filter paper, were introduced into the soxhlet apparatus after which 100 ml of ethanol and water mixture was added in the ratio of 80: 20 for 5 hours. The electric stove is lit at 80 ° C, and the steam is dewatered with cooling. Obtained liquid extract. The result of liquid extract in the flask is then steamed to remove the remaining solvent, after the liquid extract is considered sufficiently concentrated, the liquid is then transferred in the weighing bottle. And ovenkan for 15 minutes with temperature 105oC to eliminate the remaining water content, then put into the deksikator for 30 minutes, and weighed the results of extracts on the analytical balance, then tested the antioxidant activity of DPPH method, then cooking oil as much as 250 ml inserted into baker glass. Heat up to 900C by using an electric stove. After that, enter the extract of cinnamon deangan a certain amount into cooking oil while stirring. Keep the temperature for 15 minutes. Then the baker glass is lifted from the stove and cooled to room temperature and stored in specified time. And then in the analysis of peroxide and iodine. Based on the research it can be concluded that, The optimum time used for the storage of cooking oil added cinnamon extract in overcoming ketengikanpada cooking oil is on the 33rd day and the optimum ratio in overcoming the rancidity of cooking oil is 5%.

Keywords: cinnamon extract, cooking oil, iodine number, peroxide number, rancidity

Highly sensitive safrole sensor based on chitosan modified electrospun polyacrylonitrile nanofibers

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Safrole is one of the main precursors in the production of an amphetamine-type stimulant (ATS) drugs, N-methyl-3,4-methylene-dioxyamphetamine (MDMA or ecstasy). In the practical application, safrole should be able to be detected rapidly and accurately. This paper aims to report the main characteristics of quartz crystal microbalance (QCM) coated with polyacrylonitrile (PAN) nanofibers to detect safrole. Here, the fibers were prepared using electrospinning and deposited directly on the both Au surfaces of the QCM followed by drop coating with chitosan solution. For comparison, we also characterized the QCM coated with PAN nanofibers only and the QCM coated with drop cast chitosan only. As results, the sensors without combination of PAN nanofibers and chitosan exhibited very low sensitivity, while that of combination presented an excellent response to detecting safrole vapor at ambient temperature. In more detail, the sensor with combination of PAN nanofibers and chitosan possess excellent sensitivity of 0.119 Hz/ppm, good reversibility, fast response (40 s), with relatively stable and selective for safrole detection. Hence, such promising QCM sensors based on chitosan modified electrospun polyacrylonitrile nanofibers could not only potentially allow for detecting safrole, but also flexibility in designing and developing novel QCM sensing systems for other drugs and narcotics.

Keywords: chitosan, ecstasy, nanofiber, polyacrylonitrile, precursor, QCM, safrole

Polyethylenimine-Modified quartz crystal microbalance and its characteristics for detecting acetic acid

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Acetic acid is a clear liquid with a strong smell of acids. The danger of inhaling acetic acid vapors may cause irritation of the nose and throat. At high vapor levels, acetic acid may cause respiratory inflammation, and can cause eye irritation and eye damage permanently. New detection methods of acetic acid is urgently required especially for practical applications. In this study, the acetic acid vapor sensor was developed by depositing polyethylenimine (PEI) layer onto the two QCM substrates using well-known self-assembled monolayers (SAM) method. As results, the sensor was less sensitive to humidity. The sensor also showed high sensitivity and limit of detection limit (0.85 mg/L) to acetic acid.

Keywords: acetic acid, polyethylenimine, quartz crystal microbalance, SAM, self-assembly monolayer,

Characteristic of chitosan-coated quartz crystal microbalance for alcohol sensors

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Alcohol in gas phase is one of volatile organic compounds (VOCs). In liquid phase, it is often found in workplaces, laboratories, medicine and pharmacy, and food industries. The real-time monitoring of alcohol vapor is important because exposure alcohol vapor with concentration of 100 - 500 ppm may cause harm for human health. This study aims to improve the detection capabilities of quartz crystal microbalance (QCM) based sensor for detecting alcohol vapor. The active layer of chitosan film was deposited onto QCM substrates after deposition consecutively with L-cysteine and glutaraldehyde, respectively. The deposition of L-cysteine was carried out by self-assembled monolayer (SAM) technique, while that of glutaraldehyde and chitosan by self-assembled technique in solution. Prior to characterize for alcohol sensing, the gas sensor was firstly tested to humidity as an environmental factor. As results, the sensitivity of sensor to humidity was (6.5 ± 0.1) Hz/%RH. Moreover, we also obtain that the sensor exhibit high sensitivity to n-amyl alcohol, and less sensitive to isoamyl alcohol. Oppositely, the sensor was not sensitive to 1-propanol and ethanol. Additionally, the sensor showed high stability to n-amyl alcohol vapors for 17 different days.

Keywords: 1-propanol, chitosan, ethanol, gas sensor, isoamyl alcohol, n-amyl alcohol, quartz crystal microbalances, self-assembled monolayer,

Polyacrylamide coated on quartz crystal microbalance electrodes for highly sensitive sensor of acetic acid

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In some cases, acetic acid is categorized as hazardous to health. A high performance sensor for detecting acetic acid is urgently required. This study aims to observe the characteristics of quartz crystal microbalance (QCM) coated with polyacrylamide as an acetic acid sensor. For this purpose, we prepared the sensor by firstly coating with 1-dodecanethiol (using self-assembled-monolayers or SAM technique) followed subsequently by glutaraldehyde and polyacrylamide (PAM). As results, the sensors showed less sensitivity to humidity changes, which is one of the basic prerequisites for a stable sensor. We also obtained that the sensor showed fast response time and high sensitivity of approximately 96 seconds and 12.9 Hz/(mgL⁻¹), respectively. Further research is still required to improve the sensitivity and specificity by choosing more selective polymers.

Keywords: acetic acid, polyacrylamide, quartz crystal microbalance, SAM, self-assembly monolayer

Effect of seed amounts on the synthesis of zeolite ZSM-5 using coal bottom ash and rice husk as sources of silica and alumina by using seeding method

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ZSM-5 has been successfully synthesized by seeding method using coal bottom ash and rice husk as the sources of silica and alumina. Synthesis ZSM-5 were performed by the hydrothermal method in autoclave autogenous at 180 °C for 36 h with molar ratio 10Na : 50SiO : 2Al₂O₃ : 500H₂O with the addition of ZSM-5 commercial as seed. In this experiments, investigated variations seed amounts of 5, 10, 15, and 20 % of weight silica. The product was characterized using X-Ray Diffraction (XRD), Fourier Transform Infrared (FTIR), Scanning Electron Microscope (SEM), and Brunauer-Emmet-Teller (BET). Resulted showed that ZSM-5 succeed formed in all variation of seed contain. At variation seed amount 5 %, crystallinity obtained still low in which content of quartz phase still be high. Percent crystallinity highest obtained at the variation of seed amount 20 % with the result percent crystallinity relative 106 %. The experimental results revealed that phase transformation has occurred, in which an amorphous phase of coal bottom ash and rice husk has been transformed to the ZSM-5 crystal with addition seed as substitution organic template.

Keywords: coal bottom ash, crystallinity, rice husk, seed, template free, ZSM-5

Synthesis and characterization of Mg(OH)₂-Impregnated activated carbon adsorbent from coconut shell

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Impregnating Mg(OH)₂ onto activated carbon is a promising path for wastewater treatment of uranium removal from aqueous solution. The present study aims to synthesize and characterize Mg(OH)₂-impregnated activated carbon from coconut shell. The impregnating Mg(OH)₂ into treated biochar by activation method using various impregnation ratio (IR) of MgCl₂ (IR = 0.3; 0.6; 1.0). Characterization of functional groups in produced activated carbon was conducted with the aid of FTIR spectroscopy. The presence of O-H or Mg(hydroxyl) bond was confirmed by FTIR analysis at 3343.50 cm⁻¹. Also, presence of Mg(OH)₂ or brucite was confirmed by XRD analysis at d = 2.3952 Å, d = 1.8279 Å, and d = 1.5980 Å with the highest intensity of the obtained peak at impregnation ratio (IR) 1.0. Due to the surface area is one of important factors that control a material's ability to adsorb contaminations, the surface area of activated carbon was measured about 353-358 m²/g by BET method. To indicate that impregnating Mg(OH)₂ or Mg(hydroxyl) into treated carbon is successfully work, the presence of Mg (%w) in activated carbon was performed using X-Ray Fluorescence Analysis with the highest Mg presence about 28.587 (%w) at impregnation ratio (IR) 1.0.

Keywords: Activated Carbon, BET, FTIR, Impregnation, XRFÅ

Oviposition-deterrant activity of chitosan/lemongrass essential oil composite film against *Bactrocera carambolae* Drew & Hancock

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This research was aimed at finding the formulation of chitosan / lemongrass essential oil (*Cymbopogon citratus* Stapf.) composite as an oviposition deterrent of carambola flies (*Bactrocera carambolae* Drew & Hancock). The lemongrass essential oil was extracted through evaporation distillation in which the result of GC-MS test showed that the biggest compound content was 38.3 % Geranal, 31.28 % Sitrail and 6.82 % Juniper camphor. The production of the chitosan composite/ lemongrass essential oil films with the chitosan/lemongrass essential oil composite variations of 0.5/0.1 %, 0.5/0.25 %, 1.0/0.1 %, and 1.0/0.25% was done by dissolving 0.05; 0.05; 0.1 and 0.1 gram of chitosan with 0.01; 0.025; 0.01 and 0.025 mL of lemongrass essential oil and 0.2 mL of Tween 80 in acetic acid until the solution volume was 10 mL. Then the solution was poured into a petri dish which the diameter was 9 cm for 24 hours to make a film. The film measurement were mechanical characteristics such as thickness, tensile strength, and elongation. The higher chitosan concentration the bigger values of thickness and tensile strength will be. The functional groups of the films were analyzed by FTIR (Fourier Transform Infra Red) while the surface morphologies were analyzed by SEM (Scanning Electron Microscope). The solution was sprayed to the red guava skin surface. The chitosan / lemongrass oil composite film with the tensile strength value of 33.02 Mpa and elongation value of 3.99 % was regarded as the film with the best mechanical characteristics. It was obtained from the solution of 1.0/0.25 % chitosan / lemongrass essential oil composite. The result of the deterrence test shows that the concentration combination of the chitosan / lemongrass essential oil composite films which become repellent to Carambola flies (*Bactrocera carambolae* Drew & Hancock) is 1.0/0.25 % with the ER value of 44.99 %.

Keywords: *Bactrocera carambolae*, chitosan/lemongrass, composite films, deterrence, essential oil, repellent

AFB₁ antibody encapsulation in silica gel as matrix of immunoaffinity column

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Silica extraction from rice hull ash (RHA) in related to the encapsulation of anti-aflatoxin B₁ antibody (Ab-AFB₁) and its application as a matrix of immunoaffinity column have been achieved. The RHA extraction was performed using NaOH 4 M and yielded sodium silicate (Na₂SiO₃) for the production of silica gel. Silica gel trapped Ab-AFB₁ with sol-gel technique. The mixture of Na₂SiO₃:H₂O:H₃PO₄ (2:0.5:2.1) 1 M could generate silica gel at pH 7 that is suitable for encapsulation of 13.6 mg Ab-AFB₁. After aging for 48 hours, silica gel modified with Ab-AFB₁ was grinded and packed as matrix of immunoaffinity column (IAC-SG AFB₁) in order to apply for AFB₁ purification. Modified silica gel was analyzed using FTIR and SEM. The characterizations of IAC-SG AFB₁ were determined by the analysis of recovery, binding capacity, reusability, LOD and LOQ. Recovery of IAC-SG AFB₁ against AFB₁ was 92 ± 10 %. This column had binding capacity of 50 ng AFB₁ and could be re-used for 5 times with recovery more than 80 %. LOD and LOQ were 0.22 µg/kg and 0.75 µg/kg, respectively.

Keywords: aflatoxin B₁, immunoaffinity column, rice hull ash, silica gel, sol-gel

Adsorption of oxygen and nitrogen molecules on monolayer germanene: The density-functional-theory study

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We perform calculations of adsorption energy of O₂ and NO₂ on germanene by using the density functional theory (DFT). We find two favorable configurations for O₂, the hollow-site (Hsite) and W-site configurations with similar adsorption energies of -0.99 and -0.91 eV, respectively. The H-site is weakly bounded by germanene via van der Waals interaction, while W-site is strongly bounded via a covalent bond. As for NO₂, we find two favorable configurations, the top-site (T-site) and initial-bridge-site (IB-site). The T-site configuration is 0.1 eV more stable than the IB-site one, and both configurations are chemically adsorbed by germanene.

Keywords: adsorption energy, DFT, germanene, NO₂, O₂

The effect of zeolite addition on the mechanical properties of bioplastics based on carboxymethyl cellulose-urea

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The bioplastics based on carboxymethyl cellulose (CMC) and urea have been successfully synthesised at addition of various amount of zeolites. Urea inclusion into the bioplastics was supposed to result in new model of nitrogen slow-release fertilizer. It has been shown that the addition of zeolites in the bioplastics increased its tensile strength. However, the addition of zeolites at the amount of greater than 0.5 g decreased its strain because of the hydrogen bonds formed between CMC polymer and zeolite particles. Also, the addition of zeolites prolonged the time to biodegrade because ammonium ions being bonded with zeolites could prevent urea from decomposing. The amount of urea absorbed in the bioplastics increased as the amount of zeolites increased. This may be due to the high cation exchange capacity of zeolites. The best composition for the bioplastic were the one with 2 g of zeolites. After being added with ChCl-urea plasticiser, the strain of the bioplastics increased by 36 %. The bioplastics containing zeolites had low tensile strength but high strain. They also took short time to biodegrade, and had high amount of urea absorbed.

Keywords: bioplastic, cellulose, fertilizer, nanocomposite, urea

Density-functional-theory calculations of vacancies in monolayer hexagonal boron nitride (h-BN)

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We have carried out the density functional theory calculations of vacancies in monolayer h-BN. We model five configurations, two configurations of monovacancies (V_B and V_N) and three configurations (V_{BB} , V_{NN} , and V_{BN}) of divacancies. In the case of monovacancies, we find that there are three dangling bonds (broken bonds) in both of V_B and V_N . Weak bonds of B-N atoms around Nvacancy site induce two boron atoms to approach each other, decreasing its distance. On the contrary, B-monovacancy elongates the distance of N-N around vacancy site. In the divacancy case, we find that V_{NN} produces a heart-like configuration having two pentagons and leaving two dangling bonds, while V_{BB} leaves four dangling bonds. As for V_{BN} , it produces two pentagons and left no dangling bond. The calculated formation energies of V_B , V_N , V_{BB} , V_{NN} , and V_{BN} are 11.65 eV, 12.05 eV, 17.59 eV, 22.32 eV, and 16.89 eV, respectively. These energies show that V_B is more stable than V_N , while V_{BB} is more stable than V_{NN} . We conclude that N-rich h-BN sheet is energetically favorable to be formed rather than B-rich one. However, the most stable configuration of the divacancies belongs to V_{BN} compensating from the absence of the dangling bond, which is in agreement with the results of the previous dangling-bond-counting-model study.

Keywords: B-N vacancies, dissociation energy, divacancies, formation energy, monovacancies,

First principle calculations of mono- and di-vacancies in germanene

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By using first principle calculations, atomic geometry and stability of mono- and divacancies of germanene are studied. One configuration of monovacancy (MV1) and three configurations of divacancies (DV-1, DV-2, DV-3) are performed in the calculations. In this work, we check stability by calculating formation energies. We find pentagonal bond in the relaxed structure of DV-1 and DV-2, and tetragonal bond in DV2 and DV3. Our calculations show that in the divacancy, DV1 is the most stable system compared to DV2 and DV3.

Keywords: configuration, dangling bond, formation energy, germanene, vacancy,



MECHANICAL AND INDUSTRIAL ENGINEERING



Analysis of mental workload in human resource department

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The role of human resources (HR) is an important key in the sustainability of an industry. In order to optimize its human resources utilization, a company needs to measure the workload of its employees so they can perform their tasks properly. In this study, we determine the mental workload of 11 employees in Human Resources Division at a pipe industry, and analyse the indicators affecting the mental workload. NASA-TLX is applied in measuring the workload because it is the most convenient measurement technique. The results shows that the mental workload of each employee is high but Cleaning Coordinator. Furthermore, Personnel Services Admin is the highest mental workload among others with a score to 79.33. While the lowest is Cleaning Coordinator reaching 30. Mental Demands (MD) is the most significant indicator influencing mental workload up to 780.

Keywords: human resource department, industry, mental workload, NASA-TLX, performance

Strategic Formulation of a Higher Education Institution Using Balance Scorecard

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Strategic formulation is an important planning phase for any organization. Balance Scorecard (BSC) is a fastgrowing emerging tools for strategic formulation, with a wide range application. Faculty of Engineering Universitas Indonesia develops Strategic Plan every five years and decided to use BSC as strategic formulation tools for their next strategic planning. Analytical Hierarchy Process (AHP) method is used to develop the BSC strategy map with the weighting of each strategic theme. The selection strategy used Borda (ranking) and triangulation (interview, observation, and questionnaire) with respondents are faculty leaders (dean, vice dean, head of department, secretary of department), and chosen five faculty strategies that originating the strategic plan of university. AHP method is also used to focus on five strategies that will be prioritized in achieving the vision and mission of the faculty and provide a performance progress report of performance strategy. The selected priority of strategies are good university governance and management, strengthening human resources professionalism, increasing capacity, quality and productivity of research, community service and innovation, increasing quality of graduates globally competitive, increasing quantity and quality of infrastructure and optimal utilization. Each strategy has several programs to achieve strategy which grouped into BSC four perspectives

Keywords: AHP, balance scorecard, higher education, performance evaluation indicators, strategy map

Effect of inlet pressure, size and wind speed of an evaporator on amount of refrigerant charge and performance of a portable propane air conditioner

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Previous studies show that propane refrigerant has good performance in air conditioners, but the drawback of its flammability needs attention. The propane air conditioner should be designed for minimum refrigerant charge. In this work, the amount of refrigerant charge and cooling capacity of the air conditioner are the focus of analysis. The effect of the evaporator's variation of inlet pressure and variation of air speed over the evaporator on cooling capacity and amount of refrigerant within the evaporator are discussed. This research is mainly computational work with limited experimental validation. We found that, for a single duct portable propane air conditioner, cooling capacity increases from 0.956 kW to 4.319 kW when the inlet pressure of the evaporator is changed from 0.8 MPa to 0.4 MPa. Under the same condition, the accumulated refrigerant mass within the evaporator decreases from 176.846 g to 67.768 g. Increase in air speed over the evaporator increases the cooling capacity from 3.208 kW to 4.275 kW when the air speed increases from 1.0 m/s to 3 m/s, while refrigerant mass decreases from 110.307 g to 68.033 g. It should be noted that, at the lower inlet pressure of the evaporator, frost quickly appears on evaporator coils.

Keywords: cooling capacity, charge, flammability, inlet pressure, propane

Model development of lean action plan selection to reduce production waste in batik industry

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This research is done to develop a model of lean action plan selection for reducing production waste in Batik industry. The study is conducted with three main stages, i.e. identification of production waste, model development and application model to choose the best lean action plan. There are four main methods that are being used, i.e. value stream mapping, waste assessment model, supply chain response matrix and analytic hierarchy process. The research shows that excessive inventory becomes the most influential production waste (0,25). Four lean action plan alternatives are then developed and evaluated using three criteria, i.e. benefits, time and difficulty level. Production leveling have the highest priority score of 0,33. This action can improve the process efficiency up to 36%.

Keywords: action plan, ahp-valsat, batik industry, lean manufacturing, waste assesment model

Proposed natural fiber bag design meeting customers' needs

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Natural fiber bag products require innovation in order to compete with similar products made from plastic and leather. Therefore, these products need further developments to fit the market needs. This research has two objectives, (1) to know the important factors that determine the success of 'agel' natural bag and (2) to find out the relationship between the fulfillment level of the quality attribute of the natural fiber bag with the consumer satisfaction based on Kano model. The results of the survey of the important level of product attributes become inputs in the Kano model survey. The female bag attributes are divided into 3 categories. The first category is attributes that have very important levels, such as a zipper must be durable, neat stitching and wicker, and bags material are not easily moldy. The second category is attributes that have quite important levels, like the bag creating an impression of expensive, flat-shaped bags, and convex bag shape. The third category is attributes that have unimportant levels including heavy bag materials, striking bag colors, and a busy bag design. The design of the ladies bag that needs to be developed is the design of the bag at number 4, 10, 14 because the design goes into the attractive category that will increase consumer satisfaction exponentially if developed.

Keywords: agel natural fiber, design, customers needs, kano model, women bag

Experimental and simulation study of the vibration of a rectangular plate with a vertical clamped midline

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A gunungan is one of the characters in Wayang Kulit originating from Indonesia. When it is played during the performance, dhalang as a player of Wayang Kulit vibrates it to create a lively shadow. This phenomenon is interesting to be studied. To gain more insights on the gunungan, we study the vibration characteristics, namely natural frequencies and mode shapes. This study uses a rectangular plate from aluminium 1100 with dimensions of 50 cm in length, 35 cm in width, and 0.2 cm in thickness. The plate is clamped in the middle as close as possible to the real condition of the gunungan. The plate is tested by using the modal experiment, such that the vibration characteristic results can be used to validate our simulation model we built in Abaqus/CAE 6.11-1. Afterward, the simulation results are used as a main reference to create the advanced simulation which is closer to the real condition.

Keywords: clamped in the middle, experiment, gunungan, mode shapes, natural frequency, simulation

Experimental investigation on air-water two phase flow and transition phenomenon in capillary channel

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Experimental study on the air-water two-phase flow using mini-channel with diameter of 1.6 mm has been studied experimentally in order to understand the flow characteristics in a mini-channel. In this experiment air and water were mixed in the mixing chamber. The air superficial velocity J_G were varied between 0.025 – 66.3 m/s and water superficial velocity J_L were 0.033 – 4.935 m/s by using control valve. The air and water flow were monitored by using flow meter. Two phase flow phenomena in the mini-channel were captured by using a high-speed camera and the result shows that within the ranges of air and water superficial velocity, bubbly and slug flow patterns were predominantly observed. Small dispersed, elongated, wavy and bubble with tail was also observed from the experiments. It was also found that the bubble geometry in capillary channel was affected by the flow parameter. Investigation on the bubble frequency shows that the variation of J_L affect the bubble frequency significantly.

Keywords: bubble slug transition, flow regime, frothy bubble, two-phase flow, mini-channel, liquid film, liquid wave,

A gap analysis on implementation of safety management system in airport: A case study

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The aviation industry in Indonesia is considered flourishing as the national airline industries are expected to grow and develop well in the future, according to the Ministry of Industry. This condition has resulted in increasingly dense schedules of departure and arrival of aircrafts at the airport. Improved aircraft flight schedule will be directly proportional to the increase in the risk of the accident flights and serious incidents. To prevent the associate risk, there are standards that must be met to be able to carry out the flight activities safely. The International Civil Aviation Organization has set the airport safety management system (SMS) as a mandatory standard for airline industries. This research aims to investigate the implementation of the SMS, i.e., safety management manual (Doc 9859). A gap analysis is performed to compare the standard with the observed phenomena. The case study was conducted in Adi sumarmo International Airport which is located in Boyolali, Central Java Province. The results show that there are indeed gaps in the implementation of the standard. The fault tree analysis and barrier analysis are then employed to identify the cause of failure.

Keywords: airport, barrier analysis, fault tree analysis, gap analysis, safety management system

Basic analysis of logistics cost for Indonesian fishery commodities

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Fisheries commodities are categorized as high perishables products, therefore these products need a specific handling to keep the quality until delivered to processing industries or used by end consumer. For this we need a logistics and supply chain approach to manage the products flow and cost and information as well. We consider integrated logistics activities along the supply chain so that the fisheries commodities reach the destination on the right time, on the right quality and on the right quantity. These logistics activities, however, will be a trigger of cost and will be a contributor of products price. Therefore we need analysis of fisheries logistics cost to measure the proportion of logistics cost so that we could obtain an appropriate solution for minimizing the cost. In this paper we identify a basic fisheries logistics cost in Indonesia by using a systematic review. Based on the result, we conclude that there are two kinds of logistics models, i.e. wild fisheries and aquaculture. These two models have different supply chain pattern of commodities flow, cost and financial flow and information flow as well. Besides, as a result the proportion of logistics cost for every tier along the chain is different.

Keywords: aquaculture, end consumer, fisheries, logistics cost, supply chain management

Supply chain strategy of catchment sea-fish based on logistics cost structure

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Supply chain catchment sea-fish requires good management in order to produce good quality fish and has a high selling price, in the management carried out logistics activities undertaken, where the whole activity produces a logistics cost. As well as the logistics costs incurred from each supply chain actor must be managed so that there will be no significant improvement and remain in balance with the qualities possessed by each of the actors of the supply chain. Sampling method using convenience sampling and snowball sampling method. The areas in this study are 5 provinces in Indonesia, namely DIY, Central Java, East Java, West Java, and DKI Jakarta. Processing and measurement of logistics cost is done by determining the average logistics cost and the average proportion of logistics cost. Based on the results of research that has been done, a suitable strategy to be applied is responsive supply chain strategy for fisher tier and efficient supply chain strategy for tier traders and collectors. Furthermore, the strategy for the whole supply chain is the push supply chain strategy.

Keywords : activity based costing, catchment sea-fish, logistics activity, supply chain, strategy

A proposed model for aligning maintenance strategy to business strategies in engineering asset management

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A well-managed maintenance system may provide a competitive advantage for the business. To get to this point, the business must treat maintenance as one of its strategic partner instead of seeing maintenance from a traditional perspective. Many businesses have difficulties on initiating this process. This paper proposes a preliminary guideline for business, researchers, and practitioners in the area of maintenance and asset management to start this challenging process. The main idea of the guideline is that the business should align the strategy of its maintenance department to comply with the business strategy. The evolution of maintenance function is also presented in this paper so it can be used by the business to benchmark the position of their maintenance department to the recent perspective. There are two suggested steps in the guideline: (1) implementation of asset management system, and (2) to develop a clear model understandable by all personnel in the organization about how the maintenance strategy can be aligned to the business strategy and how their work can contribute to this process. For the second step, the system matrix is proposed in this paper.

Keywords: advantage, asset management system, business strategy, competitive, maintenance strategy, system matrix

Risk mitigation for fresh raw-milk in the rural supply chain

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Raw fresh-milk has a perishable characteristic so it needs an appropriate handling from milking to processing, otherwise fresh milk will be contaminated by bacteria so that the shelf life becomes shorter and it losses the quality. Besides, from the perspective of quantity, the lower farmers' production in the upstream will minimize the product availability in the downstream. This condition may cause some potential risk during the supply chain. We focus in the upstream of the rural fresh-milk supply chain. Using sample in Boyolali Regency in Central Java Province, Indonesia, we obtained there is a need to map the risk along the supply chain. This paper aimed to analyze the pattern of the supply chain and its risk, to set the risk treatment and to mitigate the risk as well. For this we implemented ISO 31000:2009. Data sampling were selected by convenience and snowball sampling and then collected using in-depth-interview to the risk owners. The results showed there are 5 supply chain flow models and the total number risk is 21 in which 11 of them were mitigated.

Keywords: ISO 31000:2009, bacteria, raw fresh-milk risk, mitigation, supply chain

Transportation cyber-physical systems: Impacts on humans

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The advancement of computation, actuator and sensor has brought promising progression for the air and land transport, addressing the increase in global traffic density. While most research has focused on the development of computation algorithm and hardware for its application in new operations, human aspects seemed to be neglected. Inevitably, human's role is increasingly essential, rather than less. Several issues concerning human's roles in Cyber Physical System-based operations in air and land transport and some future directions are highlighted.

Keywords: computation algorithm, cyber-physical system, global traffic, human factors, transportation

The implementation of image processing technique to analyze the air-water stratified flow characteristics in a horizontal pipe

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In horizontal two-phase flow system, stratified flow should be maintained since it provides good key operational factors and pipe construction safety. Recently, the investigations of stratified flow have widely covered various aspects of the flow, such as the liquid hold-up. An image processing technique devotes numerous advantages related to the abilities of non-intrusive measurement and quantitative visualization. The aim of the present work was to implement the image processing technique to study the characteristics of the stratified flow. Here, the observations were conducted in a transparent horizontal pipe with inner diameter of 50 mm. Air and water were used as the working fluid. The liquid superficial velocity (J_L) was between 0.005 m/s to 0.05 m/s while the gas superficial velocity (J_G) was between 0.94 m/s to 6 m/s. The data was processed by using the image processing algorithms that have been developed in the previous study. As a result, qualitative and quantitative identifications of each stratified flow patterns (smooth, ripple, and roll) have been carried out by using an image processing technique. The effects of gas and liquid superficial velocities to stratified flow behaviors were also obtained. Moreover, this study proved that the developed algorithm has been successfully implemented on the present stratified flow case. Furthermore, it can be a promising method to be used in another cases of stratified flow and validation of the available CFD simulation models on stratified flow in horizontal pipes.

Keywords: stratified flow, image processing, liquid hold-up, flow pattern, flow visualization

Investigating the temperature and air velocity distribution of split-type air conditioners using computational fluid dynamics

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An air conditioning (AC) system is defined as a system that regulates the temperature, movement, and humidity of air in a particular room. An air conditioning system is said to have good performance if it is able to ensure a room is in a comfortable condition. A college classrooms is one place where teaching and learning activities are conducted. In general, classroom capacity ranges from 20 to 50 people. To avoid noise pollution from the surrounding environment, classrooms should be designed as closed rooms. A problem that often arises in classrooms is the uneven distribution of air temperature and circulation. In this research, numerical simulation is done using the classroom model at Sekolah Tinggi Teknologi Nasional (STTNAS) Yogyakarta. The air conditioning system installed in the classroom includes two split-type AC units. Numerical simulation is performed on the classroom model using ANSYS Fluent software and a transient pressure-based solver to investigate the temperature and air velocity distribution of the air conditioning system. The room is simulated for 10 minutes, with a time step size of 1 second and total of 600 time steps. The maximum number of iterations per time step is set 100 iterations. Based on numerical simulations, it can be concluded that temperature distribution in the front of the room is higher than in other parts of the room. Furthermore, air velocity distribution in the front of the room is also lower than in other parts of the room. Temperature and air velocity distribution is uneven in the front of the room, a situation caused by improper placement of an indoor air conditioning unit.

Keywords: air conditioning, CFD, computational fluid, modeling, simulation

Managing on-time delivery in engineering-to-order supply chain with buffer time optimization

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Engineering-To-Order (ETO) is a production approach where manufacturers design, engineer, and assemble a product based on specific customer requirements. In this type of operation, manufacturers are faced with a lot of uncertainties in the design and supply chain process which often lead to unreliable delivery time and high total cost. This paper proposes a project management approach to cope with the uncertainties in ETO supply chain by allocating a number of buffer times within the network. Particle Swarm Optimization (PSO) is used to find the optimal configuration of the buffer time within the supply chain. The result shows that buffer time optimization method can help manufacturers to keep a high level of on time delivery performance (95%) while keeping the total cost minimum.

Keywords: engineering to order, on time delivery, particle swarm optimization project management, supply chain

Ergonomic student laptop desk design using the TRIZ method

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Students are among the most common users of laptop devices. With the variety of activities done by students using their laptops, many issues are faced because the physical interaction between user and laptop is not well designed. This research aims to produce a laptop desk design for students. The study was conducted with 30 undergraduate and postgraduate student subjects in an integrated campus environment of Universitas Islam Indonesia. Based on the results of questionnaires given to the subjects, six main problems of the laptop desks were identified: storage, lack of additional functions, lack of laptop mats, complaints while typing or using laptops, and complaints of neck pain. An analysis was done to find a solution using the TRIZ method. The TRIZ analysis tools used were cause and effect chain analysis (CECA) and engineering contradiction. The validation of the success of the solution was determined by using a homogeneity test with $P > 0.05$. This shows that there is no difference between the solutions given to the table design in terms of consumer expectation.

Keywords: consumer needs, design, desk,laptop,TRIZ

Improvement of Shewhart control chart on autocorrelated data in production process

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SPC is widely used to monitor, control and improve quality in many industrial processes. One of the most widely applied SPC tools is the control chart which is useful for knowing the variance of the process. The traditional SPC technique is based on the assumption that the resulting data is distributed independently. But in the process of continuous industry most data are autocorrelation. Autocorrelation is a state in which between sequential observations have a relationship. In order to use the control chart effectively, the autocorrelation in the data must be eliminated. For that step can be done is to map the residual result of modeling using time series method because the residual from modeling normal and independent distribution. In this study Particle Swarm Optimization is integrated with least square support vector regression for optimization of model parameters. After the calculation it was found that the proposed modeling results yielded 3.84 % more precise than other modeling methods.

Keywords: autocorrelation, control chart, least square support vector regression, particle swarm optimization, residual control chart

User needs analysis for industrial design of Kansei engineering-based sensor for agroindustry (KESAN)

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This paper analysed user needs for the purpose of an industrial design of KESAN (Kansei Engineering-based sensor for Agroindustry). Up to date, KESAN has been developed to serial Mir-1, Mir-2, Mir-3 and Mir-4. At the final stage, industrial design was required for the purposes of mass production. The research objectives were: 1) To identify the attributes of user need for industrial design of KESAN. 2) To analyse the user needs using Kano model. The respondent were the members of Sleman Regional Businessman Association for Food and Beverages. The 13 user needs were identified and selected. Subsequently, the attribute were mapped using Kano model. The research results mapped 7 attributes for category of one dimensional, 4 attributes for must be and 2 attributes for attractive. The research results indicated most important attribute is desktop application as a complementary to KESAN in displaying information and documentation.

Keywords: food and beverages, industrial design, kano model, KESAN, SMEs

Model of warehouse performance measurement based on sustainable warehouse design

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In sustainable supply chain management (SSCM), sustainability aspects, i.e. economic, social and environmental are integrated in managing supply chain. This concept has elicited government regulations that requiring every company to prevent the occurrence of environmental pollution. However, the concept of sustainability has not been implemented in operational processes of most industries in Indonesia particularly warehouse. This study aims to develop a model of warehouse performance measurement, to measure the warehouse performance, and to identify the indicators needed to be improved. The Balanced Scorecard (BSC) method with Sustainable Supply Chain Management (SSCM) approach is applied in developing the model. Balanced scorecard is a performance measurement method based on four perspectives: financial, customer satisfaction, internal process, and learning growth. BSC is appropriate for overcoming the problems related to performance assessment in SCs according to several researches. There are 12 indicators used in warehouse performance measurement, i.e. warehousing costs, labor cost, perfect quality items, on time delivery, inventory accuracy, environmental friendly tools, waste management, turn over, 5s implementation, worker competency improvement and environmental awareness. The warehouse performance measurement model based on sustainable warehouse design has been successfully demonstrated in medium scale textile industry.

Keywords: balance score card, sustainable, supply chain management, warehouse performance measurement , internal process

Reliability centered maintenance on critical component in Indonesian commercial trains

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Bogie is a train component that performed to support the basic framework of train vehicle body. The Bogie maintenance in Indonesian commercial trains is done every 350.000 km-400.000 km. But many types of Bogie K5 is fail to operate before reaching a distance of 350.000 km. The Bogie K5 component can not being replaced by other Bogie type components because the specifications are different. This research is done to determine the critical components and its maintenance plan. The method used is reliability centered maintenance (RCM). The result shows that there are 21 components of Bogie K5 that categorized in safety problem, outage problem, economic problem and hidden failure. Brake block component becomes a critical component because it is included in the safety problem component and has the highest RPN (Risk Priority Number) value compared to other components. The RCM action is develop based on conditional directed (CD) and time directed (TD) category. Based on data distribution test for component of brake block, component time to failure is categorized as weibul distribution and component time to repair is categorized as log-normal distribution. The goodness of fit test shows that hypothesis testing is acceptable. For mean time to failures, the average time is 59,44 days, which means that the average component will be damaged after 59,44 days of operation. As for the mean time to repair value is 9,18 days which means that the average time to fix the critical component is 9,18 days.

Keywords: commercial trains, FMEA, Indonesia, RCM, logic tree analysis

Water tunnel flow visualization due to canard deflection effect on aircraft to improve stall delay performance

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One of the advantages of the fighter is the ability to perform maneuver movements. Modification of flow along the fuselage becomes very important in creating the ability to maneuver to avoid the stall. Addition of canard on the fuselage will modify the flow so that it can delay the occurrence of the stall. The canard configuration will determine the extent to which the aircraft can hold on so as not to fall at a high angle of attack. In this study will examine how the configuration of canard deflection angle can optimize the downwash flow of the canard and the flow interaction along the main wing to keep the streamline and delay the stall. The use of visualization method using water tunnel will give detail result visually or aerodynamic force that happened. Also, the use of computational fluid dynamics (CFD) computation method is used as validation of experimental data to obtain accurate results. The results show that the deflection angle setting can delay the occurrence of aircraft stalls. At the canard deflection angle of 30°–40° could delay the stall until the maximum angle of attack 70°.

Keywords: aircraft, canard, stall delay, maneuver, visualization, water tunnel

Business process reengineering in a sago production process

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Sago is one of main food sources in Indonesia besides rice, but the farming for this commodity is not optimally managed. Also, the nutrition fact of sago is similar with rice. It leads to an opportunity that sago might be a good substitution for rice in Indonesia. However, the common business processes from harvesting to sago flour are still traditional practices. It is predicted that about 4.55 million tons of starch is wasted due to these practices. The result indicated that the proposed process as the result of the business process reengineering has a better performance.

Keywords: business process, reengineering, key performance indicator, performance, production, sago industry

Simultaneous optimization of tensile strength, energy consumption, and processing time on FDM process using Taguchi and PCR-TOPSIS

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Rapid prototyping with FDM technology is widely used by industry for producing prototypes. High quality and low processing cost are the main concerns. This study aims to determine the optimal parameter setting of 3D printing based on FDM technology to produce prototypes with high tensile strength with low energy consumption and processing time. The parameters to be optimized are extrusion temperature, infill density and infill angle. The Taguchi method is used to design the experiment. PCR-TOPSIS is used to obtain the optimal parameter settings simultaneously. The result showed that optimal parameters setting were in level combination of extrusion temperature 210 °C, 40 % of density and 45° of fill angle. From the three parameters, the most significant parameter is the infill density.

Keywords: energy consumption, PCR-TOPSIS, rapid prototyping, taguchi, tensile strength

Analysis of air traffic conflict geometry on brain activity

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This research was conducted to empirically examine the effects of conflict geometry on air traffic controllers' brain activity. Fifteen participants performed air traffic control tasks to resolve 6 different conflict geometry scenarios including lateral conflict (i.e. crossing, converging, and overtaking) for both level and non-level aircraft positions. The results revealed that theta and alpha frequencies at the right temporal lobe were activated, showing significant effects of lateral and vertical factors, respectively. Converging and crossing conflicts induced higher stress than overtaking one. Furthermore, conflict occurring when both aircraft were at different altitude also provoked higher stress. The implications of the findings are highlighted in this paper.

Keywords: air traffic control, brain activity, conflict geometry, geometry scenarios, theta alpha frequencies

Investigation of agel leaf fiber/unsaturated polyester composite cutting parameters using CO₂ laser

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Composite is a material with some advantages such as corrosion-resistant, strong, and lightweight. The development of composite materials moves toward sustainable issues by using natural fibers as reinforcement. One of natural fiber type that can be used as reinforcement is agel leaf fiber. The result of composite forming using agel leaf fiber can be applied as the main structure of unmanned aerial vehicle (UAV). The process of making the main structure of UAV is done by cutting the composite sheet. Cutting process using conventional machining results various kinds of damage to composite such as rupture, crack, delamination and tool wear. Laser cutting presents capability to eliminate the potential damage due to no contact between the cutting tools and the work piece. Another advantage from laser cutting is capability to repeat the same process with a high level of precision. This study aims to determine the effect of various cutting factors of agel leaf fiber/unsaturated polyester with CO₂ laser in order to obtain best results in the form of smallest kerfs width/depth (L/D). Laser power varies at 32, 48, and 64 W. Cutting speed varies at 2, 4 and 6 mm/s. Nozzle distance varied at 24, 26, and 28 mm. Gas pressure varied at 2.5; 5; and 7.5 kPa. Taguchi Method's Orthogonal Arrays L9 is used to combine multiple factor. To ensure data accuracy, each number of tests are done by 3 times repetition. Based on Signal to Noise (S/N) Ratio and ANOVA analysis, gas pressure rank first as the most influencing factor in cutting process of agel leaf fiber/unsaturated polyester composite using CO₂ laser. Cutting speed, nozzle distance and laser power rank second, third and fourth, respectively.

Keywords: agel, composite, kerf, laser cutting, NaOH

Numerical investigation on flexibility of metal cardiovascular stent

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In practical field, “ease of stent delivery” during PCI is important for cardiologists since the stent goes through a very complex passage of blood artery before arriving the plaque blockage. However, there was no standard yet for representing it and thus various opinions existed for among cardiologists. In the current study, “ease of stent delivery” would be presented by flexibility. The flexibility of cardiovascular stent is determined numerically by curvature-index which is ratio of rotation angle to the length of the stent. The curvature-index was depicted at crimped or non-expanded and inflated or expanded conditions. Bending moment was applied to the stent in respect to x and y axes. Numerical work was performed by software ABAQUS. A stent model was open cell design made of stainless steel 316L with size of 100mm thick, strut and link width of 80mm, 20 mm long and initial outer diameter of 1.237 mm. Results on flexibility simulation showed that there were proportional values of bending moments of less than 0.4 N-mm and curvature index of less than 0.01 rad/mm. Beyond that value, the curvature index increased steeply. However, in general the expanded stent showed more flexible compared to that of non-expanded. To improve its flexibility with remained design, it could be carried out by reducing its thickness for less than 100 mm of its strut and link width for less than 80 mm.

Keywords: flexibility, metal, numerical, simulation, stent

Analysis of fundamental parameters on zooming and rotation using pinch gestures

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Previous research has not adequately investigated fundamental parameters, namely range of operation and preference, for zooming and rotation using pinch gestures on a multi-point touch screen. This study obtained these fundamental parameters and introduced an innovative methodology to measure a comfort pinch. Thirteen right-handed participants were recruited to perform experimental tasks on a 23-inch touch screen. The data showed that the maximal and comfort pinch in zooming were around 600 and 375 in pixels (160 and 100 in millimeters) for both hands while the range of rotation were 148-degree clockwise and 115-degree counterclockwise using the dominant hand. This study also found that participants preferred a 42-degree clockwise inclination to initiate rotation. Using non-dominant hands decreased the range of rotation but not the span of pinch. Rotating with thumb fixed also significantly reduced the range of rotation. These findings could be used for guidelines in bimanual pinch manipulation, designing virtual rotary knobs, and other practical gesture operations.

Keywords: comfort pinch, fundamental parameters, gesture operations, pinch, rotation gesture

3D printing for fashion development

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Fashion designers in the world currently working on developing patterns that possible to be created as 3D printing fashion. Indonesia has many decorative patterns that can be developed using this technology. On our previous research, we tried to developed batik pattern, one of decorative pattern in Indonesia, using 3D printing technology. It turned out good but need to be developed more. This article report is the next experiment we've done to improve the pattern further.

Keywords: 3D printing, batik, decorative pattern, fashion, pattern 3D

Design and development of wearable GPS tracking device by applying the design for wear ability approach

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The cases of children abduction are the concerns of majority countries in the world, because it may lead to human trafficking crime. One of the most common ways of preventing such cases from happening is to use Global Positioning System (GPS), at which it can be used to monitor the children location. Integrating the GPS module with the children wearable devices allows transmission of an early warning signal to the parents/caretakers on their whereabouts. Design guidelines for wear ability provide useful steps to designing the wearable device. Along with the guidelines (focused on device placement, human perception of space, device attachment and the aesthetic factor), some aspects of human factors are also included as considerations such as context-awareness. This study describes the implementation of such device and approach to prevent child abduction in Indonesia. The GPS module was integrated with a belt buckle of the primary student in Indonesia. The system allows an early warning system to the parents or caretaker, once the child is over the designated monitoring area.

Keywords: children, context-awareness, design, Global Positioning System (GPS), wearable device

Design and hydrodynamic test propeller of mini submarine with high efficiency and low cavitation

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As a maritime nation, ideally required defense equipment that is reliable and complete. One marine strategic defense equipment with high technology is a submarine. Therefore, self-reliance in defense equipment supply equipment into one of the important reasons of this study. An important aspect in designing a submarine is a propulsor. Propeller submarine that is both high-efficiency and low cavitations Research on the hydrodynamic design and testing mini-submarine propeller 22 M with high efficiency level and low cavitations aims to produce a propeller design that meets the hydrodynamic aspects are good to use in prototype mini-submarine and Type U209P. At this year's research conducted propeller design that has a better aspect with the addition of a dummy model of mini-submarines 22M, it aims to determine the flow around the propeller. Expected results of this study found an increase in the efficiency of above 0.7 on the operating pressure of the mini-submarine.

Keywords: cavitation, design, efficiency, hydrodynamic, mini submarine, propeller

The CFD simulation of cyclone separator with the counter-cone in the updraft gasification process

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The performance of cyclone separator as the hot-gases clean up utilization in the updraft gasification system was studied through the Computational Fluid Dynamic (CFD). The hot-gases clean up utilization system is important part due to the effect on the gasification process, in particular on the quality of Syngas (Synthesis Gas). Therefore, the aim of this study is to find the best performance of the cyclone separator in the gasification apparatus that can clean the syngas from the particulates. The CFD simulation was performed to determine the effect of adding the counter-cone in the cyclone separator to the trend of the performance of tangential velocity, pressure profile, and pressure drop in the gasification process. The Reynolds Stress Model (RSM) was employed for the for swirl flows modeling accuracy. The performance of ash separation was predicted by using the path lines in the cyclone separator and the pressure drop in the vortex finder. The results of this simulation show that by adding the counter-cone in the cyclone separator increasing the performance of particulates trapped and the path lines of particle diameter.

Keywords: CFD, cyclone separator, counter-cone, gasification, RDF (Refuse Derived Fuel), syngas

A study on the visual menu design using pinch gestures on touch screens

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The visual menu design is one of the important issues in Human-Computer Interaction (HCI). Gestural operations on touch screens will play an important role in future HCI. Pinch gesture is the most common one and its two operations, zooming and rotation, are usually performed on touch screens device. At present, previous studies have not specifically investigated the interaction between visual menu design and the modes of gestural operations. This study aimed to determine how various visual menu designs affect users' performances (task completion time and accuracy) and subjective ratings (comfort ability and preference) in using pinch zooming and rotation. The results showed that visual menu designs did not significantly affect performance time and accuracy. However, the design significantly affected participants' perceived comfort and preferences, presumably attributable to compatibility between the mental models formed based on the menu design and the explicit feedback from the modes of operations. The study revealed that despite no significant effect of different visual menu designs on user performance and gestures, users might have preferred one alternative over another and compatibility between menu designs and operational mode must be taken into consideration for gestural operations on touch screens.

Keywords: design, index finger and thumb finger, pinch and rotation gesture, touch-screen, visual menu

Free expansion behavior of coronary stent based on strut linker geometry

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An ideal stent is stent with good endurance against pressure from its surrounding so that the stent failure can be avoided. Geometry analysis can be used to find out the stent characteristics before and after expanded using balloon angioplasty. The aim of this research is to evaluate the free expansion behavior of coronary stent based on the geometry of strut linker using finite element method. Pressure load was added into inner surface of stent to get the von Misses stress maximum value and its distribution. The results showed that strut linker geometry affected free expansion behavior.

Keywords: coronary stent, expansion behavior, finite element method, geometry strut linker

Material recommendation for the development of lower limb exoskeleton design for post stroke patients

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Stroke has become a leading cause of paralysis in some countries such as Indonesia. Exoskeletons can be used as one of the supporting tools which is used after the stroke attack playing an important role to help the post stroke patient in the daily life. A torsion study is conducted in this research to obtain information in regards to the displacement, strain and stress of the product during the simulation. As the result of the simulation, a recommendation for the material based on the simulation should be considered for the prototyping.

Keywords: exoskeleton, lower-leg, lower-limb, post-stroke, patients

Investigation of potential impact parameters to be used for future detection of kopyor coconut with drop test method

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Kopyor coconut is a mature coconut with distinct characteristics as compared to a normal coconut; it has a sweeter flavor and jelly-like meat texture resulting from genetic abnormalities. From its external appearance, kopyor coconut does not differ much from normal coconut, therefore a reliable detection method is necessary. The most common one to this day, practiced by farmers are by shaking and knocking the coconut to obtain sounds that are unique to both coconuts. However, apparently this traditional method still results in false detections. In this research, detection of kopyor coconut by impact drop test is proposed. As a preliminary stage, the aim is to investigate which impact parameters (impulse, peak force, and contact time) are unaffected by variation in coconut's mass. Additionally, the effect of variation in drop height is also investigated. Coconuts with three variations in mass (1.00 kg, 1.15 kg, and 1.30 kg) are used and dropped from three variations in drop height (0.3 m, 0.4 m, 0.5 m). The results show that mass variation affects impulse and peak force whereas drop height variation affects all impact parameters. Furthermore, impulse and peak force obtained are divided by corresponding coconut's mass and are observed. It has been shown that the impulse divided by the mass or contact time could be used as a potential parameter for detection. Moreover, since the variation in drop height affects all impact parameters, the drop test is suggested to be conducted at a constant drop height.

Keywords: drop test, detection, impact parameters, test parameters, kopyor coconut

SEM PLS models for performance analysis of manufacturing companies

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This study examines the influence of external factors on the financial performance of manufacturing companies. In this study there are three external factors that allegedly affect the financial performance of manufacturing companies. These factors are derived from several aspects, namely macroeconomics, import of manufacturing products, and prices of energy fuels. In doing the analysis to measure the relationship is used Structural Equation Modeling Partial Least Squares (SEM PLS). This study uses secondary data based on the company's financial statements with the criteria of manufacturing companies listed on the Indonesia Stock Exchange and has published the company's annual report in 2010-2015. The results of this study indicate that import of manufacturing products negatively and significantly affect the financial performance of manufacturing companies. Macroeconomics and energy fuel prices have no significant effect on the performance of manufacturing companies. The results of this study can be used by companies as a basis for consideration in decision making.

Keywords: financial performance, macroeconomics, manufacturing company, structural equation modeling partial least squares (SEM PLS), Stock Exchange

Effects Of heat treatments on mechanical properties, specific wear, and corrosion rate Of HQ 809 steel for machinery components application

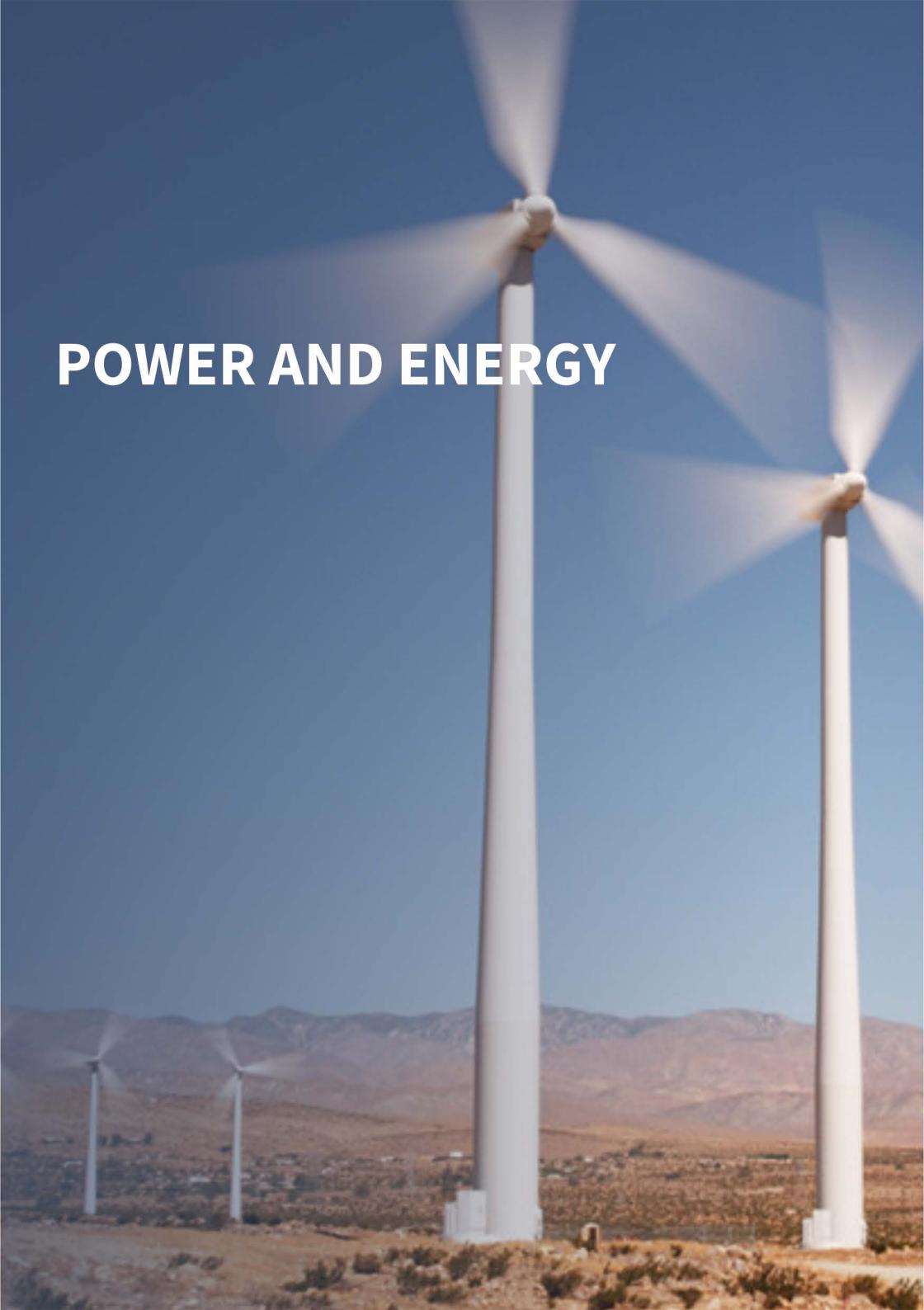
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HQ (High Quality) 809 steel is a HSLA (High Strength Low Alloy) steel and it is equivalent to AISI 4140, JIS SCM440, DIN 42CrMo4. HQ 809 is a chromium molybdenum alloy steel for applications requiring a high tensile strength, good harden ability, ductility, toughness, wear resistance and good fatigue strength. HQ 809 is commonly used for heavy-duty shafts, gears, axles, couplings, pins, bolts, nuts, impellers of centrifugal compressors. The objective of this research is to characterize the effects of heat treatment such as quenching and tempering processes on mechanical properties (hardness, impact energy), specific wear and corrosion rate of HQ 809 steel in 3.5 % NaCl solution. Quenching process has been conducted by heating the samples at the austenite temperature of 950 °C with a soaking time of 2 hours and then these samples were cooled rapidly in oil medium. Tempering processes were done at temperatures of 150, 200, 250, 300, 350, 400, 450, 500, 550 and 600 °C with a holding time of 2 hours. The sample properties such as hardness, impact energy, specific wear and have been characterized by a micro Vickers hardness test, Charpy impact, disk-on-block wear test respectively. Corrosion rate was characterized by potential polarization. All tests were performed at room temperature and test parameter was tempering temperature variations. The results show that the tempering temperature variations generate significant effect on HQ 809 properties. In general, the Vickers micro hardness decreases, however, the specific wear and impact energy increase if tempering temperatures of the samples increase. The raw material of HQ 809 has a hardness of 270 VHN (Vickers Hardness Number) and the quenched sample has the highest hardness of 370 VHN. But, tempering temperatures do not have significant effects on the corrosion rate of HQ 809. The tempering temperature of 500 °C produces a more cathodic sample compared to other tempering temperatures.

Keywords: corrosion, hardness, tempering, quenching, wear

POWER AND ENERGY





Energy saving potential and maintenance costs reduction in Water Treatment Plant (WTP) Pengok PDAM Tirtamarta Yogyakarta

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Electrical energy production and electrical energy consumption in Indonesia increase 6.25 % and 12.6 % y.o.y respectively. While the total installed capacity of power plants in Indonesia is 54664.5 MW. The gap between production and demand of electrical energy can be solved by energy conservation. Energy conservation is to find the potential of energy saving. The cost of processing raw water into clean water in water treatment plant (WTP) Pengok is calculated based on energy consumption and material cost. The energy saving potential in WTP Pengok is conducted by energy management and capacitors installation. The result showed that processing cost is lower than predetermined price by PDAM with the profit Rp1,266.44. On the other hand, energy saving by applying energy management is 389.69 kWh/month. While the saving through the installation of capacitors is 679.59 kWh/month.

Keywords: electricity, energy consumption, energy saving, water treatment plant

Cogeneration power-desalination in Small Modular Reactors (SMRs) for load following in Indonesia

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A large number of industries in East Java, Indonesia cause a high demand for electricity, especially on peak hours (18:00 to 22:00). For the load following fuel, oil and gas as the fuel used in Indonesia's power plant is very costly to operate. Meanwhile, renewable energy, especially wind and solar, as a popular fossil fuel substitute for load following mode is very unreliable energy sources because of its infamous with intermittency. Small Modular Reactor (SMR), a smaller size (under 300 MWe) of nuclear power plant, is proposed as alternative for load following power plants by using cogeneration system. The cogeneration system suitable in Indonesia is the seawater desalination. The Korean System Integrated Modular Advanced Reactor (SMART) is used in this study because its proven technology for power-desalination cogeneration system. The reactor and desalination plant are proposed to be placed in the Greater Surabaya Area (Sidoarjo Regency, Surabaya City and Gresik Regency) due to its potential to fulfill four criteria: coastal typology, low tsunami and earthquake risk index, and high number of large and medium industries. The proposed plant consists of six SMART reactors, one of which produce electricity only on the peak hours. Based on the economic analysis, for an 8 % discount rate, the proposed setting will be able to reach discounted payback period of investment in 14.7 years.

Keywords: cogeneration, desalination, load following, SMR

A Study of harmonic spreading against distribution network reconfiguration in passive radial distribution systems

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The study of power quality improvement especially in the radial distribution system is still warm to keep on review in the last decade. Various methods and techniques used to improve power quality, one such technique is the reconfiguration of distribution network. This study attempts to assess the spread of harmonics during distribution network reconfiguration when restoring one of the buses by using Load Curtailment Method in designing distribution network reconfiguration of radial distribution system. The results, Harmonic dissemination should be of special concern in maintaining the power quality of the system on the reconfiguration techniques of the distribution network in radial distribution systems.

Keywords: harmonic, load curtailment, power, radial distribution network, reconfiguration.

Life expectancy of transformer insulation system by reconditioning

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Reduction of waste oils and lubricants are indispensable because they are an important part of the volume of the organic waste generated worldwide. The recommended procedure for extending the life time of transformer oil is the reconditioning and reclamation process. The breakdown voltage test and the viscosity test of the transformer oil dielectric properties derived from the high vacuum purification process were investigated in this research. Variations transformer loading represented as an increase in temperature ranges from 30 °C to 130 °C. The test results of the breakdown voltage indicated that the recondition process increases the breakdown voltage value from 28.73 kV to 75.32 kV in the second round. The application of load variation on the transformer decreased the lifetime value of the transformer oil, but the reconditioning process was able to reduce the decline of from 0.01333 % to 0.00889 %.

Keywords: insulation system, life expectancy, recondition, reduction, transformer oil

Power flow analysis of power system topology development for advancing electricity system of local interconnection

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This paper presents a power flow analysis based on the topology development for the local interconnection system. This system is concerned in the power system reconfiguration through the networking expansion in the 16-bus system model. This work is subjected to evaluated performances of the expanded model. The model is modified from the existed structure for covering existed power sources and designed load blocks. This power flow analysis is focused on the normal operation and case studies. These cases are used to express the faulted effects. Results show that the normal operation is performed in different with case studies of the open line condition for the sources. Three case studies also give in different implications between each other.

Keywords: development, operation, power flow, structure

Experimental study on fuel consumption and energy efficiency at soymilk cooking using a mini boiler and using a gas stove

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This paper presents a comparison of fuel consumption and energy efficiency at soymilk cooking between using a gas stove and using a mini boiler. The experiment had been done at tofu production line at Subang. We used a tofu cooking stove that can be operated using a gas burner or using steam from a boiler. There were three experiments i.e. cook using a gas stove (A), cook using a gas boiler (B), cook using a wood pellet boiler (C). The highest of specific fuel consumption was based on cooking using a wood pellet mini boiler (0.157 kg fuel/kg tofu production) and the lowest one was cook using a gas boiler (0.047 kg fuel/kg tofu production). The highest of specific energy consumption of the soymilk cooking was cooking using a gas stove ($3792 \text{ kJ} \cdot \text{kg}^{-1}$ tofu production) and the lowest one was cook using a gas boiler ($2076 \text{ kJ} \cdot \text{kg}^{-1}$ tofu production). Soymilk cooking using a mini boiler could save the fuel cost and the cooking time compared with soymilk cooking using a gas stove, cooking using a wood pellet mini boiler was the cheapest and fastest one. The highest of energy efficiency was cooking using a gas boiler (59.24 %) and the lowest one was cook using a gas stove (33.66 %).

Keywords: energy efficiency, fuel consumption, mini boiler, stove, soy milk cooking

Study of solar and wind energy using as water pump drive-land for agricultural irrigation

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During the dry season farmers have struggled watering their crops, because they have to lift water from wells. To irrigate farm land by using his power to lift water to agricultural lands, it is not very effective work by farmers in producing agricultural products. Many of those who cannot use water pumps for farm land because away from a source of electrical energy. Solar and wind water pump technology is as an alternative energy to overcome these obstacles. This research was conducted to calculate of solar and wind resources, compare the efficiency of water pump using a battery energy source with a pump that only use a charged battery with solar and wind power. A method used in this research is to compare the flow of water is obtained by using an electric pump with battery and only using a battery energy alone. When batteries are full and then used to drive the pump, the volume of water obtained is 4,590 L. At the during testing by using a water pump battery is work from 9:00 am until 11:00 pm the water discharge obtained is 10,710 L. While at the time of testing without using batteries, water pumps cannot exist. There are several possibilities among which the pump power is needed for early movers insufficient and unstable voltage and current are get out of solar panels and wind turbine, therefore, water pumps without using the battery cannot be done.

Keywords: energy pump, irrigation agriculture, solar energy, water storage, wind energy

Investigation flow on horizontal axis wind turbine with Betz Chord distribution, Twist, and Winglet

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Wind energy is one of the clean renewable forms of that can handle the existing global energy crisis. A new design has been proposed for small-scale wind turbine laboratory with high power coefficients. The design used a three blades with Clark-Y airfoil smoothed and 15 segments on the blade. For twist and winglet, the horizontal axis wind turbine (HAWT) using Schmitz method and blended winglet. The turbine has been simulated using blade element momentum (BEM) method for two-dimensional analysis and Computational fluid dynamics (CFD) for three-dimensional analysis. The result shows that the effect of blended winglets on HAWT with winglet has an increasing performance because adding winglets capable of preventing the flow on the surface of tip blade from leaking power, This would reduce the intensity of tip blade rotor vortices and the corresponding lift-induced drag and also on the lower tip speed ratio (TSR), rotor with winglet has a larger starting torque. Therefore the effect of twist on the blade is adjusting a maximum angle of attack for airfoil toward relative velocity for increasing coefficient lift and reduces vortices on leading edge of the blade.

Keywords: BEM, Betz Distribution, CFD, HAWT, Twist, Winglet

Simulation of close-open standing wave thermoacoustic engine toward variation of resonator diameter

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Thermoacoustic engine is a promising device for converting heat to electrical power. Obtaining a higher performance of thermo acoustic engine remains a challenging effort before applying widely in industrial implementation. This study aims to investigate the performance of thermo acoustic engine in variation of resonator diameter. The study consists of three main subjects, namely establishing of the simulation model, validation and then used for predicting of the performance on variation of resonator diameter. The model simulation was established using DeltaEC freeware. For validation purposes, the simulation was conducted on similar geometrical configuration with that on the experimental set up. The resonator diameter was straight, tubular shape with inside diameter of 52 mm. The simulation is then enhanced to predict the thermo acoustic performance on varied resonator diameter of 25 mm, 38 mm, 78 mm and 90 mm. Results revealed that the simulation of thermo acoustic engine with 52 mm diameter generated acoustic power of 22.853 W. On the validation, this power has a deviation of 9% with that on the experimental data. Performance simulation showed that the acoustic power is generated at 19.454 W, 20.528 W, 20.812 W and 20.858 W, for 25 mm, 38 mm, 78 mm and 90 m resonator diameter, respectively.

Keywords: acoustic power, resonator diameter, thermo acoustic engine

Short-term electric load forecasting using recurrent neural network

Study case of load forecasting in Central Java and Special Region of Yogyakarta

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Short-term load forecasting (STLF) is a very important factor in the planning and operation of power systems. The purpose of load forecasting is to balance the demand and electricity supply. The electrical load is dynamic, changing over the time. The provision of electrical energy is also dynamic following the pattern of load changes. Load forecasting is required to ensure an accurate decision on power plant scheduling, unit commitment, and power delivery. This paper presents a recurrent neural network (RNN) model with Levenberg-Marquardt and Bayesian regularization training algorithms used for short-term electrical load forecasting. The accuracy criterion used is Mean Absolute Percentage of Error (MAPE). The results show that the RNN model can make good predictions. RNN model with the Bayesian regularization training algorithm has better accuracy. Its average MAPE in one week is 1,4792 %. It implies that the RNN model is great tool for STLF.

Keywords: Bayesian regularization, Lavenberg-Marquardt, MAPE, rnn, short-term electric load forecasting

Investigation of the reliability of $\text{CF}_3\text{CHCl}_2 + \text{N}_2$ gas mixture as a potential substitute for SF_6

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The presence of Sulfur Hexafluoride (SF_6) as a gas insulation in Gas Insulated Switchgear (GIS) equipment is essential because of the reliability of SF_6 gas in sustaining the electrical power system while transmitting power from the power plant through a substation. Utilization of SF_6 gas as a gas insulation medium in high equipment especially in Gas Insulated Switchgear is contrary to the policy issued at Kyoto Convention which is famous for the Kyoto Protocol. Under the Kyoto Protocol, SF_6 gas usage requires immediate limitation and reduced use as it causes environmental damage. Effects of use arising from the SF_6 gas are high acid rain from the S (Sulphur) element released in the air and the depletion of the ozone layer due to the release of F (Fluor) in the air causes the binding of oxygen in the air so that ozone formation in the atmosphere is inhibited. Investigation of an alternative gas alternative to SF_6 gas is CF_3CHCl_2 gas mixed with nitrogen gas. The purpose of mixing the gas to reduce the CF_3CHCl_2 gas concentration in the air. Our research shows a mixture of $\text{CF}_3\text{CHCl}_2 + \text{N}_2$ with a ratio of 70 % and 30 % is valued of reliability against breakdown voltage with a value of $186.8 \text{ kV} \cdot \text{mm}^{-1}$ bars. This mixed gas capability has a strong electrical value of 1,075 times that of the SF_6 gas capability which has an insulating capability of $90 \text{ kV} \cdot \text{mm}^{-1}$ bar tensions. For a better breakdown voltage capability of SF_6 gas and the ability to extinguish the flame, $\text{CF}_3\text{CHCl}_2 + \text{N}_2$ gas suitable is recommended for use as an alternative gas application for SF_6 gas substitutes on high voltage equipment as reliable gas insulation.

Keywords: dichlorotrifluoroethane, gas insulated switchgear, Kyoto Protocol, sulfur hexafluoride

Effect of blades number on undershot waterwheel performance with variable inlet velocity

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The undershot waterwheel is recommended to increase electrification ratio in remote areas of Indonesia due to its simple shape, which results in higher efficiency under low head conditions than other turbines. Using analytic and numerical methods, this study develops an equation to determine how many blades should be used and examines the effects of the kinetic energy of water on the energy conversion process to determine how the undershot waterwheel should be classified. Analytical methods were used to develop an equation to determine blade number, and numerical methods were used to verify the new equation. Variable inlet velocities of 1 m/s, 3 m/s, and 5 m/s and variations in blade numbers of 6, 7, 8, 9, and 10 blades were tested. From the analytical results, the recommended number of blades is 8. Based on the numerical results, an 8-bladed waterwheel is most efficient with variable inlet velocities of 1 m/s (45.5 8% efficiency) and 5 m/s (13.84 % efficiency). Analyzing the data using two-factor analysis of variance (ANOVA) without replication, it was determined that blade number effects output power, but inlet velocity does not. Thus, the proposed equation for determining the ideal number of blades can be effectively used, but it still needs validation through experimentation. Furthermore, the kinetic energy of water was not found to have an effect on the energy conversion process in an undershot waterwheel, therefore, the undershot waterwheel should be classified as a reaction turbine.

Keywords: ANOVA, blade, pico hydro, reaction turbine, undershot waterwheel

Design and implementation of solar based ice block machine in remote island case study: Maratua Island, Indonesia

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Maratua Island is located in the outer border of Indonesia territory. Maratua's people rely their life as fishermen. In order to preserve the fish, they bought an expensive ice block from seller. The way to solve this problem is making an ice block by using alternative energy. In this paper, we provide the design of solar-based ice machine. This system has been applied in remote island. This system built at Teluk Alulu, Maratua Island, East Kalimantan, Indonesia. Total 56 kW solar power system has been implemented in Teluk Alulu, Maratua Island to overcome the total demand output by $110.54 \text{ kW} \cdot \text{d}^{-1}$. Output demand is separated into primary load for ice machine and secondary load for additional devices such as water pump and lightning. The system can produce an ice block up to $2,000 \text{ kg} \cdot \text{d}^{-1}$. Nevertheless, $500 \text{ kg} \cdot \text{d}^{-1}$ ice has been produced by solar powered ice machine in commissioning session.

Keywords: ice block machine, remote area, renewable energy, solar energy

Stepper motor driven solar tracker system for solar panel

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Solar power plant is one of energy converters that are essential to sustain human life in the future where fossil fuel supplies will be depleting. It is also very useful for areas where electricity supply is not available. Generally, solar panels are fitted on a structure with a static direction. The generated electric energy will be optimal if the direction of the panel can follow the movement of the direction of incoming solar rays. This research is aimed to study the use of a solar tracker and driver system of a solar panel on its technical and economical aspects of. The system consists of LDR sensors, two stepper motors, and a microcontroller. The experimental results showed an error of 1.30° at the east-west direction and of 0.85° at the north-south direction. A life cycle cost analysis shows that the use of the solar tracker system will be economical for solar panels with a capacity of 200 or more Wp.

Keywords: cost, energy, solar power plant, stepper motor, tracker system.

Blade depth investigation on cross-flow turbine by numerical method

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In 2016, more than 1060 million people in the world lived in areas that are difficult to access, causing insufficient access to electricity. To overcome the problem, a pico hydro cross-flow turbine is considered to be a proper solution because it has a simple design, has few civil works, is easy to maintain, and can operate at a medium head with high variation of discharge. To increase the turbine's performance, this study aims to find the effect of blade depth on performance and to investigate the possibility of a cross-flow turbine being a reaction turbine. The CFD method was selected because it can represent the flow pattern in a turbine with more detail than other methods. The blade depth variation in this study consists of 0 mm, 3 mm, 6 mm and 9 mm, and the pressure inlet boundary conditions are varied with heads of 2.7 m and 5 m. The model turbulence RNG k- ϵ standard has been used to predict turbulent flow. From the 2.7 m head, the average efficiency with the ratio U/V 0.42-0.5 produced by blade depth are: 0 mm is 41.9 %, 3 mm is 45.8 %, 6 mm is 34.4 % and 9 mm is 36.7 %. Meanwhile, the variations from the 5 m head are: 0 mm is 49.8 %, 3 mm is 57.3 %, 6 mm is 53.7 % and 9 mm is 49.6 %. A two-factor ANOVA without replication was performed to determine the relationship of blade depth to performance, and the results showed there is an effect because the F-critical was higher than F. In addition, the blade does not entirely convert the water's kinetic energy to power. Thus, the reaction turbine concept cannot be used in cross-flow turbines because there is no lift force produced by any blade in the two conditions.

Keywords: ANOVA, blade depth, CFD, cross-flow, pico hydro.

The influence of bucket shape and kinetic energy on performance breastshot waterwheel

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Approximately, almost equal to equal 10 % peoples of Indonesia do not have energy access because the energy sources are far away which they live or categorize remote area. Breastshot waterwheel are able to become the solution for this problem because water energy potency until 19 GW. To enable its use, this study will develop a simple bucket shape that is easy to manufacture but the efficiency remains to be considered and proves whether the kinetic energy contributes to the energy conversion process. There are three possible bucket shape which consist: straight, circular, and thick. The CFD method is used to answer the actual physical phenomenon with six DoF feature. From the study, the results obtained that straight bucket has better efficiency than other buckets. The numerical results give the analysis that this bucket make rotation and torsion high than others. The generated power has amount 120 W with the potential energy is 318.8 W or efficiency is 37.6 %. Analytical power output net 192 W which have the different 72-W error from simulation. On the circular bucket, the power generated is 43.05 W and efficiency is 13.5 % better than thick bucket is 19.3 W or 6 %. ANOVA two factor without replication ensures there is no effect of kinetic energy (inlet velocity) on the energy conversion process. Thus, straight bucket recommended to use because generated power higher and easier manufacture than others.

Keywords: breastshot, CFD, Pico hydro, six DoF, waterwheel

State of Charge (SOC) analysis and modelling battery discharging parameters

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Estimating battery capacity or State of Charge (SOC) is indispensable when using the battery as a backup of electrical energy for various applications. Examples of battery applications that are used are trend mobile devices, electric vehicles, renewable energy, and many other applications. SOC batteries can be estimated using several techniques available today, mostly based on battery modeling. There are at least three models that have been introduced in recent developments today. Three known battery models are electrochemical models, analytical/mathematical models, and electrical circuit models. In this paper, we use battery modeling based on electrical circuit models to analyze the characteristics of battery parameters during the discharging process. The reason is, using this model will be easier to analyze the measurement data such as voltage, current, and internal resistance values as parameters to estimate SOC.

Keywords: battery modeling, battery parameters, electrical battery model, modelling, SOC

Analysis of the effect of overflow leakage phenomenon towards Archimedes turbine efficiency

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In Indonesia, 2,519 villages do not have access to electricity because its location is difficult to access. Utilizing the small-scale hydropower by using Pico hydro type Archimedes turbine could be an alternative solution. Archimedes turbine has a suitable characteristic to operate under low head condition with a wide range of water discharge. This study aims to determine the value of critical slope angle (α) that causes overflow leakage and to observe the effect of variation of turbine slope angle towards the turbine efficiency. This study is conducted by analytical method and followed by experimental method. The analytical result shows that the critical value of the slope angle depends on the turbine outer radius and the water volume flow rate. However, there is a contradiction between the analytical result and the experimental result. Based on the analytical result, the turbine efficiency is dramatically decreased when the turbine slope is raised, especially when it surpasses its critical value. On the other hand, the experimental result shows that the efficiency is increased as the slope angle (α) increased. It can be concluded that the overflow leakage is not decreased, significantly, the turbine efficiency. It means that the overflow leakage does not give any losses and the determination of the critical value of slope angle (α) to prevent overflow leakage is unnecessary.

Keywords: Archimedes turbine, hydropower, overflow leakage, Pico hydro, slope

The model of HVAC's control technique based on occupancy in smart building for energy saving

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Global warming has become an important problem because excessive energy use can increase CO₂ emissions. Building control techniques for energy saving have been performed using conventional and scheduling methods. Although building controls have been based on user schedules, both methods have disadvantages due to device automation based on the maximum occupancy in the room. Therefore, smart buildings have limitations to adapt to environmental alteration. We propose a model of control techniques based on user presence, location and the number of occupants in the room. The aim is to increase the energy efficiency in buildings. To evaluate our approach, we compared our model using conventional and scheduling method. This model shows 25 % and 16 % potential energy savings respectively, whereas compared with the conventional and scheduling method.

Keywords: control techniques, energy saving, rule based, smart building

Characteristic of gradual discharging process on thermosyphon SWH tank containing PCM

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The purpose of this paper is to reveal the characteristics of thermal energy release in a solar water heater (SWH) tank involving phase change materials (PCM) as energy storage material. A bundle of cylindrical capsules is inserted in a 30-L of SWH tank. The capsule contains paraffin wax as latent type heat storage. K type thermocouples are mounted on the water side and the PCM side. Experiments begin with the charging process using solar energy until water temperature exceeds the melting temperature of PCM. After that, a gradual discharging process is done to extract the thermal energy from the tank. At the best conditions during the experiment, a SWH tank containing 17 L of water can produce 60 L of hot water with an average temperature of 45.11 °C.

Keywords: discharging, hot water, paraffin wax, PCM, SWH

Analysis of PLN's electrical energy demand in the area of Batam-Indonesia using the linear regression method

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The economic growth in all sectors becomes a consequence in the increasing of the need for electrical energy, especially in the city of Batam. It urges the electrical energy supplier to make the planning or forecasting for electric power system operations in Batam. The decisive factor in making the electric power system operation planning is the prediction of the electricity demand that must be provided. This study aims to predict the need for electrical energy in the Batam city in 2016 to 2021 based on historical data, it is expected to be considered in the planning of electric power system operatio. The method used is Linear Regression with the simulation of minitab version 18, then the result of prediction in the increasing of electricity subscriber on industrial load is 104 customer (the average of growth per year is 4.33 %) and for the non-industrial load is equal to 81.632 customers (the average of annual growth is 4.11%), power connected to the industrial loads is 219.769 MVA (the average of annual growth is 8.22 %) and for the non-industrial loads is 586.083 MVA (the average growth per year is 7.72 %), the electrical energy sold at industrial loads is 289.481 GWh (the average annual growth is 6.95 %) and for the non-industrial loads is 441.118 GWh (the average of annual growth is 7.72 %), and the sales revenue on industrial expenses amounted to 414.934 Million Rupiah (the average of annual growth is 7.99 %) and for the non-industrial expenses amounted to 697.428 Million Rupiah (the average of annual growth is 5.30 %).

Keywords: Batam, economic growth, electrical energy consumption, linear regression, minitab simulation

The background image is a high-resolution aerial photograph of a coastal region. It shows a mix of dark green fields, lighter green pastures, and brownish-yellow agricultural patterns. A winding river or stream bed is visible in the center-left. In the bottom right corner, a large body of water meets the land, with white foam from waves crashing against a rocky shore. The overall texture is rugged and varied.

REMOTE SENSING AND GEOMATICS



Multi-Sensors remote sensing for mapping and monitoring canals on tropical peatland

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An assessment of multi-sensor remote sensing images for observation of canals on peatland in Indonesia has been carried out. Canals construction on peatlands is closely related to forest degradation and deforestation, and hence mapping and monitoring of these canals is essential for conservation and restoration of degraded peatland in Indonesia. Over million hectares of tropical peatland across the country and rapid land dynamic change, this task requires advance tools with capabilities to cover large area and detect change in near real time. With limitation possessed by each of remote sensing image, an effective and efficient mapping and monitoring system should be established by integration of these multi-sensors remote sensing. This paper presents evaluation of these images and how their performance fit into the system.

Keywords: images comparison, mapping and monitoring canals, multi-sensors remote sensing, peatland degradation, tropical peatland

The implementation of LADM versioned object class in spatial data presentation of 4D cadastre object (3D cadastre + time)

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3D space utilization is developed rapidly in some countries, including Indonesia. In several cities in Indonesia, there have been many flats and apartments that can be rented or owned by individuals or institutions (HMSRS). In the 3D Cadastre concept, flats are examples of 3D cadastre objects. On its development, there can be any changes to 3D cadastre object that does not only occur in spatial but in ownership. The change of 3D cadaster object is recorded as a historical data (4D Cadastre). In the data validation process, historical data is necessary to track changes over time and to know the data's correctness. Presentation of 4D cadastre objects becomes very important to avoid disputes in the future. This paper focuses on presenting the spatial data of 4D cadastre objects by applying the LADM VersionedObject class. The process begun from the analysis of existing information systems in Indonesia, namely KKP. The analysis is related to the various presentations of cadastre objects that have existed in the KKP. Based on these analyzes that can be formed a model of spatial data presentation in accordance with the administration system in Indonesia for 3D cadastre objects and its history. Presentation models of 4D cadastre objects in this research applied the five principal packages of LADM and the VersionedObject class. Land Administration Domain Model (LADM) is an international standard conceptual model (ISO 19152) that can show the liaison association of a cadastre object stated in RRR (Rights, Restriction and Responsibility). In addition, there is a Versioned Object class in LADM that represents various versions or history of spatial units, owners and administration. The Versioned Object class can be represented the 4D cadastre object information, which is the change of 3D geometry boundary status by time. The result of this research is a spatial data presentation model of 4D cadaster object based on web.

Keywords: 3D, 4D, Cadastre, data history, data presentation, LADM, land information system, Versioned Object

Spatial habitat suitability modeling of the Roti snake-necked turtle (*Chelodina mccordi*) based on Landsat-8 Imagery and GIS

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Landsat imagery can be used to establish spatial habitat suitability modeling for prediction habitat quality and evaluation potential habitat. However, the imagery has limit information for specific habitat characteristics such as turtles' habitat. *Chelodina mccordi* is an endemic turtle from Roti Island but many previous studies has been done either biological or non-spatial studies. This study use Landsat-8 OLI and TIRS as actual data and support with Landsat-5 TM as historical data, through a Geographic Information System (GIS). This study aims to make a spatial habitat suitability map model of *C. mccordi* and its mapping accuracy. The method that is used for modeling is overlay indicative parameter maps use of logistic regression to presents the Habitat Suitability Index (HSI). There are 9 parameters used for modeling in this study, i.e. Normalized Difference Water Index (NDWI), Land Surface Temperature (LST), slope, Topographic Wetness Index (TWI), distance from high canopy density, distance from settlement and agriculture, distance from freshwater, distance from sea or salty, and distance from street. We found 3 parameters that have strong contribution i.e. NDWI, LST and TWI. The result of spatial habitat suitability model of *C. mccordi* based on Landsat-8 OLI/TIRS and GIS analysis presents value of mapping accuracy is 75 %.

Keywords: conservation, freshwater turtles , geographic information system (GIS), habitat suitability index (HSI), remote sensing

Observation duration and multipath analysis on Yogyakarta Opak fault monitoring station

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GNSS observation of Opak Fault is performed on the monitoring station from 2013 to 2016 to find out the deformation magnitude. The condition around the monitoring station change with the time. The growing vegetation makes the GNSS observation data has a different obstruction and multipath value. Additionally, the observation performed each year has different observation duration. In this study, the difference in observation duration and multipath value in each year is modeled by linear and polynomial regressions. The modeling is carried out to determine the relationship between observation duration and multipath value to the coordinate precision. The observation duration and multipath value are grouped into several classes to simplify the modeling. The result can be explained that the observation duration have higher effect to the coordinate precision than multipath value.

Keywords: coordinate precision, GNSS, multipath, observation duration, regression model

Cirrus cloud correction in Landsat 8 image using the image-based approach: A case study in Indonesia

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Satellite observations show that cirrus cloud can cover 30 % of Earth's surface with 70 % of its global coverage in the tropics. Indonesia as a tropical country has cirrus coverage all year round. Cirrus clouds are typically thin which form at high altitude making it difficult to detect on optical images. However, with the availability of cirrus band in Landsat 8, cirrus cloud effects can be estimated and corrected. This paper demonstrates the image-based approach by utilising cirrus band to estimate and correct cirrus clouds which cover Landsat 8 image of Indonesia. We use Landsat 8 image of Sumba in this study to perform cirrus correction. Cirrus effect on each pixel in visible bands is estimated using linear regression model involving contaminated pixel samples in homogenous area with variety of cirrus intensity. Cirrus cloud correction is performed using band math based on the slope regression coefficient which corresponds to the highest determination coefficient. The cirrus corrected image is also statistically validated using free cirrus image as reference. This study shows satisfactory result of cirrus corrected image. The quality of cirrus corrected images of blue, green and red band statistically improves with the increase of determination coefficient by 2.17 %, 10.36 %, 7.44 % respectively.

Keywords: cirrus band, cirrus cloud, Indonesia, Landsat 8, linier regression

Satellite-based estimation of above ground carbon stock estimation for rubber plantation in Tembir Salatiga Central Java

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The concentration of CO₂ content in the atmosphere needs to be reduced in order to reduce the greenhouse effect. The effective way of CO₂ absorption in the air is through photosynthesis performed by vegetation. Through photosynthesis, the CO₂ absorbed by vegetation and converted into organic carbon stored in biomass. This research was conducted in a rubber plantation at Tembir Salatiga Central Java. This research aims to determine aboveground carbon stocks that exist in the research area by utilizing remote sensing data. This research uses the image generated by the TERRA satellite sensors, that produced by the project's partnership between the Japan - USA to resolve the problems concerned with natural resources and environmental issue that is the image of the ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer). The method used in this research is remote sensing data extraction and statistical analysis. The data is the correlation between biomass data at each sample plots with vegetation index value (MSAVI). The value of R is the correlation between those two data that is used to find out how big the relations between both variables that be correlated. the results of this research are the relationship between vegetation index transform (MSAVI) with biomass content obtained from allometric calculation. The relationship of these two variables indicated by the value of the linear regression which of these research produced a regression between MSAVI and biomass content is $y = 1683.9x - 423.87$ with R² 0.681 (68 %). From these results can be seen that the content of the biomass resulting from the extraction of remote sensing data able to represent 68 % of the biomass conditions contained in the study sites. The research results show that carbon stocks contained in the research sites were 875227.25 TonC.

Keywords: biomass, carbon stock, formatting, MSAVI, remote sensing data

The comparison of canopy density measurement using UAV and hemispherical photography for remote sensing based mapping

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Canopy density estimation using remote sensing data based on the empirical method need canopy density that measured on the field. There are several methods to obtain the canopy density data, and it can be separated into downward and upward measurement. Those two methods have different term that used, and it is possible to produce different result. This study aims to compare aerial photography from UAV and hemispherical photography that represent the downward and upward method, respectively. The results showed downward method produce the higher canopy density than upward method. The regression analysis showed upward method provides the better method in canopy density estimation, however the term of downward measurement is more appropriate to canopy density term.

Keywords: aerial photography, canopy density, hemispherical photography, sentinel-2, UAV

Combination of gravity disturbances and gravity anomalies for geoid determination a case study in Semarang City Central Java, Indonesia

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Conversion of geodetic height to orthometric height requires geoid to transform geometric elevation above ellipsoid into physical elevation above mean sea level. The need of accurate geoid is increasing as many of spirit levelling network bench mark has lost and deformed due to city development and natural activities. This paper presents geoid determination based on combination of gravity disturbances data and gravity anomalies data. Gravity disturbances were computed from 185 terrestrial gravity data. Gravity data were measured on March 2016 using Scintrex CG-5 gravimeter. All gravity stations coordinates were measured using rapid static method of GNSS to achieve sub-meter accuracy. Gravity anomalies data for improving the accuracy of the geoid models was measured by some government and private agencies using analogue gravimeters. It consisted of 10149 data and covered whole Jawa island which was not less than 2 arc degree of latitude and 10 arc degree of longitude. Gravity disturbances of the city represented local gravity data, gravity anomalies of Jawa island represented regional data, while EGM2008 represented global gravity data. Gravity anomalies of jawa were converted to gravity disturbances data using geoid undulation of EGM2008 by simple free air reduction. The converted data were then shifted to local gravity data system. Gravimetric geoid were computed using Remove-Compute-Restore scheme and integral of Hotine based on combination of local and regional data. Gravimetric geoid was validated on 30 geometric geoid points measured by static method of GNSS and spirit levelling. These validation points were distributed along 51 km of spirit levelling line. Accuracy test showed that average deviation of gravimetric geoid to geometric geoid was -0.773 m while standard deviation of geoid was 0.042 m. Conclusion of this research was that combination of gravity disturbances data and gravity anomalies data could achieve accuracy of centimeter.

Keywords: geoid, GNSS, gravity anomaly, gravity disturbance, hotine

Redefinition of coordinate GNSS CORS Indonesia land agency for purpose cadastral survey control points

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Ministry of ATR / BPN utilizes CORS GNSS technology known as JRSP to perform cadastral measurement and mapping. The definition of the CORS GNSS base station coordinates is carried out in accordance with the reference at the time of construction. To produce cadastral measurements with precision in accordance with the specifications it is required monitoring the GNSS CORS network. The fundamental method of monitoring is by periodically doing base station coordinates redefinition of GNSS CORS. Redefinition coordinates are performed to monitor and update base station positions in order to accommodate Indonesian geodynamics and tailored to the Cadastral mapping specifications. The zero baseline tests are used to test the accuracy of a GNSS receiver. The results of base station coordinates redefinition and calibration of GNSS CORS BPN receiver shows the effect of pillar stability, movement of earth dynamics, migration of base station location and change of receiver antenna quality.

Keywords: cadastral, coordinat redefinition, CORS, geodynamic, GNSS, zero baseline test

Study of sea level rise using tide gauge data year 1996 to 2015 at Semarang and Prigi stations

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Sea level rise monitoring using tide gauge data is done continuously so that long period data is available. The objective of this research is to analyze sea level rise from long period tide gauge data. This research uses tide gauge data in Semarang and Prigi station period 1996 to 2015. Data processing is done using Matlab 2013b to plot sea level rise data and to calculate the trend of sea level rise. Initial stage of data processing is quality control of tide gauge data by eliminating outlier data with confidence level of three sigmas and filled empty data with NaN (Not A Number). Shifting correction is done if there is reference bias at some period of data recording at a station. Processing followed by calculation of monthly MSL (Mean Sea Level) and SLR (Sea Level Rise) with linear regression to calculate trend value of sea level rise. The result of this research is at Semarang tidal station produces SLR $4,4 \text{ mm} \cdot \text{yr}^{-1}$ with SEE 0,1 mm. At Prigi station, SLR calculation is divided into three periods namely 1996 to 1999, 2002 to 2009 and 2010 to 2015 due to more than 1 year data vacuum. Data period 1996 to 1999 shows the falling in sea level about $10.2 \text{ mm} \cdot \text{yr}^{-1}$ with SEE 0,3 mm, 2002 to 2009 data period produces sea level rise $25.5 \text{ mm} \cdot \text{yr}^{-1}$ with SEE 0,2 mm, and 2010 to 2015 data period shows the falling in sea level about $0.07 \text{ mm} \cdot \text{yr}^{-1}$ with SEE 0,08 mm. The conclusions of this study are the rise and fall of sea level influenced by El Nino and La Nina phenomena and climate change.

Keywords: climate change, el nino and la nina phenomena, mean sea level (MSL), sea level rise (SLR), tide gauge data

Developing android application for precise geotagging using RTK GPS module

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The use of cameras on smartphones with the addition of photo position information on photo metadata or often called geotagging extends over time. This is because in survey jobs that require extensive documentation of photographs, photo positioning information allows surveyors to recognize the location of photo objects in the survey and ease the process of data management. Currently, smart phones are equipped with positioning features using GPS and or Assisted-GPS (A-GPS) which can provide sufficient positioning for geotagging photos. However, in the execution of certain surveys there is a need for more precise positioning than the standard GPS/A-GPS positioning features of the smart phone. One way to improve geotagging position accuracy is to use an external RTK GPS module integrated with a smartphone. This paper discusses the making of Android-based smart phone applications for geotagging using an external RTK GPS module. In this paper also discussed the advantages and disadvantages of the applications that have been made, as well as the opportunities and limitations of the use of such applications.

Keywords: android, geotagging, GPS module, precise, RTK

Movement detection of Sermo Dam control point based on GNSS observation data in 2016 to 2017

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There is a fault under the Sermo Dam. It's known based on the Geology Map of Yogyakarta in 1995. It is a normal fault, which there is a fault up on one side, and fault down in another party. The fault divides Sermo Dam in the center. The direction is from Sermo Dam straight ahead to the southeast to Pengasih. There is no information about the level of fault activity in Sermo Dam, includes the effect of fault to the Sermo Dam deformation. In the previous research built many control points in the Sermo Dam and measured it yearly. This study measured the five Makro control points in the year 2016 and 2017. The measurement using relative-static GNSS observation method. The duration of observation is for four days with the sampling rate 15 seconds. The processing of GNSS observation data uses GAMIT/GLOBK version 10.61. This processing aims to get coordinates value and to determine the movement velocity. In the GNSS data processing used seven IGS stations as reference points. These are COCO, DARW, GUUG, IISC, KARR, LHAZ, and PIMO. The IGS stations located around the observation area. The study result shows that there is a movement at all Makro control points. The movement velocity is between $0.02\text{-}0.05 \text{ m} \cdot \text{yr}^{-1}$ on the X-axis, 0.008 to $0.037 \text{ m} \cdot \text{yr}^{-1}$ on the Y-axis, and 0.002 to $0.024 \text{ m} \cdot \text{yr}^{-1}$ on the Z-axis. The horizontal movement directions are to the east and the southeast. It was similar to the movement direction of Sundaland block which is a part of Eurasia plate. In the vertical movement, MAK1 and MAK5 points indicate that the control point is moving up. But at other points (MAK2, MAK3, MAK4) have negative values that or show the control point is moving down. In the locations distributions, MAK1 and MAK2 located on the left side of the fault. MAK2, MAK3, and MAK4 situated on the right side of the fault. The differences sign in Y-axis indicates there is a vertical deformation. Due to the fault movement under the Sermo Dam.

Keywords: fault, GNSS, GAMIT/GLOBK, sermo, velocity

On the relationship between artificial nighttime light (ANTL) and built-up area: A remote sensing perspective

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Suomi-NPP Visible Infrared Imaging Radiometer Suite (VIIRS) nighttime light composite data has released in early 2013. This imagery applicable for study about night phenomenon, some studies like light pollution estimation, urban growth, electrical consuming estimation usually use nighttime light imagery. This research aims to determine correlation of artificial nighttime light and built-up area in Central Java and Special Region of Yogyakarta, Indonesia. Artificial nighttime light is estimated by VIIRS imagery that and built-up area is detected by Landsat 8 OLI. Both of VIIRS and Landsat 8 OLI are corrected radiometrically and geometrically. The corrected VIIRS imagery is show artificial nighttime light. Normalized Built-Up Area Index (NDBI) and Urban Index (UI) are used to extract built-up area from Landsat 8 OLI. Statistical method is used to determine the correlation of artificial nighttime light and built-up area. The correlation test using Spearman's ρ is significant at the 0.01 level with one-tailed between NDBI-VIIRS imagery of 0.63 and UI-VIIRS imagery of 0.69, the values belong to strong correlation. Scatter plot analysis of UI-VIIRS and NDBI-VIIRS result monotonic function. This research concludes that built-up area and ANTL has positive correlation.

Keywords: artificial nighttime light, built-up area, correlation, remote sensing, visible infrared imaging

Analysis of concentration of total suspended solid (TSS) in Palong Sidoarjo river water

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Porong River is Lapindo mud disposal area that has occurred since 2006 until now. Lapindo Mud river flow into the Porong River has caused higher sedimentation Mud in Porong River. Therefore, observation of TSS (Total Suspended Solid) distribution is needed to know the air quality in the waters. In this research, observation of TSS distribution is done by using remote sensing method by utilizing Landsat 7 Satellite Imagery 7 year 2000, and Landsat 8 in 2013, 2014, 2015, 2016, and 2017, and in situ data in the form of 20 air samples. Landsat-8 L1T satellite image data in 2017 was processed using 5 TSS algorithms namely Syarif Budiman Algorithm (2004), Parwati Algorithm (2006), Guzman & Santaella Algorithm (2009), Nurahida Laili Algorithm (2015), and Jaelani Algorithm (2016). From result of data processing using Algorithm Budhiman (2004), with Normalized Mean Error (NMAE) equal to 19,53 %, that value proves that TSS Algoritma Budhiman (2004) is the most appropriate algorithm to explain the condition of TSS constellation in the dimensions of the Porong River Estuary, the algorithm is applied to apply other years of Landsat data. The result of TSS concentration in the waters Porong River which has the highest value of TSS between $11,52 \text{ mg} \cdot \text{L}^{-1}$ to $92,16 \text{ mg} \cdot \text{L}^{-1}$. According to the Decree of the Minister of the Environment. 51 of 2004 on Marine Water Quality Standard for Marine Biota, sea water quality standard for TSS parameter is $80 \text{ mg} \cdot \text{L}^{-1}$ meaning in year 2013, and in year 2014 at estuary of Porong River can be said not good because difference of standard quality which have specified.

Keywords: porong river, remote sensing method, sea water quality, TSS, TSS algorithm

Geospatial information utilization in Indonesian local government

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Government decisions and actions at national and local levels have, to varying degree, spatial footprints. At the local government level, this includes spatial planning, land management, taxation, and the issuance of building and site permits. Utilization of geospatial information in Indonesian local government was started more than 25 years ago. However, there was high variation in the intensity, frequency, and types of geospatial information utilization. In a particular local government, there was also a variation of use among local government agencies. This paper aims to portray and analyses the current status of geospatial information utilization in Indonesian local government. Quantitatively, the information was obtained from questionnaires distributed to 24 districts and seven cities. The questionnaire covered areas of data availability, utilization, and management of geospatial information. For every district and city, around 20 to 30 questionnaires were sent, to gather information from all local governments agencies. Qualitatively, observations and in-depth interviews were conducted to collect information on the plans, progress, and challenges in geospatial information utilization. In general, the utilization of geospatial information is progressing steadily with some cities or districts made significant achievement while others still struggling in defining geospatial policies. Local governments have limited staffs with expertise in spatial data handling. Some recommendations to overcome the challenges and impediments are presented. Recent central government initiatives on national spatial data infrastructure and one map policy, are essential to speed up the process of creating better environment governance in local government.

Keywords: geospatial, implementation, local government, spatially enabled government, status

Progo watershed delination and river network analysis using SRTM DEM and Contour DEM Hypsography of RBI 1:25000

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Watershed is a combination of waters and land areas where the boundary is topography of water separator. Watershed can be imagined as a sloping from upstream to downstream where rainwater that falls on topographic boundary will flow into river. The end of drainage system is a single outlet that boils down to larger body of water such as river, lake, or sea. Watershed can be formed based on the topography of a region. Topographic data is processed to Digital Elevation Model (DEM). DEM development can be utilized for the purposes of watershed characteristics analysis. DEM can be used for determination of watershed boundary and established river network. The characteristics of the watershed will affect hydrological behavior such as evapotranspiration, infiltration, and river flow. The result of the research shows the area of DAS based on SRTM DEM data is 218257.640 hectare, while based on RBI DEM data is 238714.236 hectare. The length of the main river Progo River based on SRTM DEM data is 133.874 km, while based on data RBI DEM has a length of 134.689 km. The combination of these two data produces the physical characteristics of Progo watershed quite well.

Keywords: DEM, hypsography, river network, watershed, watershed delination

Application of IKONOS imagery for estimating population exposure to landslide hazard in Banjarmangu Sub District Central Java, Indonesia

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This paper aims to estimate population exposure to landslide hazard in Banjarmangu sub district (46.5 km²), Central Java province, Indonesia. A high resolution imagery (i.e. IKONOS) has been used to assess the distribution and size of individual house over the landslide hazard area. Furthermore, houses are divided into two classes based on their size: <80 m² and >80 m² to estimate population density, for which it is assumed that house with size <80 m² is occupied by 3 people, while house with size >80 m² is occupied by 5 people. Next, error on the population estimation has been estimated by comparing the results with the population census. The results show that 30,927 people (69 %) in the study area are exposed by landslide hazard, where 1 % and 40 % of these people are located in the very high and high landslide hazard prone area, respectively. Based on the error analysis, our population estimation is overestimation of about 3 % indicating a good agreement between remote sensing-derived population estimation and field survey. The results of this study can be useful for the local authorities to reduce landslide disaster risk of the study area.

Keywords: Banjarmangu sub district, disaster management, IKONOS imagery, landslide hazard, population estimation

Vertical accuracy of a ground filtered UAV-derived DEM using cloth simulation filtering algorithm

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Collecting earth surface data using Unmanned Aerial Vehicles (UAV) become more easy and accurate in the recent time. Based on photogrammetry, point clouds data can be produced from small format aerial photography (SFAP) using Structure from Motion (SfM) to make 3D model called Digital Surface Model (DSM). To create Digital Elevation Model (DEM), ground filtering must be applied to DSM. LiDAR point clouds data is common source data to create DEM. In this research, DEM is created by executing ground filtering algorithm called Cloth Simulation Filtering (DSM) to UAV-derived DSM with different cloth resolution. The aim of this research is to examine vertical accuracy of UAV-Derived DEM using Cloth Simulation Filtering method. The result accuracy from this algorithm calculated according *Badan Informasi Geospasial* (Geospatial Information Agency of Indonesia) vertical error calculation. The result show different accuracy for each cloth resolution. Vertical accuracy from 0.5, 1, and 2 size of cloth resolution consecutively is 2.34 m, 4.0 m error, and 26.27 m.

Keywords: cloth simulation filtering, ground filtering, point cloud, structure from motion, UAV

Euler poles determination of southern Sunda microblocks base on GNSS GPS observations

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Determination of Current Instantaneous Euler Poles is a geodetic contribution for the geo-kinematic determination of the earth by using ideal spherical assumptions. The Euler pole parameters are estimated based on the shift or movement speed of a minimum of three GNSS-GPS stations located in the same rigid zone. By applying four geometric calculation methods (L1-Norm Minimization or Least Absolute Deviation/Error, best fitting L2-Norm Minimization, distance or/and time weighting), the stability of the estimation result given the sensitivity to the distribution pattern of GNSS GPS observation is not homogeneous in plates/blocks. The absolute residuals of the observations with the Euler polar velocity estimation results indicate the presence of the stations within or outside the rigid zone. By applying all of the mentioned steps, a stable estimation value of the Java-Sumba-South Sulawesi micro-blocks Euler poles of absolute residuals is about $2 \text{ mm} \cdot \text{yr}^{-1}$ to $3 \text{ mm} \cdot \text{yr}^{-1}$, and these parameters are used as geo-kinematic information.

Keywords: euler pole, geometric calculation, geo-kinematic, GNSS GPS, microblock

Temporal gravity gradient of South Kalimantan Region

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South Kalimantan is one of the provinces in Indonesia facing a problem with the conversion use of peatland. This phenomenon may alter the pattern of some component, such as hydrology, where changes of hydrology further affect the gravity field around the area as well. In this research, the changes in gravity field are estimated using the temporal gravity data from GRACE satellite observations. The data used in this research is the temporal monthly data of the ITSG-Grace2016 from 2014 to 2016, which was the chosen time period to give the latest information available for the temporal gravity data in the region. The obtained gravity field is analysis using the topography maps also the land cover map of South Kalimantan. This research concluded that there have been variations in the mean gradient of gravity in South Kalimantan for period of 2014, 2015 and 2016 with values ranging from -2.23×10^{-13} to 4.19×10^{-14} mgal. The peak point during this period of time takes place on April 2015, while the lowest is on January 2014. It has also been approved that the gravity value is affected by the mass of water, meaning that the gravity gradient values can be used to determine the condition of hydrology in peatland area.

Keywords: gravity gradient, grace, hydrology, peatland, South Kalimantan

Quality analysis of the geodetic control networks for purposes of geodynamics study of Sangihe Island

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The Sangihe Islands in Sulawesi Utara are located at three tectonic plates, Collins area, therefore the Sangihe Islands are one of the natural disaster-prone areas, especially earthquakes. To reduce the effect of disasters, studies related to geodynamics are carried out, one of the studies uses the multi-epoch GPS survey method. Three points Sangihe Geodynamic monitoring network has been defined since 2014, which are SGH1, SGH2 and SGH3. In this study, the quality of the network has been analyzed and used for the purpose of geodynamics study based on 2014 and 2015 epochs GNSS data measurement. The results show that the accuracy and reliability of the network based on A-optimality, E-optimality, S-optimality, I-optimality and D-optimality criteria meet the minimum criteria, therefore the network can be used for geodynamics studies. Comparing the 2015 and 2014 coordinates shows that the movement of the SHG1 horizontally is $15 \text{ mm} \cdot \text{yr}^{-1}$ to southeast and increased vertically $9 \text{ mm} \cdot \text{yr}^{-1}$, the SGH2 deformed horizontally $200 \text{ mm} \cdot \text{yr}^{-1}$ to southeast and decreased vertically $55 \text{ mm} \cdot \text{yr}^{-1}$ and the SGH3 deformed horizontally $3.6 \text{ mm} \cdot \text{yr}^{-1}$ with same direction to the others and decreased vertically $14 \text{ mm} \cdot \text{yr}^{-1}$.

Keywords: accuracy and reliability, geodynamics, geodetic control network, quality analysis, Sangihe islands

Testing spatial data deliverance in SQL and NoSQL database using NodeJS Fullstack Web App

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During the last decade, we saw an explosion of geospatial data being produced. Most of which coming from GPS-enabled devices available for general consumers. The large amount of geotagged data coined the term 'Geospatial Big Data', indicating the semi-structured and unstructured nature of such data. SQL relational databases have been known in the past to handle geospatial data very well. However, the abundance of geospatial big data pushed forward the need for NoSQL database which is expected to perform better in terms of handling and storing geospatial big data. This paper discusses the quantitative comparison of performance between the SQL (i.e. PostGIS) and NoSQL (i.e. MongoDB) databases in handling geospatial big data. A NodeJS-based angular-framework web app was developed to test the real-world performance of MongoDB and PostGIS in handling a large amount of simulated geospatial data. A different number of points were generated for testing the geospatial data storing and loading capability of both the databases. The test was conducted by comparing the result of XHR (XML HTTP Request) of both databases in each case. The result showed that NoSQL database, i.e. MongoDB, performs better in loading big geospatial data compared to traditional SQL database using PostGIS.

Keywords: database, MongoDB, NoSQL, NodeJS, PostGIS

Geospatial analytics of pedestrian safety in Tanah Abang

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This study aims at better understanding the geospatial phenomenon of offenses or violations happening at the urban pedestrian with a particular focus on (a) motorcyclists passing through pedestrian lanes, (b) street vendors selling at pedestrian lanes, and (c) illegal parking at pedestrian lanes during and post new policy on pedestrian infrastructure. The first and the second type of offense involves dynamic behaviors while the third offense inherently involves both behaviors. Tweets and Qlue reports (represent passive and active crowdsourced data) regarding Tanah Abang pedestrian condition are employed as the materials of the study case. Based upon spatial and temporal values of crowdsourced data, statistics charts and heatmap visualization are presented to know the spatial pattern and fluctuation of offenses. The results of this study are presented as a collection of visual displays in order to provide geospatial insights such as dynamics of reports on top of an online map using Leaflet. The study illustrates the usefulness of geospatial analytics to correlate offenses extracted from crowdsourced data with pedestrian safety as a new policy on pedestrian infrastructure was introduced.

Keywords: crowdsource, geospatial analytics, pedestrian, report, violations

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Field of Interest

- Medical Laser and Optics
- Tomography and Elastography for cancer cell
- 3D- Imaging

Education

- 2004 Bachelor of Science (B.Sc./S.Si.) in Physics at Universitas Indonesia (UI), Depok, Indonesia
- 2007 Master of Engineering (M.Eng.) in Biomedical Engineering at in Universität zu Lübeck, Germany
- 2011 Doktor-Ingenieur (Dr.-Ing.) in Advanced Optical Technologies at Technische Friedrich-Alexander Universität Erlangen-Nürnberg, Germany

Research Projects

- Hamed Abbasi; Georg Rauter. Differentiation of femur bone from surrounding soft tissue using laser-induced breakdown spectroscopy as a feedback system for smart laserosteotomy. (SPIE Conference Proceeding) Published: 17 May 2018
- Hamed Abbasi; Georg Rauter; Raphael Guzman; Philippe Cattin; Azhar Zam . Laser-induced breakdown spectroscopy as a potential tool for autocarbonization detection in laserosteotomy (SPIE Journal Paper). Published: 2 March 2018
- Hamed Abbasi; Georg Rauter. Plasma plume expansion dynamics in nanosecond Nd:YAG laserosteotome (SPIE Conference Proceeding). Published: 20 February 2018
- Lina Beltrán Bernal; Gholamreza Shayeganrad. Performance of Er:YAG laser ablation of hard bone under different irrigation water cooling conditions(SPIE Conference Proceeding). Published: 13 February 2018
- Hervé Nguendon Kenhagho; Georg Rauter, et al. Comparison of acoustic shock waves generated by micro and nanosecond lasers for a smart laser surgery system (SPIE Conference Proceeding). Published: 12 February 2018
- L. Beltrán; H. Abbasi, et al. Effect of laser pulse duration on ablation efficiency of hard bone in microseconds regime (SPIE Conference Proceeding). Published: 22 August 201
- Hamed Abbasi; Lina Beltrán, et al. Effect of cooling water on ablation in Er:YAG laserosteotome of hard bone (SPIE Conference Proceeding). Published: 22 August 2017



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Professional Activities

2001–2003 Chairman Hanyang University, Department Chemical, Seoul, South Korea

Research Projects

- Total Synthesis of Nigalins D and G, *Org. Lett.* **2017**, *19*, 4688-4691
- Directed Fischer Indolization as an Approach to the Total Syntheses of (+)-Aspidospermidine and (-)-Tabersonine, *Org. Lett.* **2017**, *19*, 6168-6171
- Visible-Light-Induced Synthesis of Carbazoles by in Situ Formation of Photosensitizing Intermediate, *Org. Lett.* **2017**, *19*, 1906-1909
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Field of Interest

- Mechanical engineering and energy
- Thermal and Fluid Science
- Nuclear safety research

Education

- 1996 S.T. in Mechanical Engineering, Universitas Gadjah Mada, Indonesia
2003 M.Eng. in Mechanical Engineering, Tokushima University, Japan
2006 Dr.Eng. in Macro-Controll Engineering, Tokushima University, Japan

Awards

- 2008 Georg Forster ResearchFellowship Award, Alexander von Humboldt Stiftung, Germany
2014 1st Place of the Outstanding Lecturer, Universitas Gadjah Mada
2015 2nd Place of the National Outstanding Lecturer

Professional Activities

- 2001 - present Formal member of The Japan Society of Mechanical Engineer, JSME
2002 - 2006 Formal member of The Japanese Society of Multiphase Flow, JSMF
2005 - 2006 Formal member of Heat Transfer Society of Japan, HTSJ
2007 - present International Geothermal Association, IGA
2016 - present Member, National Research Council Republic of Indonesia
2017 - present Member, The Institution of Engineers Indonesia (PII)

Research Projects

- "Experimental investigations of the circumferential liquid film distribution of air-water annular two-phase flow in a horizontal pipe", Setyawan, A., Indarto, Deendarlianto, Experimental Thermal and Fluid Science, 85, pp. 95–118, (2017)
- "The dynamics of the water droplet impacting onto hot solid surfaces at medium Weber numbers", Mitrakusuma, WH, Kamal, S., Indarto, Susila, MD, Hermawan, Deendarlianto, Heat Mass Transfer 2017, pp. 1-13, (2017).
- "Scenariosanalysis of energy mix for road transportation sector in Indonesia", Deendarlianto, Widyaparaga, A. Sopha, BM, Budiman, A, Muthohar, I, Setiawan, IC,Lindasista A, Soemardjito, J, Oka, K. Renewable and Sustainable Energy Reviews, 70, pp. 13-23 (2017).



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Field of Interest

- Broadband Wireless
- Mobile Satellite Communication

Education

- 1997 S1 Degree (equivalent Bachelor) in Electrical Engineering,
Faculty of Engineering, University of Indonesia, Indonesia
- 2002 Master Program in Telecommunication and Information Technology,
University of Karlsruhe, Germany
- 2008 Doctor Program in Electrical Engineering,
Faculty of Engineering, University of Indonesia, Indonesia

Research Projects

- Fitri Yuli Zulkifli, Rahardjo, ET., and Hartanto, D., "Mutual Coupling Reduction Using Dumbbell Defected Ground Structure for Multiband Microstrip Antenna Array", Progress In Electromagnetic Research Letters (PIERL), vol 13, 2010, ISSN: 1937-6480.
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- Fitri Yuli Zulkifli, Mayang Dewi Kurniawan and Eko Tjipto Rahardjo, "Dual Band PIFA with U slot for WiMAX Application", Asia Pacific Microwave Conference (APMC), Singapore, 7-10 Desember, 2009. Conference on Telematics, System, Services, and Applications 2009 (TSSA 2009), 20-21 Nov 2009, Bandung Indonesia
- Fitri Yuli Zulkifli, Eko Tjipto Rahardjo, " Mutual Coupling Reduction of Multiband Microstrip Antenna Array Using Defected Ground Structure", The 2009 International Symposium on Antennas and Propagation (ISAP2009), pp.656-659, Okt 20-23, Bangkok,Thailand
- Fitri Yuli Zulkifli, Arman D. Diponogoro and T. Maulana Habibi, "Design of GSM Authentication Simulation with A3 Algorithm Using Microcontroller AT89S52", 11th Int. Conference Quality in Research (QIR), Agustus 2009



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Field of Interest

- Auditory perception in general
- Auditory modality (e.g., auditory illusions, speech perception, music perception)
- Visual modality (e.g., visual illusions, motion perception)
- Special perceptual abilities (e.g., absolute pitch and synesthesia)

Education

Bachelor of Art, Leiden University

Master of Art, Leiden University

Doctoral degree, Kyushu Institute of Design

Professional Activities

Associate Professor / Human Science Course, Human Science International Course, Research Center of Applied Perceptual Science, Department of Human Science, Kyushu University

Research Projects

- Gerard Remijn, Kikuchi, M., Shitamichi, K., Ueno, S., Yoshimura, Y., Tsubokawa, T., Kojima, H., Higashida, H., Minabe, Y., A NIRS study on cortical hemodynamic responses to normal and whispered speech in 3- to 7-year-old children, (2017). Journal of Speech, Language and Hearing Research, 60, 465–470, 2017.03.
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- Remijn, G.B., Kikuchi, M., Yoshimura, Y., Shitamichi, K., Ueno, S., Nagao, K., Munesue, T., Kojima, H., Minabe, Y. (2011), Hemodynamic responses to visual stimuli in cortex of adults and 3- to 4-year-old children, Brain Research, 1383, 242-251.



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Field of Interest

- Optoelectromechanical
- Nanosystems
- OptoSense

Education

- 2008 Bachelor of Engineering (B.Eng./S.T.) in Electrical Engineering,
Universitas Gadjah Mada, Indonesia
- 2010 Master of Engineering in Computer Science and Information Engineering,
Asia University, Taiwan
- 2014 Doktor-Ingenieur in Electrical Engineering, Information Technology, and Physics,
Technische Universität Braunschweig, Germany

Research Projects

- Schmidt, A. Gad, G. Scholz, H. Boht, M. Martens, M. Schilling, H.S. Wasisto, A. Waag, U. Schröder (2017) Gold-modified indium tin oxide as a transparent window in optoelectronic diagnostics of electrochemically active biofilms. *Biosensors and Bioelectronics* 94, 74–80.
- M. Bertke, G. Hamdana, W. Wu, H.S. Wasisto, E. Uhde, E. Peiner (2017) Analysis of asymmetric resonance response of thermally excited silicon micro-cantilevers for mass-sensitive nanoparticle detection. *J. Micromech. Microeng.* 27, 064001(10pp).
- F. Yu, S. Yao, F. Römer, B. Witzigmann, T. Schimpke, M. Strassburg, A. Bakin, H.W. Schumacher, E. Peiner, H.S. Wasisto, A. Waag (2017) GaN nanowire arrays with nonpolar sidewalls for vertically integrated field-effect transistors. *Nanotechnology* 28(9), 095206 (9pp).
- G. Hamdana, M. Bertke, L. Doering, T. Frank, U. Brand, H.S. Wasisto, E. Peiner (2017) Transferable micromachined piezoresistive force sensor with integrated double-meander-spring system. *J. Sens. Sens. Syst.* 6, 121–133.



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Field of Interest

- Engineered Inorganic
- Mineral Brine Processing
- Microporous silica membranes
- Thin-film ceramic membranes

Education

2006 PhD in Material Science, University of Montpellier, France

Research Projects

- Zhang, Tianlong, Elma, Muthia, Xie, Fengwei, Motuzas, Julius, Zhang, Xiwang and Wang, David K. (2018) Rapid thermally processed hierarchical titania-based hollow fibres with tunable physicochemical and photocatalytic properties. *Separation and Purification Technology*, 206 99-106. doi:10.1016/j.seppur.2018.05.063
- Song, Yingjun, Motuzas, Julius, Wang, David K., Birkett, Greg, Smart, Simon and da Costa, João C. Diniz (2018) Substrate effect on carbon/ceramic mixed matrix membrane prepared by a vacuum-assisted method for desalination. *Processes*, 6 5: . doi:10.3390/pr6050047.
- Chen, Huihuang, Motuzas, Julius, Martens, Wayde and da Costa, Joao C. Diniz (2018) Ceramic metal oxides with Ni²⁺ active phase for the fast degradation of Orange II dye under dark ambiance. *Ceramics International*, 44 6: 6634-6640. doi:10.1016/j.ceramint.2018.01.071.
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- Motuzas, Julius, Drobek, Martin, Martens, Dana L, Vallicari, Cyril, Julbe, Anne and Diniz da Costa, João C (2017) Environmental mineralization of caffeine micro-pollutant by Fe-MFI zeolites. *Environmental science and pollution research international*, 25 4: 3628-3635. doi:10.1007/s11356-017-0530-0.



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Education

- 1983 Bachelor Degree in Electrical Engineering,
Institute Technology Bandung, Indonesia
- 1985 Bachelor Degree in Economic, Universitas Padjajaran, Indonesia
- 1988 Master Degree in Computer Science, University of New Brunswick Canada
- 1992 Doctoral Degree in Computer Science, University of New Brunswick Canada

Professionals Activities

- 2004 – 2008 Adjunct Professor, University of New Brunswick Canada
- 2016 – 2021 Majelis Wali Amanat Institut Sepuluh Nopember

Research Projects

- Riyanto Sarno,Sistem Manajemen Keamanan Informasi, ITSpress, 2009
- Riyanarto Sarno, Wiwin Sulisty, "Modelling of Automated Audit for ISO/IEC 17799:2005 Incorporating Extended Weighted - Tree Similarity Algorithm", ICTS, 2007, Surabaya".
- Bilqis Amaliah, Riyanarto Sarno, Muh. Husni, "Context Awareness Telephony Base On 3 D Context Model", ICTS, 2006, Surabaya".
- A.Hoirul B, Anton Prasetyo, Riyanarto Sarno, "Bridging Mobile Office-Facsmile Using GSM and CDMA Network", ICTS, 2006, Surabaya".
- Wiharto H, Riyanarto Sarno, Isye Arieshanti, "A Web Based Application for Planning of Electricity Distribution Network", ICTS, 2006, Surabaya".
- Budianto, Riyanarto Sarno, Shape Matching Using Thin-Plate Splines Incorporated to Extended Weighted-Tree Similarity Algorithm for Agent Matching in Virtual Market, ICTS, 2005, Surabaya.
- M. Endi Nugroho,Riyanarto Sarno, Yoyon Cahyono, Pendekripsi Posisi pada Sistem Informasi Geografis dengan Menggunakan PC Pocket, SIIT, 2005, Surabaya.
- Sholeh Hadi Setyawan, Riyanarto Sarno, Fuzzy Logics Incorporated to Extended Weighted-Tree Similarity Algorithm for Agent Matching In Virtual Market, ICTS, 2005, Surabaya.



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Field of Interest

- Geology, environmental and development
- Computer science, civil engineering, and electrical engineering communication, and socioeconomic study
- Integration of geohazard spatial data

Education

- 1993 Bachelor Degree in Geology, Universiti Kebangsaan Malaysia
1995 Master in Geologi Gunaan/Geologi, Universiti Kebangsaan Malaysia
2006 Ph.D in Environmental and Development, Universiti Kebangsaan Malaysia.

Awards

- 2006, 2013, 2014, 2016 Excellent Academic & Research Excellence Leadership Award
2017 Second place in Newton Fellowship Award from Royal Academic Engineering United Kingdom

Professional Activities

- 1993 - 1994 Tutor Zamallah in Universiti Kebangsaan Malaysia
1994 - 1995 Engineering Geologist in Jurutera Perunding Zaaba, Malaysia
1995 - 1997 Engineer in Kinta Kelas PLC (Renong Group of Company), Malaysia
1997 - 1999 Engineer in Pengurusan Lebuhraya Berhad (Renong Group), Malaysia
1999 - 2001 Engineer (Pavement Management System) in Africon PLC, South Africa
2001 - 2006 Lecture in Universitas Tenaga Nasional, Malaysia
2006 - 2014 Senior Lecture in Universitas Tenaga Nasional, Malaysia
2015 - 2018 Associate Professor in Universitas Tenaga Nasional, Malaysia

Research Projects

- Rohayu Bte Che Omar, Dr., Intan Nor Zuliana Baharuddin, Fathoni Usman, Dr., Nor Hazwani Binti Nor Khalid, Rasyikin binti Roslan; Progress Report: Research On Virtual Geo-Hazards Monitoring And Asset Management System (Asset Development); Progress Report; Agency: Tenaga Nasional Berhad, Year: 2017
- Rohayu Bte Che Omar, Dr., Rasyikin binti Roslan, Intan Nor Zuliana Baharuddin, Fathoni Usman, Dr., NOR HAZWANI BINTI NOR KHALID; Progress Report: Sustainable Streetscape For Improvement Of Tnb Street Furniture; Progress Report; Agency: Tenaga Nasional Berhad, Year: 2017; 31 Jul 2017.

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POLICE
110



AMBULANCE
118 OR 119



FIRE
113



SEARCH AND RESCUE
115



MOBILE AND SATELLITE PHONE
112



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