

The background is a blue-toned image of a hand with the index finger pointing towards a large, stylized white letter 'I'. The 'I' is set against a background of intricate white and light blue circuit board patterns. The overall aesthetic is technological and futuristic.

**2ND IEEE INTERNATIONAL CONFERENCE
ON INNOVATIVE RESEARCH AND
DEVELOPMENT**

ICIRD 2019

28 JUNE - 30 JUNE 2019

**UNIVERSITAS INDONESIA
DEPOK, INDONESIA**



2nd IEEE International Conference on Innovative, Research and Development 2019

The 2nd IEEE ICIRD-2019 is being organized by IEEE IIUM SB, technically supported by the IEEE IMS Malaysia Chapter with Collaboration of NQ-TECH, ETSS Management Malaysia and University of Indonesia. The theme of this conference is “Innovative, Research and Development are Driving our Future”.



Organized by:



ABOUT NQ-TECH



Aims and Objectives:

The main aim of the NQ-TECH Management and Services is to support research culture among international community in the fields of Engineering, Technologies, Business, Social and Applied Sciences.

The primary objective of the NQ-TECH Management and Services is to promote research and developmental activities in Engineering, Technologies and other fields of sciences. Also, NQ-TECH is to promote information exchange between researchers, developers, industrialists, engineers, students, entrepreneurs and practitioners working in and around the world.

Activities:

The NQ-TECH is involved in organizing local as well as international conferences, seminars, workshops, research talks and many more. NQ-TECH firmly believes in collaborative activities with global partners, institutions, research and development organizations, academic institutions and others. ICIRD 2019 is one of those activities that NQ-TECH, ETSSM, universitas Indonesia and IEEE IIUM student branch are collaborating together to achieve bigger objectives.

Prof. Dr. Asadullah Shah
Executive Chair ICIRD 2019
Executive Director
NQ-TECH, Malaysia

FOREWORD FROM GENERAL CHAIR

Dear distinguished delegates,



It is our great honor and pleasure to welcome you to the 2nd IEEE International Conference on Innovative Research and Development (ICIRD 2019) in conjunction with International Engineering Student Conference, which are held in Faculty of Engineering, Universitas Indonesia (FTUI), Depok City, Indonesia on June 28-29, 2019. ICIRD 2019 is being organized and sponsored by FTUI and IEEE Malaysia Section IMS Chapter.

The theme of this conference is “Innovative Research is Driving our Future”. ICIRD 2019 will provide a meeting place for the sharing of novel ideas and research findings in the field of engineering, technologies, social sciences & business management. Its main goal is to foster multidisciplinary knowledge exchange by researchers and developers as well as research students and professional experts.

We would like to express our heartfelt appreciation to our chairs, sponsors, technical program committee members, organizing committee members, authors and delegates, who made a lot of efforts and contributions to our conference. Thanks to your support and help, we can hold this conference successfully and always keep making progress. The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in the engineering-related fields.

Because of their hard work, we are pleased to accept 72 presentations coming from 7 countries including Indonesia, Malaysia, Pakistan, Bahrain, Bangladesh Iraq and Kuwait. We thank to our keynote speakers who are pleased to make contributions to our conference and share their new research progress with us. They are Prof. Dr.Eng. Wisnu Jatmiko, Chair of IEEE Indonesia Section from Faculty of Computer Science, Universitas Indonesia, who is delivering a speech on “Development of Intelligent Smart Telehealth System for Indonesian Healthcare” and Dr. S. Ismail Shah, ITU Area Representative for Southeast Asia and Head of ITU office for Southeast Asia and Timor-Leste, who will make a speech on “The Role of Digital Science in Sustainable Development”.

On June 28-29, we have 3 parallel presentation sessions including (Engineering, IT and Software and Communication and Technology). The platform is ready, so please take this opportunity to show your thoughts, comments and opinions in this scientific conference. We wish you enjoy following the event, contribute effectively toward it and take back with your knowledge, experiences, networks and happy memories of these days.

Thank you for your attention and we look forward to meeting you in conference.

On behalf of ICIRD 2019 committee

Chairul Hudaya, PhD
Technical Program Chair
ICIRD 2019

FOREWORD TECHNICAL GENERAL CHAIR



The International Conference on on Innovative Research and Development (ICIRD) 2019 is an IEEE Indexed Explore (Code # 47319., ISBN No. 978-1-7281-2825-2- 978-1-7281-2825-2) event with much more adding on to its début since its last debut in 2018. Here participants meet for an eye-to-eye and contemplating on different subject areas. ICIRD is one of the two flagship events of Engineering Technologies and Applied Sciences. ETSS a platform where researchers, academicians and educationists from around the world meet once every year. ICIRD's Technical Committee adds values and virtues to their skills they have gained during such events in the past while attending to delegates' responses and queries diligently. Participation in our event will equip one with an unforgettable learning experience, as we are on our way to host more international events bearing flag of the major IEEE Societies. We hope that you will be having a fruitful stay here at Universitas Indonesia, Depok. We guarantee attention with service, and see you in the upcoming events which will be announced soon.

Prof. Dr. Sheroz Khan
Technical General Chair
ICIRD 2019

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KEYNOTE SPEAKERS



Dr. S. Ismail Shah

(ITU Area Representative for Southeast Asia and Head of ITU office for Southeast Asia and Timor-Lest)

Title: The Role of Digital Science in Sustainable Development

Abstract: The Sustainable Development Goals (SDGs) and targets will stimulate action over the next several years in areas of critical importance for humanity and the planet. As acknowledged by the 2030 Agenda for Sustainable Development, the spread of information and communications technologies and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies, as does scientific and technological innovation across areas as diverse as medicine and energy. Digital Science and technologies can play a very important role to achieve the SDGs. Technologies like advancement in broadband (advanced 4G and 5G), Artificial Intelligence, Blockchain, 3D printing, Internet of Things (IoT) will not only play a critical role in moving the country towards the Fourth Industrial revolution but pave the way for the fulfilment of these the SDGs. his talk will focus not only on the role digital technologies and digital science but the solutions that need to be developed and the research that need to be carried out, can play in achieving sustainable development goals by 2030. Thus achieving progress in a comprehensive manner without leaving anyone behind.

Professor Dr. Eng. Wisnu Jatmiko S.T., M.Kom.

(Professor at Faculty of Computer Science, University of Indonesia)

Title: Faculty of Computer Science, University of Indonesia

Indonesia is a nation located in South-East Asia that extends 5.120 kilometers from the east to the west. In addition to the large area, the archipelago has more than 17.000 islands, where five of them are considered as the main islands. However, Indonesia still face problems in several sectors, one of which is healthcare. One of the most prominent problem is the uneven distribution of specialists between islands of Indonesia, particularly Cardiologists and Obstetricians. Roughly 44% of Cardiologists in Jakarta are base in Java, while 24% of Obstetricians in Indonesia are located in Jakarta. In addition, the country is also experiencing high fetal and mother mortality rate. One of the major factors that caused this issue is the lack of growth monitoring. Based on the afore mentioned problems, we have developed a Smart Telehealth System for Indonesian Hospitals. The general aim of a Telehealth System is to conduct remote consultation and to exchange healthcare information between the patient and the doctor. In our developed Telehealth System, there are two sub-systems: Tele-USG and Tele-ECG System. The Tele-USG is a mobile-based system which covers end-to-end process, from doctor consultation, fetal progress, to USG fetal measurement. In addition, an intelligent module that automatically detects and measures the biometrics of the fetus is implemented in this system by approximating the organs using Hough Transform-based curve. The module could calculate the Head Circumference, Biparietal Diameter, Abdomen Circumference, Femur Length, and Humerus Length. The Tele-ECG System is also a mobile-based end-to-end system. The system could obtain the patient's heartbeat by using ECG Sensors. From the ECG sensors, the data is processed by using Baseline Wander Removal (BWR), Beat Segmentation, Wavelet methods to reduce the dimension. The signal is then transferred to a mobile device. In addition to these features, the system could also classify arrhythmia based on the ECG data. The system used AMGLVQ classifier, which has been proven accurate in classifying heartbeat signals. Before transferring the data to a Cardiologist in the main islands of Indonesia, the data is compressed using 2D SPIHT Compression, with a 24 lossless compression ratio. With this Telehealth System, it will help to reduce mortality rate for Cardiovascular disease related death and for the Fetal and Mother.

Schedule DAY-1: Friday 28th June 2019

Time	Venue	Program	Duration
08:00		Conference Registration	60 minutes
09:00	Room A	Welcome speech and 2 nd ICIRD 2019 commencement by Conference Executive Chair (Professor Dr. Asadullah Shah)	15 minutes
Keynote Speech			
09:15	Room A	Dr. Ismail Shah	45 minutes each
		Professor Dr. Eng. Wisnu Jatmiko S.T., M.Kom	
		Vote of Thanks by Dr. M. Yaqoob Koondhar, Secretary ICIRD 2019	10 minutes
		Awarding of Plaque of Recognition	05 minutes
11:00	Lunch and Prayer		150 minutes
01:30	Room 1	IT and SOFTWARE Parallel session	(10 min of presentations + 5 min of Q&A)
	Room 2	ENGINEERING Parallel session	
	Room 3	COMMUNICATION and Technology Parallel session	
15:00	Refreshment Break		30 minutes
15:30	Room 1	IT and SOFTWARE Parallel session	(10 min of presentations + 5 min of Q&A)
	Room 2	ENGINEERING Parallel session	
	Room 3	COMMUNICATION Parallel session	
17:00	Tea Break		
END of Day 1			

Schedule DAY-2: Saturday 29th June 2019

Time	Venue	Program	Duration
09:00	Room 1	IT and SOFTWARE Parallel session	(10 min of presentations + 5 min of Q&A)
	Room 2	ENGINEERING Parallel session	
	Room 3	COMMUNICATION and TECHNOLOGY Parallel session	
10:30	Refreshment Break		30 minutes
11:00	Room 1	IT and SOFTWARE Parallel session	(10 min of presentations + 5 min of Q&A)
	Room 2	ENGINEERING Parallel session	
	Room 3	COMMUNICATION and TECHNOLOGY Parallel session	
12:30	Lunch Break		60 minutes
13:30	Room 1	IT and SOFTWARE Parallel session	(10 min of presentations + 5 min of Q&A)
	Room 2	ENGINEERING Parallel session	
	Room 3	COMMUNICATION and TECHNOLOGY Parallel session	
15:00		Closing Ceremony & Award Distribution Speech by Technical General Chair Dr. Sheroz Khan	30 minutes
15:30	Tea and End of Conference		

TECHNICAL SESSIONS: SCHEDULE

IT AND SOFTWARE TRACK

TIME(Hrs.)	PAPER ID	PAPER TITLE
DAY-1: Friday 28th June 2019: Room 1		
13:30	10	Technical and Economical Feasibility Utilization of Exhaust Gas from Oil Wells Venting System in Y Offshore Platform
13:45	23	Internet of Things Platform to Monitoring & Controlling Project Remotely: A Qualitative Analysis
14:00	27	On Developing Network Scheduling Simulator: IR-TASA Visualization
14:15	38	An Analytical Hierarchy Process Assessment of The Environmental Management System on Higher Education Institute in Indonesia
14:30	39	Scheduling The Arrival of Raw Material Suppliers Using Truck Turnaround Time Method in FMCG Company
14:45	40	Measuring Quality of Service (QoS) and Quality of Experience (QoE) on 5G Technology: A Review
15:00	Lunch and Prayer (150 MIN)	
15:30	44	Failure analysis of superheater tubes in a circulating fluidized bed boiler
15:45	47	Comprehensive ICT Framework for Educational Institutes of Kuwait: An Empirical Study
16:00	55	Potential Implementation of A2G Technology for IFC Services on Flights in Indonesia
16:15	74	Time and Cost Optimization of a Nuclear Reactor Project Using Combined-Method
16:30	84	Development of Rainwater Utilization Scheme as an Alternative of Water Source at a Hotel
16:45	90	Question Answering Systems: A Survey and classification
17:00	END of Day	

TIME(Hrs)	PAPER ID	PAPER TITLE
DAY-2: Saturday 29th June 2019: Room TBD		
09:00	95	Development of Greywater Utilization Scheme as an Alternative of Water Source in a Hotel
09:15	101	Rainwater Harvesting Scheme as Additional Source of Clean Water at an Apartment
09:30	108	Digital Literacy and the Attitude of Educators Towards MOOC Platform in GCC Countries
09:45	111	Authentication System Comparison on Android Application
10:00	113	LoRa Network Planning for Smart Meter Utilities in Jakarta and Tangerang Area
10:15	115	Voice User Interface Optimization Based On Android Speech API and PocketSphinx for Indonesian Language on Radio Internet Application
10:30	Refreshment Break (30 MIN)	
11:00	116	Valuation of Indonesian Biodiesel Formula Prices By The Characteristics-Related Palm-Based Biodiesel' Pricing System
11:15	32	Efficient Power and Routing in UAV Communication Networks
11:30	48	Pervasive Learning Environment For Educational Makerspaces With Emerging Technologies And Teaching And Learning Transformation
11:45	81	M2M Connectivity and Business Strategy Analysis : Case Study of PT XYZ in Jabodetabek Area
12:00	18	Strategy of National Fiber Optic Backbone Network Utilization Enhancement in Rural Area of Indonesia
12:15	80	Evaluation of The Implementation of Fixed Broadband Access Provision Policy in Accelerating Fixed Broadband Penetration in Indonesia
12:30	Lunch Break	
15:00	END of DAY 2	

ENGINEERING TRACK

TIME(Hrs.)	PAPER ID	PAPER TITLE
DAY-1: Friday 28th June 2019: Room 2		
13:30	25	Control of Electronic Devices Using Neural Network Based Sundanese Speech Recognition
13:45	26	Modeling and Designing Direct Inverse Control Using Back-propagation Neural Network for Skid Steering Boat Model
14:00	33	Improving Loss of Load Probability through Biomass Power Plant Integration : A Case Study in Tanjung Balai Karimun
14:15	36	MICROGRID DESIGN FOR SEBIRA ISLAND IN KEPULAUAN SERIBU WITH TECHNICAL AND ECONOMICAL ANALYSIS Abstract
14:30	41	Economical Analysis Optimization of East Sumba Microgrids
14:45	43	Design of Single Input Multiple Output Full Bridges DC-DC Converters For Personal Computer Power Supply
15:00	Lunch and Prayer (150 MIN)	
15:30	46	Disturbance Characteristics in Frequency 9 kHz-150 kHz on Photovoltaic System with RLC Load
15:45	31	PERFORMANCE EVALUATION OF NILM DATA PREPROCESSING FOR NAÏVE BAYES CLASSIFIER
16:00	59	Installation of Hybrid Power System in Ro-Ro Passenger Vessel
16:15	62	Economic Load Dispatch Optimization of Thermal Power Plant Based on Merit Order and Bat Algorithm
16:30	64	Rectangular Microstrip Array Antenna for Enhancing Terahertz Imaging Quality
16:45	65	Optimization of Tugboat as Lifting Operation Support Vessel in Indonesia's Upstream Oil and Gas Terminals using Differential Evolution Algorithm
17:00	END of Day 1	

TIME(Hrs)	PAPER ID	PAPER TITLE
DAY-2: Saturday 29th June 2019: Room TBD		
09:00	68	Antifungal Test of Bee Propolis Microcapsule <i>Tetragonula</i> spp. With Maltodextrins and Gum Arab Coating
09:15	69	Voltage Stability Improvement Using Load Shedding and Static VAR Compensator (SVC): Study Case of Senayan - Sambas Power System
09:30	71	Medical Image Analysis using Deep Learning: A Review
09:45	73	Study on Short Circuit Current Contribution after Photovoltaic Solar Plant Integration in Lombok's Distribution Network
10:00	75	A Method to Improve Frequency Stability Using Location-based Load Shedding: Study Case of Senayan-Sambas Power System
10:15	76	Planar Microstrip Array Antenna with Rectangular Configuration Fed with Chebyshev Power Distribution for C-Band Satellite Application
10:30	Refreshment Break (30 MIN)	
11:00	122	Street lighting Poles Top Solar Power Generation for Typical Housing Area in Kuwait
11:15	110	Solar Irradiance Estimation at Certain Location Using Artificial Neural Network and ASHRAE Clear-Sky Mode
11:30	105	Design of Low-Cost Energy Metering Device for Direct Load Control and Air Conditioning Energy Monitoring
11:45	60	Prediction of Power Transformers Lifetime Using Thermal Modeling Analysis
12:00	89	Molecular Docking Study of Anti-Inflammatory Biomarkers in Sulawesi Propolis as Potent Inhibitors of Cyclooxygenase-2
12:15	118	Performance Analysis of Solar-Powered Submersible DC Water Pump
12:30	Lunch (60 MIN)	
13:30	92	Effect of Repetitive Recycling on the Optical Properties of Polypropylene Based on Material Value Conservation Paradigm
13:45	99	Analysis of Discharge Rate and Ambient Temperature Effects on Lead Acid Battery Capacity
14:00	11	SEMI PORTABLE BIOGAS POWER PLANT USING ENGINE GENERATOR SET FOR DISASTER AREA
14:15	104	Mitigation of Voltage Sag Caused by Unbalanced Load by Using DFT Controlled DVR
14:30	xx	
14:45	xx	
15:00		

Communication and Technology Track

TIME(Hrs.)	PAPER ID	PAPER TITLE
DAY-1: Friday 28th June 2019: Room 3		
13:30	16	Literature Review Related Causal Factor Risk of Delay at Construction Project: Meta-Analysis
13:45	20	Cost Overrun Risk Factors in Jakarta MRT Project Phase 1: What Does Literature Tell Us?
14:00	21	Effects of Composition Variation of CrO ₃ Doped on Phase Transformation and Microstructure of TiO ₂ Nanomaterial as CO Gas Sensor
14:15	78	Effect of Curing duration and environment on mechanical properties and bonding strength of composite-metal
14:30	29	Effect of Hardness Natural Rubber to KNF 700 Performance
14:45	45	Optimization of Propane Reliquefaction Cycle in LPG Plant
15:00	Lunch and Prayer (150 MIN)	
15:30	50	Causal Factors of Change Order and Variation Order in Construction Project: A Literature Review
15:45	53	Economic Analysis of Renewable Energy Power Plant in Sumatera, Indonesia
16:00	63	Optimal Degree Distribution with Minimal Stopping Sets for Massive IoT Communications
16:15	66	Implementation of DMAIC Six Sigma to Reduces Defects in Slab Construction Process: A Case Study Of Highrise XYZ Building Construction
16:30	83	Contagion Analysis of Asian Financial Conditions Towards Indonesian LNG Price as an Investment Strategy
16:45	85	Impact of Design for Material Value Conservation on Flexible Plastic Packaging towards the Life Cycle of Plastic Materials
17:00	END of Day 1	

TIME(Hrs)	PAPER ID	PAPER TITLE
DAY-2: Saturday 29th June 2019: Room TBD		
09:00	86	NB-IoT Planning in Jakarta Area for Smart Meter Utilities
09:15	87	Universitas Indonesia Welding Center Sub Sea Personel Qualification GAP Analysis
09:30	91	Newly Installed Subsea Pipeline Potential Failure Analysis Using Risk FMEA Method
09:45	98	Quality Analysis and Lifetime Prediction of SF ₆ in High Voltage Gas Insulated Switchgear (GIS) at CSW Bulungan
10:00	112	Performance Implementation of Multi-access Edge Computing at Indonesia Telco Operator
10:15	42	An S-bend based Optical Directional Coupler Using GaN Semiconductor
10:30	Refreshment Break (30 MIN)	
11:00	77	Optimum Location for PV Implementation Based on Load-flow Analysis Using Newton-Raphson Method for Lombok Electrical Network
11:15	88	Prediction of Electricity Load Growth of Tangerang City using SIMPLE-E
11:30	100	Optimization of Point-to-Point CO ₂ Pipeline Transport for Carbon Capture Utilization Sequestration (CCUS)
11:45	121	An Implementation of Electroencephalogram Signals Acquisition to Control Manipulator through Brain Computer Interface
12:00	109	Calibration of 100 A/50 mA Instrument Current Transformer Energy Meter Using Bisection Method
12:15	114	Comparison of Automatic Indonesian Plate Number Recognition Using K-Nearest Neighbor And Neural Network Method
12:30	Lunch (60 MIN)	
13:30	117	COMPRESSIVE SENSING IMAGE RECONSTRUCTION WITH TOTAL VARIATION AND L _{2,1} NORM FOR MICROWAVE IMAGING
13:45	120	High-Gain Rectangular-Fins Shaped Balanced Antipodal Vivaldi Antenna Array Extended by Dielectric for wide-band Imaging Application
14:00	35	Establishing National Science and Technology Park in Pakistan
14:15	xx	
14:30	xx	
14:45	xx	
15:00		



ABSTRACTS

(Note these abstract and names are from the easy chair account. For publication, your pdf express versions will be used)

Paper ID: 10

Technical and Economical Feasibility Utilization of Exhaust Gas from Oil Wells Venting System in Y Offshore Platform Ruspenda and Sukirno

The electrical submersible pump that was used for lifting oil from the formation, cannot work properly because it often experiences a gas lock because of the produced associated gas in the well bore. To overcome this, the associated gas has to be discharged through the casing annulus and vented to the atmosphere. This venting system potentially causes the air pollution. Therefore, 5 MMSCFD of associated gas that was produced at Y Platform needs to be utilized by delivering it to the process platform. Technical feasibility study for utilization of 5 MMSCFD of associated gas suggests the installation of additional facilities, i.e. a 55 "OD x 8'0" S/S scrubber, 8" 5700 ft-long pipeline, and a compressor. The compressor discharge pressure has to be 400 psig so that the gas can be used as a feed at a gas turbine or gas plant for further treatment. This project is economically feasible since the NPV, IRR, annual revenue, and payback period values are US\$ 136.9 million, 157%, US\$ 11.1 million and 8 months respectively.

Paper ID: 11

SEMI PORTABLE BIOGAS POWER PLANT USING ENGINE GENERATOR SET FOR DISASTER AREA Ardiansyah Yatim and Ade Luthfi

This paper aims to find out the potential of a biogas power plant system using generator sets as an alternative energy source in disaster areas. Indonesia is a country at risk of experiencing a disaster based on World Risk Index data for 2014-2016. The Palu Earthquake shows that electricity is an important necessity during a disaster. Based on BNPB regulation No. 17 of 2009, generator sets are needed as units of electricity generation in disaster areas. Biogas can be an alternative power plant in the area. The research method used to determine the appropriate biogas treatment method. Variation of fuel and loading, engine capacity is carried out to determine the performance of the generator. Obtained biogas production will be optimal after 10 days of biomass retention, 90 minutes of purification of vapor in bag absorbent. The 1 kW generator set was tested using gasoline and biogas with a load of 200 W, 400 W, and testing a 3 kW generator using methane gas with a load of 400 W, 750 W, 1000 W, 1500 W. high, namely methane gas, biogas and gasoline and the thermal efficiency of a 3 kW generator set is higher than 1 kW. Active power per load produced by a 1 kW generator and 3 kW generator is relatively the same.

Paper ID: 16

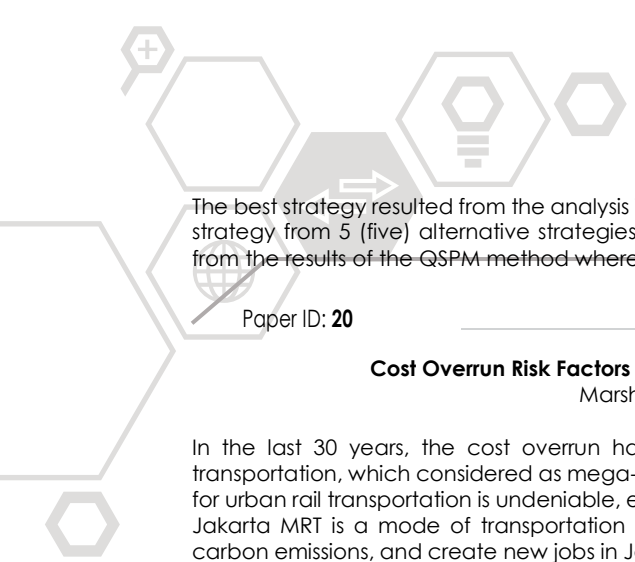
Literature Review Related Causal Factor Risk of Delay at Construction Project: Meta-Analysis Mohammed Ali Berawi and Rangga Adi Putra

The construction projects have a role in the establishment of physical infrastructures in a country. However, the most problem in construction projects is the issue of delay. This paper reviews thirty studies around the world which had identified the delay factors in construction project. The purposes of this paper are to identify and highlighting the research gaps in the literature. To achieve that purpose, the author has conducted a comprehensive literature review. The thirty articles were reviewed in five discussion topics: research background, the objective of the papers, construction object areas, research variables used and methodology and data analysis. The paper using statistical method to find the most used variables at the each discussion topics. Majority of articles have a. "the occurrence of delay" as the research background, b. "identify the causes of delay" as the research objective, c. "General construction project" as the type that discuss, d. "Literature review, interview, and questionnaire survey" as the sampling method, and e. "Relative Important Index" as the formula to analyze the data.

Paper ID: 18

Strategy of National Fiber Optic Backbone Network Utilization Enhancement in Rural Area of Indonesia Yanuar Antoni and Muhamad Asvial

Telecommunication world is becoming innovation locomotive which fundamentally changing human life. The development of telecommunications technology embodies several systems that can increase effectiveness and efficiency of human life and economic growth of a country. Reviewing the benefits of the role of telecommunications, Government of Indonesia is building a national fiber optic backbone network called Palapa Ring in rural area by utilizing the contribution of Universal Service Obligations managed by the Ministry of Communications and Information (MCI) of the Republic of Indonesia. However, the Palapa Ring Network has a low utilization rate due to its immature business management strategy. This study analyzed the best strategies of network utilization enhancement in rural area that can be applied by BAKTI as MCI's representatives or the other organization with similar roles. The strategy analysis is carried out using the quantitative strategic planning matrix (QSPM) method, SWOT Analysis and IE Matrix. The analysis is elaborated based on the results of evaluation of internal and external factors which data collection is done using a descriptive method.



The best strategy resulted from the analysis in this study is "Catalyzing 4G growth in rural areas". This strategy is the best strategy from 5 (five) alternative strategies that have been formed. Determination of the best strategy is reviewed from the results of the QSPM method where the strategy has a value of Total Attractiveness Score (TAS) of 3.49.

Paper ID: 20

Cost Overrun Risk Factors in Jakarta MRT Project Phase 1: What Does Literature Tell Us?

Marshall Gilberto and Mohammed Ali Berawi

In the last 30 years, the cost overrun has become a scourge for the construction world, especially in urban rail transportation, which considered as mega-projects when viewed from the value of construction. Nevertheless, the need for urban rail transportation is undeniable, especially in the city that is the heart of the Indonesian economy, Jakarta. The Jakarta MRT is a mode of transportation that helps resolve traffic congestion, increase community mobility, reduce carbon emissions, and create new jobs in Jakarta. The Jakarta MRT development project uses loan funds from JICA, and it is estimated to cost almost 16 trillion rupiahs for phase 1 [1]. The construction of phase 1 of the Jakarta MRT completed in March 2019. In 2017, the Jakarta MRT experienced an estimated cost overrun of around 31% [2]. The cost overrun that occurs in Jakarta MRT has similarities with various comparable projects in other countries. This paper critically examines the existing literature concerning cost overrun of urban rail transport, synthesize any main risk factors resulting in cost overrun, and find related factors with Jakarta MRT cost overrun. The study found that Jakarta MRT Cost overrun factors have five factors which also happened in other similar projects around the world that is scope and design changes, owner to contractor payment delay, land acquisition, utility diversion, and complex interfaces.

Paper ID: 21

Effects of Composition Variation of CrO₃ Doped on Phase Transformation and Microstructure of TiO₂ Nanomaterial as CO Gas Sensor

Shella Charisma Agryanandha, Winarto Winarto

CO gas is hazardous gases result from the incomplete combustion of motor vehicles and factories. At this time, has developed a semiconductor gas sensor made of TiO₂ by doping Cr to detect the presence of dangerous gases. In this study will be discussed on the influence of doping composition CrO₃ to change the phase and microstructure as CO gas sensor using the sol-gel method. Synthesis results show the crystal size range 23.87-55.98 nm with anatase TiO₂ crystal structure. Effect of the addition of dopant composition leads to a partial separation of the Cr atomic crystal structure of TiO₂ to the formation CrTiO on doping in variation 5 and 7.5 at. % CrO₃. The sample has a spherical morphology with a particle size ranging from 164.4 to 255.0 nm. The active surface area of TiO₂ by doping 10 at.% CrO₃ showed the highest value of 60.58 m²/g. TiO₂ by doping material shows better thermal resilience against mass reduction compared to TiO₂ without doping from room temperature to 600 ° C.

Paper ID: 23

Internet of Things Platform to Monitoring & Controlling Project Remotely: A Qualitative Analysis

Mohammed Ali Berawi , Adinugroho Sunardi and Mohammad Ichsan

The study objective is to evaluate schedule performance with the Internet of Thing platform in monitoring & controlling construction project. IoT is connecting physicals on the site with virtual things on the screen which enable the stakeholders to collaborate anywhere in real time. It used a qualitative method for coding, data visualization and finding a pattern to draw a conclusion with NVivo software. Data sources for the literature review consist of 26 journal articles about the Internet of Things in constructions project. They were published after the 4th industrial revolution in 2011. A structured interview was used as instrument data collection from four experts. Findings of the study show that the IoT platform can reduce rework, increased productivity, shorten project organization process, improve stakeholder collaboration, and use valid project document & information of the project case study. These show how IoT Platform can increase the schedule performance. This study embraces us to use the 4th industrial revolution technologies in the construction industry.

Paper ID: 25

Control of Electronic Devices Using Neural Network Based Sundanese Speech Recognition

Hariyanto and Aries Subiantoro

This paper describes how speech recognition automatically uses the local language that originated from Indonesia, namely the Sundanese, which can control electronic devices in the home. Sundanese is the second most widely used regional language in Indonesia after Java. Voice recognition using Sundanese is carried out in this study to be able to control several electronic devices directly with high accuracy. The method used in the introduction of Sundanese is the Mel Frequency Cepstral Coefficient (MFCC) extraction method and identification of backpropagation-based neural networks. There are 10 Sundanese instructions used in the introduction to speech as input to the system, and each instruction has 2 to 3 Sundanese syllables. The output used by the author in this paper is five household electronic devices, to turn on or turn off controlled output using 2 Sundanese instructions. The data used in the backpropagation training process is 300 data; each instruction is 30 data. The results of training weights can produce an accuracy rate of 96.7% when testing the system. The control system uses the MFCC method and artificial neural network backpropagation algorithm so that the program works and Sundanese language voice recognition is good.

Paper ID: 26

Modeling and Designing Direct Inverse Control Using Back-propagation Neural Network for Skid Steering Boat Model

Afif Widaryanto and Benyamin Kusumoputro

This paper discusses about designing a direct inverse control based back-propagation neural network for a skid steer model boat. The boat is modeled into a MIMO system, with port side and starboard propeller as input, while yaw, surge velocity and sway velocity as output. The inverse plant model was created for the controller and tested with an identification model of the plant. The simulation result is the plant output follows the desired output value that is fed to the inverse controller with the normalized mean sum square error for yaw 0.1203, surge velocity 0.4459 and sway velocity 0.1723.

Paper ID: 27

On Developing a Network Scheduling Simulator: IR-TASA Visualization

Arief Luthfi Aulia , Kalamullah Ramli and Iman Hedi Santoso

The most difficult challenge of the presence of the Internet of Things (IoT) is resource allocation. This happens because large numbers of nodes are simultaneously connected to networks, while the existing bandwidth is limited. Therefore, an efficient scheduling algorithm is needed. However, unfortunately, current research on network scheduling, especially 802.15.4e, is still constrained by simulator tools. Thus, this study proposes an open simulator platform for implementing network scheduling. This platform can be used by anyone who wishes to conduct a scheduling algorithm simulation. In this study the researchers used the IR-TASA algorithm to test the performance of the proposed simulator. The results of testing from two variables—the number of active time slots and the number of iterations/cycles—showed the same result, 100%, between network simulators and heuristic testing.

Paper ID: 29

Effect of Hardness Natural Rubber to KNF 700 Performance

Ocid Mursid and Yanuar

Fender is designed to have high performance, higher performance fender make berthing facility and ships safer. On this paper present analyzed effect of natural rubber hardness to KNF (Cone fender type) 700 performance. The proposed material on this study is characterized by four hardness parameter of natural rubber. Simulation of rubber fender using software Abaqus student version 2018, the input data for simulation based on stress-strain experiment data. Result on this study is higher of hardness natural rubber causes higher the maximum reaction force and energy absorption. on different parameter hardness of material are not effect to ratio performance fender.

Paper ID: 31

E PERFORMANCE EVALUATION OF NILM DATA PREPROCESSING FOR NAÏVE BAYES CLASSIFIER

Junanto Prihantoro and Abdul Halim

National energy consumption is significantly contributed by household electric power. To find out the use of electrical energy in each household electrical equipment, a technique called Non-Intrusive Load Monitoring (NILM) is used. NILM is a tool to monitor and identify the power of each electrical equipment. Recently some methods of data classification such as neural network, deep learning have been applied to develop NILM. In this paper, naïve bayes method is deployed for NILM. The method is to classify on-off condition of electric appliances. For improving the accuracy, data preprocessing methods that are normalization and discretization is used. Performance comparison is evaluated for each method. In this paper, REDD dataset is utilized. From simulation, it has been found that discretization method gives highest recognition around 96.64% with data training - testing used is 70-30%.

Paper ID: 32

Efficient Power and Routing in UAV Communication Networks

Haque Nawaz and Husnain Mansoor Ali

An unmanned aerial vehicle communication Networks (UAVCN) is a group of UAVs (unmanned aerial vehicles) that is able to communicate and trigger information to each other for a particular mission. This network nodes are power limited. However, the routing mechanism should be improved that extend the lifetime and performance of UAV nodes. This manuscript intends to introduce a concept of a cross-layer method for efficient power and routing for UAVCN to increase communication performance. The cross-layer methodology integrates the physical, link and network layer. An efficient power optimized link state routing (EP-OLSR) protocol is proposed which is an extension to optimized link state routing (OLSR) routing protocol. The proposed routing protocol evaluated by developing scenarios of UAVCN in OPNET modeler 14.5. The simulation is carried out by implementing OLSR and EP-OLSR using different network parameters and compared the routing protocols performance. The results showed that the EP-OLSR maximizes network performance efficiency as compared to OLSR. It minimizes the delay and maximizes the throughput and increases the network performance.

Paper ID: 33

Improving Loss of Load Probability through Biomass Power Plant Integration : A Case Study in Tanjung Balai Karimun
Sunarwoko, Erick Elsafan, Lalu Suhaimi and Chairul Hudaya

Many regions in Indonesia are still lack of electricity due to geographical condition in the form of archipelago, including Tanjung Balai Karimun District, in Kepulauan Riau Province, Indonesia. Therefore, using local renewable resources to fulfill load demand is better than relying on utility grid. The potential of using biomass waste, for instance oil palm and coconut residues, as renewable energy resources should be an optional decision to make improvement, not only for the reliability of existing power system itself but also to meet the load demand generally available in every region of Indonesia. In 2016, Karimun Regency in Riau Islands Province as a Special Economic Zone (SEZ) is growing rapidly in economic and facing electrical energy crisis simultaneously. Addressing this problem, the government has taken an action by making amendment on the policy that consciously planned to increase the capacity of power plants, in particular Oil and Gas Power Plants (OGPP) in the period of 2018-2024. The objective of this study is to evaluate the reliability of Tanjung Balai Karimun power system based on its Loss of Load Probability (LOLP) index designed during the planning period of power plant addition. Then, the value of new LOLP index was recalculated after integrating new system of Biomass Power Plant (BPP). Based on LOLP calculation using recursive method, LOLP index in 2018 decreased from 3.63 days/year to 2.05 days/year, reflecting quality improvement of the power plant reliability. Integrating BPP into the existing power plant has powered up the capacity of 2.8 MW according to the availability of oil palm and coconut biomass waste.

Paper ID: 35

Establishing National Science and Technology Park in Pakistan
Ali Raza, Imdad ali bughio

The need of electricity is a primary attribute in these modern eras. However, not all Jakarta residents get their hands on the electricity in an easy and sustainable way, especially the residents of Sebira Island in Kepulauan Seribu. Sebira Island is far from Java, which is not practical neither to use submarine power cable to power the island nor diesel generator for the only primary attribute of generating electricity, especially its uneconomical traits. In this research we will concentrate on how to design the best Microgrid scenario that is operated in off-grid mode. The microgrid proposed contains PV system and diesel power generator. The proposed design is also analyzed using technical and economical way to know the feasibility of the design in project manner. Contributing by using the proposed scenario, the cash flow which can be saved is up to 3.4 billion Rupiah.

Paper ID: 36

Microgrid Design for Sebira Island in Kepulauan Seribu with Technical and Economic Analysis
Tamam Abdu Khairurraziq, Budi Sudiarto and Rudy Setiabudy

The need of electricity is a primary attribute in these modern eras. However, not all Jakarta residents get their hands on the electricity in an easy and sustainable way, especially the residents of Sebira Island in Kepulauan Seribu. Sebira Island is far from Java, which is not practical neither to use submarine power cable to power the island nor diesel generator for the only primary attribute of generating electricity, especially its uneconomical traits. In this research we will concentrate on how to design the best Microgrid scenario that is operated in off-grid mode. The microgrid proposed contains PV system and diesel power generator. The proposed design is also analyzed using technical and economical way to know the feasibility of the design in project manner. Contributing by using the proposed scenario, the cash flow which can be saved is up to 3.4 billion Rupiah.

Paper ID: 38

An Analytical Hierarchy Process Assessment of The Environmental Management System on Higher Education Institution in Indonesia

Rahmat Nurcahyo, Edbert Santoso, M. Dachyar and Muhammad Habiburrahman

—Implementation of a successful management system can provide internal and external benefits for the organization or institution that adopts it. In the process of implementing the environmental management system, many criteria must be determined for the system to be successfully implemented. This study aims to obtain the best selection results in determining the critical factors that affect the adaptation of ISO 14001 environmental management system. This research was conducted by AHP method with assessment from 5 experts in the field of environmental management system. The research found that the biggest weights of the 19 existing alternative criteria are on Energy Conservation, Emergency Preparedness, Waste Treatment, Employee Commitment, and Waste Recycling. The research subject have an absolute factor that could cause a different importance of criteria.

Paper ID: 39

Scheduling The Arrival of Raw Material Suppliers Using Truck Turnaround Time Method in FMCG Company

Rahmat Nurcahyo, Fikry Aulia Putra and Muhammad Habiburrahman

In achieving the outstanding company's performance, especially in the field of logistics management, scheduling strongly become an important aspect to support the existence of the company to reach their visions. In obtaining a good performance, a FMCG company has constraints on the activities of its inbound logistics. One of the problems that exist is the long waiting time/queuing time of trucks to conduct raw material unloading in the factory warehouses. It gives negative impacts for the company and the suppliers such as financial loss, disruption of factory activity, inhibition of the production line, and the low value of the accuracy of the raw material unloading activities. This study aims to give a scheduling plan for the arrival of the truck suppliers taking into account aspects such as trucks actual turnaround time and the rate of arrival of trucks every day. This study resulted in a fixed draft scheduling truck waiting time supplier to perform the unloading of raw materials in the warehouse area of the plant. Taking into consideration of trucks turnaround time in the factory area, this research resulted in the arrival process improvements by reducing the waiting time for the warehouse 42020 amount 57.2% from 270 minutes to 115.3 minutes and for warehouse 42030 amount 43.2% from 185 minutes to 104,1 minute.

Paper ID: 40

Measuring Quality of Service (QoS) and Quality of Experience (QoE) on 5G Technology: A Review

R. Deiny Mardian, Muhammad Suryanegara and Kalamullah Ramli

The 5G technology to be released in 2020 has a distinct advantage from its predecessor. This difference also results in measurements of Quality of Service (QoS) and Quality of Experience (QoE) which are very diverse because there is no specific standard on 5G technology. This paper gives a review of various approaches in the measurement process of QoS and QoE that grouped into objects, methods, and data acquisition. In addition, this paper provides suggestions on how to prioritize a measurement process related to the location and conditions where 5G technology will be implemented and taking the example of the cellular user condition in Indonesia.

Paper ID: 41

Economical Analysis Optimization of East Sumba Microgrids

Katrin Rifanni Pamela, Budi Sudiarto and Rudy Setiabudy

On-grid existing power system in East Sumba is dominated by diesel generator. Sumba Iconic Island program meet the renewable energy development to provide 95% electrification ratio use renewable energy sources by 2025. HOMER software used to optimize the Cost of Energy and Net Present Value of the power system, include the detail type of power plant. The existing Waingapu Power System with the main diesel generator as the first model is optimized and second one is adding the wind turbine power plant as SII program. The optimal result proposed to provide the power system adding renewable energy source as suitable as more economist than the existing diesel generator.

Paper ID: 42

An S-bend based Optical Directional Coupler Using GaN Semiconductor

Maratul Hamidah, M. Raditya Gumelar, Syamsu Rijal Effendi and Retno W. Purnamaningsih

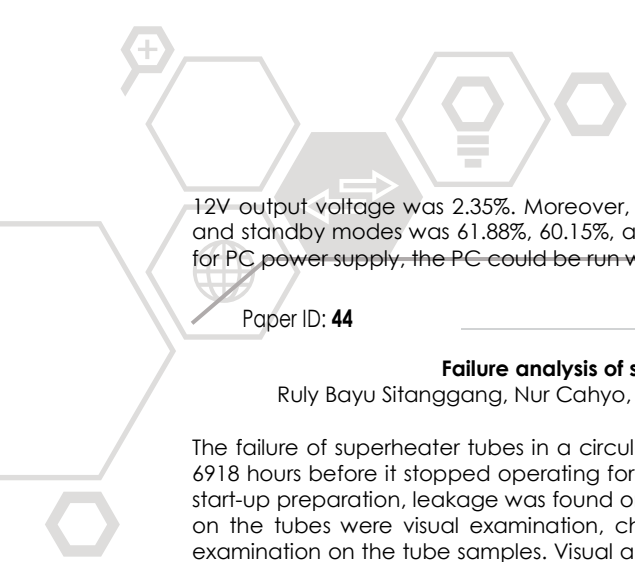
The optical directional couplers are one of the essential devices in photonic systems. It has many applications such as switches, modulator and de-multiplexer. In this paper, optimisation of the optical directional coupler using Gallium Nitride (GaN) semiconductor on sapphire was reported. The optimisation was conducted by investigating the effect of waveguide parameters on the structure using OptiBPM software. The optimisation result showed that the proposed directional coupler could successfully split light into two output branches. The best length and width of the structure were found to be 1000 μm and 17.5 μm , respectively, with a coupling gap of 6.0 μm and a width gap of 9.5 μm . It could split light into two output branches with the splitting ratio of 46.76% and 47.75%. The optical field propagation was uniform along with the structure, and the relative power reached 82.25% at a 1.55 μm wavelength. The excess loss and power imbalance were 0.84 dB and 0.09 dB, respectively.

Paper ID: 43

Design of Single Input Multiple Output Full Bridges DC-DC Converters For Personal Computer Power Supply

Perinov, Ahmad Marzuki, Gunawan Wibisono and Chairul Hudaya

Nowadays, the usage of electrical energy is mostly still using AC voltage. Nevertheless, almost all electronic equipment requires a direct current (DC) source for their operation, including the personal computer (PC). PCs are electronic devices that are widely used and commonly employed AC input source. In this study, PC will be supplied with DC input source i.e. batteries. As PC utilizes 3 different DC voltage supplies (12V, 5V, and 3.3V), therefore for this purpose, a Single Input - Multiple Output DC-DC converter for PC power supply is designed using full bridged topology and simulated by using Proteus ISIS software. The result showed that the error between simulated and developed design for +3.3V output voltage was 3.94%; for +5V output voltage was 2.94%; for +12V output voltage was 1.23%, and for -



12V output voltage was 2.35%. Moreover, the efficiency of developed DC-DC converter during starting, operating and standby modes was 61.88%, 60.15%, and 54.15% respectively. Therefore, using this developed DC-DC converter for PC power supply, the PC could be run with any DC sources.

Paper ID: **44**

Failure analysis of superheater tubes in a circulating fluidized bed boiler

Ruly Bayu Sitanggang, Nur Cahyo, Ariyana Dwiputra Nugraha, Nur Achmad Busairi and Chairul Hudaya

The failure of superheater tubes in a circulating fluidized boiler power plant has been analyzed. The boiler had run for 6918 hours before it stopped operating for two and a half year due to the forced outage of steam turbine. During the start-up preparation, leakage was found on the superheater tubes. The methods used for analyzing the cause of failure on the tubes were visual examination, chemical composition analysis, hardness measurement, and metallographic examination on the tube samples. Visual and metallographic examinations showed the occurrence of pitting corrosion and porosity in welded area. Composition analysis on the product of corrosion on the outer side of the tube showed a trace of chloride weighing 0.3 – 3% caused by rainwater entering the insulation wall area that was open or closed less tightly, acting as a promoter for the pitting corrosion. It is recommended to fix the insulation wall opening, clean the corrosion substance from the tubes and replace the old welded tubes.

Paper ID: **45**

Optimization of Propane Reliquefaction Cycle in LPG Plant

Sonny Nova Saputra and Dijan Supramono

Reliquefaction is one of the most important systems in the cryogenic process of a propane plant which functions to minimize BOG (Boil Off Gas) on propane tanks. The reliquefaction plant in a propane plant liquefies BOG back to liquid phase. Cold liquids of propane and butane from a butane plant are mixed to form LPG. BOG causes large propane loss if not handled properly. BOG occurs due to a natural increase in propane temperature, which is normally at -42oC, in the tank and causes a phase change from liquid to gas accompanied by an increase in pressure in the propane tank. At present, there is a decrease in coefficient of performance (CoP) of the propane reliquefaction cycle from 2.16 to 1.90 suspected to occur due to slight deterioration of compressor blade performance. The present work attempts to reduce the compressor work by reducing the refrigerant temperature in the compressor exit cooler by utilizing cold seawater of 17oC exiting an heat exchanger between cold liquid propane and seawater streams to replace seawater stream of 30oC. Optimization work has been conducted on the compressor exit cooler unit involving varying heat flux and heat transfer surface area affecting the investment cost. The optimization results in decrease in the compressor work from 213.04 to 179.92 kJ/kg and recover CoP of the reliquefaction cycle to 2.16.

Paper ID: **46**

Disturbance Characteristics in Frequency 9 kHz-150 kHz on Photovoltaic System with RLC Load

Della Dwindaputri and Budi Sudiarto

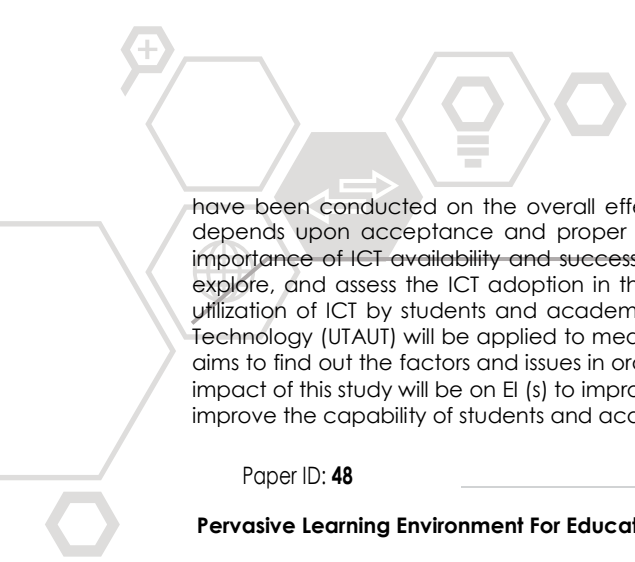
Photovoltaic can convert sunlight into DC electrical energy. With the help of an inverter, DC electrical energy that is produced by photovoltaic will be converted into AC electrical energy. However, this inverter technology produces disturbance in frequency range of 9 kHz - 150 kHz due to the switch of frequency inverter. In this research, the disturbance measurement on the off grid photovoltaic system with Picoscope 3425 device was conducted. Based on the measurement result, the highest disturbance value was at the frequency of 74 kHz. The sequence of electrical loads with the highest disturbance value at irradiance of ± 200 W/m², ± 400 W/m², and ± 600 W/m² were inductor, capacitor, and resistor. Whereas, the sequence of electrical loads with the highest disturbance values at irradiance ± 800 W/m² and ± 1000 W/m² were resistor, inductor, and capacitor. This research indicates that the higher the solar irradiance exposed to the photovoltaic, the higher the voltage disturbance generated from the output side of inverter.

Paper ID: **47**

Comprehensive ICT Framework for Educational Institutes of Kuwait: An Empirical Study

Adel Rashed Aldaihani and Asadullah Shah

The world has been changed by Information and Communication Technology (ICT), and many factors including new opportunities, fast-growing business, technological changes, and challenges have forced every part of the world to produce self-regulating and pre-found skilled oriented individuals. Driven by this compulsion the education institutions (EI) around the globe are integrating ICT tools and utilizing the latest technologies in order to provide quality education to their citizens. In this regard Ministry of Education (MOE) Kuwait has launched many plans and invested a lot in the implementation of technology in Els. Els mainly consists of Universities. While there is no comprehensive study in order to assess the adoption of ICT in the universities by all instructors and students of Kuwait as well as no empirical study



have been conducted on the overall effectiveness of ICT in the EI (s). The effectiveness of any new technology depends upon acceptance and proper utilization of technology by all stakeholders. Subsequently realizing the importance of ICT availability and success in all parts of society, this research is aimed to understand, investigate, explore, and assess the ICT adoption in the universities of Kuwait. Meanwhile in order to assess the adoption and utilization of ICT by students and academicians in their daily work, the Unified Theory of Acceptance and Use of Technology (UTAUT) will be applied to measure the ICT acceptances by students and academicians. This study also aims to find out the factors and issues in order to create a model for better utilization of ICT by stakeholders in EI. The impact of this study will be on EI (s) to improve the quality of education system through effective utilization of ICT and improve the capability of students and academicians to be more effective and quality-oriented individuals.

Paper ID: 48

Pervasive Learning Environment For Educational Makerspaces With Emerging Technologies And Teaching And Learning Transformation

Yaqoob Koondhar, Mansoor Hyder Depar, Naimatullah Leghari, Ali Raza Rang and Asadullah Shah

In 21st century the technological innovation has reshaped our educational system. Different educational methods and environments are used to facilitate students and teachers. Educational makerspaces is also one of them. This new trend has shifted educational system to student centered instead of teacher centered. Pervasive Learning (P-Learning) environment for educational makerspaces is one of the emerging environment for teaching and learning due to price reduction in handheld devices', facility for sharing the technological resources, support and smartness of smartphone technology. Educational Makerspaces environment provide the facility to teachers and learners to create a virtual environment fully equipped with latest ICT tools to share ideas, to perform experiments and collaborate with each other whenever and wherever they are. Thus, P-learning for educational makerspaces has the ability to access and share the resources for teaching and learning material beyond the boundaries of the traditional classroom arrangement. This paper presents the idea of P-learning environment for educational makerspaces which is not limited to a single geographic location or mobile or location based technologies; rather, it access, shares the resources and facilitates teaching and learning from anywhere and at any time with any handheld device means 24*7*12. The purpose of this paper is to propose a fully equipped makerspace classroom so that the students from remote areas or who can't afford laboratory expenses can access virtually labs, share their ideas, collaborate with each other and perform experiments.

Paper ID: 50

Causal Factors of Change Order and Variation Order in Construction Project: A Literature Review

Januar Adi Murdani and Mohammed Ali Berawi

Change orders (CO) and variation orders (VO) are common occurrence in construction project which can cause cost overruns, time delays and other negative impact to either project owner and contractor. Therefore, identifying the causal factors that cause CO and VO are very necessary to minimized and manage the negative impacts that potentially occur in construction projects. A lot of research has been done in this field that result causal factors, so it requires synthesizing the existing literature comprehensively. Through this paper, will be taken a systematic literature review to identifying 54 papers available literature with respect to important causal factors of CO and VO in construction project. The result of this paper revealed that the most significant causes of CO and VO which are: related to owner (Owner request change on scope, quantity, specification, and schedule) and related to consultant/designer (Issues on design: changes, errors, omissions, ambiguous and complexity).

Paper ID: 53

Economic Analysis of Renewable Energy Power Plant in Sumatera, Indonesia

Boanerges Desryanto Siregar, Budi Sudiarto and Rudy Setiabudy

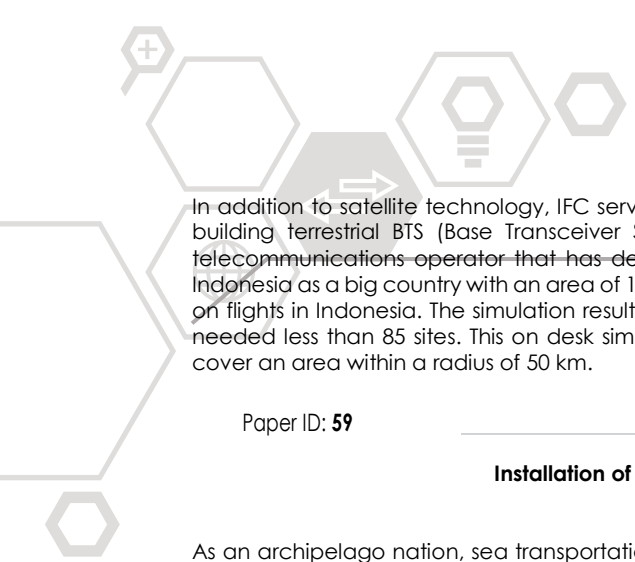
With the increase of Indonesian economy every year, it causes an increase in electricity consumption. Increased use of electricity, must be balanced with the growth of electricity generation. Indonesia is a country that has enormous renewable energy potential, but has not been utilized optimally for electricity generation, so the opportunity to invest in renewable energy in Indonesia is still wide open. To increase the interest of investors the government has issued regulations regarding the selling price of electricity based on the type and location of the power plant. In this paper, we will calculate the payback period of each type of renewable energy power plant in each province on Sumatra Island. Calculations were performed assuming a rate of 10% / year for 7 years, a loan of 70% of the total investment and a capacity of 1 MW for all types of plants. Based on the calculation, the results show that Bangka Belitung is the province with the fastest payback period of each type of power plant. The highest selling price of electricity is IDR 2,077 and the lowest is IDR 1,025. Types of power plants with the most rapid payback period derived from geothermal energy are 3 years. As for the longest payback period derived from Biomass power plants is 15.6 years.

Paper ID: 55

Potential Implementation of A2G Technology for IFC Services on Flights in Indonesia

Nuril Hudha Pramono, Muhammad Suryanegara and Muhammad Imam Nashiruddin

InFlight Connectivity (IFC) is a facility available on airplanes and can be used by passengers to enjoy internet access (wifi), GSM services and TV broadcasts. IFC services provided by Indonesian airlines currently use satellite technology.



In addition to satellite technology, IFC services can also be implemented using A2G (Air to Ground) technology by building terrestrial BTS (Base Transceiver System) networks on land. Until now in Indonesia there has been no telecommunications operator that has developed and built this A2G network to support IFC services on aircraft. Indonesia as a big country with an area of 1.9 million km² has the potential to develop A2G technology for IFC services on flights in Indonesia. The simulation results to cover the entire territory of Indonesia, then the number of A2G BTS is needed less than 85 sites. This on desk simulation has been done by Nokia Network by counting one BTS A2G can cover an area within a radius of 50 km.

Paper ID: 59

Installation of Hybrid Power System in Ro-Ro Passenger Vessel

Richki Khresna and Yanuar

As an archipelago nation, sea transportation is important for development and logistic distribution between the island. KMP (Kapal Motor Penumpang) Portlink III is one of many the ferries owned by Government of Indonesia operated in Sunda Strait. Ferry vessel is considered as one of the most successful transportation modes in Indonesia and consequently, it contributes significantly to greenhouse gas emission in Indonesia. there is a need for a research renewable energy application on a vessel to reduce greenhouse gas emissions and mitigate their impact on the environment, one of which is by using solar panels. With the consideration of geographically abundant in solar radiation, the installation of photovoltaic on Portlink III can generate 1.1 MWh/day and fuel reduction around 638,352 liters annually. This study results in savings of approximately US\$ 283,325.3 yearly and reaches the breakeven point in 1.5 years.

Paper ID: 60

Prediction of Power Transformers Lifetime Using Thermal Modeling Analysis

Sarah Affah, Jannus Maurits Nainggolan, Gunawan Wibisono and Chairul Hudaya

Transformer is one of the main components in distribution system of electrical power system towards the consumers, thereby any damage to the transformers will hinder the distribution of electricity towards the consumers, and in turn will make the SAIDI and SAIFI levels go up. High temperature in transformers can cause degradation in the insulation of transformers which in turn will cause failure in transformers. When the temperature in winding reaches or goes beyond the limit of 110°C, a degradation in insulation will start happening and the remaining life of transformers will decrease. Damage in transformers will cause disturbance in electrical power system and result in a major economic loss. Before damages occur, transformers need to be changed up until it is deemed to be no longer efficient, this can be done by replacing the transformer that is about to be damaged. To predict when a transformer is about to break, a calculation is made based on thermal modelling according to IEEE Std C57.91-1995 with its most prominent variable being Hot Spot Temperature (HST). HST is obtained by MATLAB programming using Annex G of IEEE Std. C57.91-1995. By obtaining HST thus the remaining lifetime of transformers can be predicted. This research analysed the effect of loading, hot-spot temperature, and ambient temperature on the remaining lifetime of a transformer. The higher those three factors are, the quicker the transformer will break, with loss of life percentage increasing exponentially.

Paper ID: 62

Economic Load Dispatch Optimization of Thermal Power Plant Based on Merit Order and Bat Algorithm

Ikhsan Fahri Hanafi and Ir. Rinaldy Dalimi

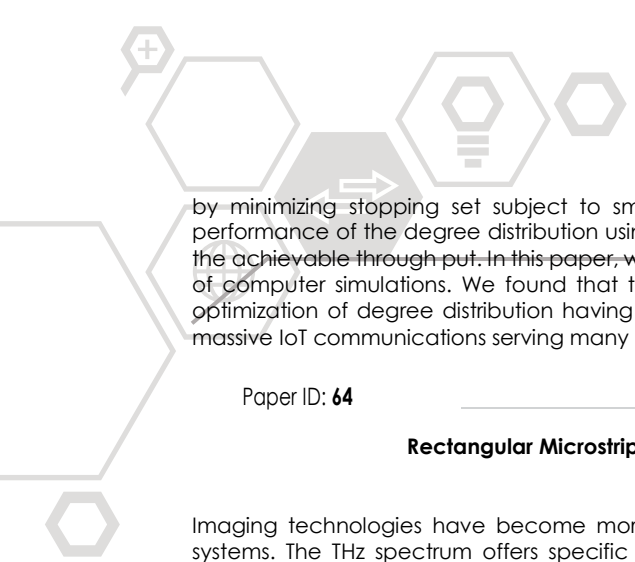
Fuel cost optimization is generally done using an approach of deterministic and undeterministic methods. This study compares the application of deterministic merit order algorithms with the application of undeterministic bat algorithms. The issue of economic load dispatch has complex equality and inequality constraints, so it is difficult to determine the optimum value using a conventional approach. In determining the optimum value it is necessary to schedule generator units to divide the generated power in meeting system requirements so the optimum fuel costs are obtained. Merit orders are arranged based on the amount of hourly fuel costs per unit operating at its maximum output, while the bat algorithm is based on echolocation characteristics of microbats simulated on a computer program from the position, velocity and frequency of bats. The researched data are the actual data of thermal power plants which amount to 6 (six) plants in the peak loads condition in 2018. By using 2 (two) different method, namely merit order and bat algorithm, the results of different production costs are obtained. The merit order can reduce production costs by 14.67% or \$ 291640 of the actual cost, while the bat algorithm produces an efficiency of 15.66% or \$ 311405 of the actual cost. From the results of this calculation it can be concluded that the use of bat algorithm can produce a more efficient (smaller) generation costs that is equal to \$ 19765 or 0.99% smaller than the merit order method. This can occur because of the bat algorithm manages to create a loading combination of more efficient power plants.

Paper ID: 63

Optimal Degree Distribution with Minimal Stopping Sets for Massive IoT Communications

Nusriyati Mahmudah Nashuha, Khairul Anwar and Gunawan Wibisona

The future networks are predicted to serve massive number of devices with small packet loss rate (PLR) and fast processing. In this paper, we propose an access scheme that is capable of serving communication with minimum PLR due to the use of degree distribution having minimal stopping sets. This paper develops coded random access with low error floor caused by the appearance of stopping sets. We derive an optimal degree distribution using optimization



by minimizing stopping set subject to small degree to keep low computational complexity. We evaluate the performance of the degree distribution using a visual tool, called Extrinsic Information Transfer (EXIT) chart, to validate the achievable throughput. In this paper, we also validate the theoretical probability of the stopping sets with a series of computer simulations. We found that the theoretical probability of stopping set is reliable, which is helpful for optimization of degree distribution having minimal stopping set. These results are expected to be useful for future massive IoT communications serving many devices with asymptotically zero failure for critical applications..

Paper ID: **64**

Rectangular Microstrip Array Antenna for Enhancing Terahertz Imaging Quality

Intan Nurfitri and Catur Apriono

Imaging technologies have become more popular and widely used in various applications, including THz imaging systems. The THz spectrum offers specific characteristics for imaging, i.e., its penetration to dielectric materials and transmittance fingerprint of many materials, including biological tissues. Therefore, this advantage has been becoming potential for medical imaging applications as well. A device should be provided appropriately to transmit and receive the electromagnetic waves in developing a THz imaging system. The antenna technique adopted from microwave technologies can be considered to deal with this issue effectively. Among various antenna parameters, beamwidth is a primary consideration to obtain image quality of an imaging system. The array technique has provided a way to modify a single element antenna to have expected parameters of beamwidth as well as gain. This research study a horizontal array technique of a THz rectangular microstrip linear array antenna to get desired beamwidth antenna parameter and provide an antenna design for scanning purpose in a THz Imaging system. CST Microwave studio is used in designing and characterization to obtain optimum designs. By applying half-wavelength separation, the results show beamwidths in the same condition both on the vertical and horizontal beamwidth. The gain of two and three elements that modified into two sub-array horizontally are 9.0 dB and 8.8 dB, respectively. Horizontal beamwidths of the two and three array elements linear are 46.4 degrees and 39.0 degrees, respectively. By adjusting the beamwidth, these results are expected to improve the image quality of a THz imaging system.

Paper ID: **65**

Optimization of Tugboat as Lifting Operation Support Vessel in Indonesia's Upstream Oil and Gas Terminals using Differential Evolution Algorithm

Prakosa Budi Ajie and Abdul Wahid

Oil and gas lifting activity become crucial for this country, because it gives the state revenues. While government's target is raising the amount of lifting volume and reducing cost recovery, optimization is needed in upstream oil and gas business. Nowadays every upstream oil and gas terminal has 2 (two) to 3 (three) tugboats with contract system to support oil and gas lifting activity. The cost of tugboats charter reaches US\$ 52.8 million per year. Research is done by classifying all of upstream oil and gas terminals into few clusters. From data of terminal coordinates in each cluster, requirement of tugboat and lifting schedule, we can get the amount of tugboat that can be used as sharing facility. Optimization method is using Differential Evolution Algorithm. This method is chosen due to have been capable to solve the complicated-combinatorial problem and fast time completion. It is expected that reducing tugboats are saving approximately US\$ 14.8 million per year cost from existing situation.

Paper ID: **66**

Implementation of DMAIC Six Sigma to Reduces Defects in Slab Construction Process: A Case Study Of Highrise XYZ Building Construction

Mohammed Ali Berawi, Achmad Maulidin and Mohammad Ichsan

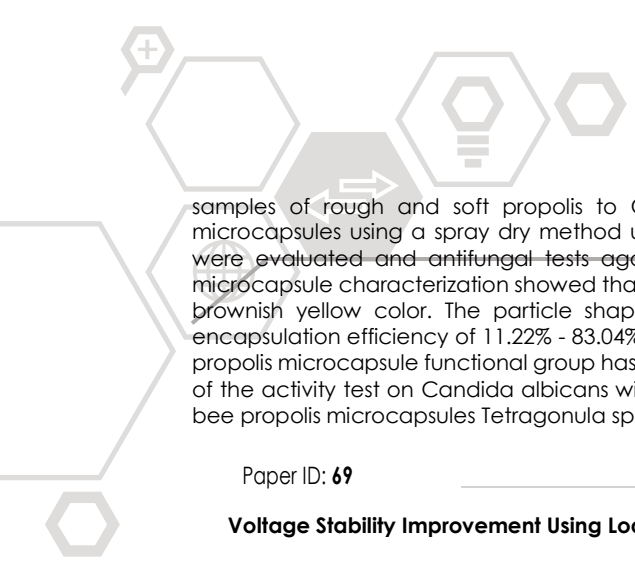
The complexity of the construction work of high-rise buildings often makes the construction results is not in accordance with the project specified quality. Poor quality work and defects in the construction phase are caused by a construction process that is not well defined. Quality improvement in the construction work process is needed to reduce defects and rework in project. This research was conducted to identify improvements that need to be made in work procedures on slab construction in high-rise building projects. Quality improvement is done by identifying the causes of defects in the construction process. Case studies are carried out on slab work in the basement of XYZ Highrise building construction projects, and by using Define-Measure Analyze-Improve-Control (DMAIC) Six Sigma method to identify actions that need to be taken to reduce the occurrence of defects in the construction process. From the results of the analysis, the current process has a DPO process 0.549, DPMO 549.382 and the sigma process 1.89. To reduce the occurrence of defects, an improvement plan is developed based on the results of the analysis carried out in accordance with the principles of DMAIC Six Sigma.

Paper ID: **68**

Antifungal Test of Bee Propolis Microcapsule *Tetragonula* spp. With Maltodextrins and Gum Arab Coating

Paksi Pujianto, Muhamad Sahlan, Iis Istikomah, Diah Kartika Pratami, Anondho Wijanarko, Heri Hermansyah, Kenny Lischer and Teti Indrawati

Propolis is a mixture of resin and saliva of Bee *Tetragonula* spp. that have antifungal activity. The purpose of this study was to develop the use of propolis into microcapsule preparations and antifungal test of propolis microcapsules with



samples of rough and soft propolis to *Candida Albicans*. The research was carried out by making propolis microcapsules using a spray dry method using maltodextrin and gum arabic coating. The resulting microcapsules were evaluated and antifungal tests against *Candida albicans* were evaluated. The results of coral and solid microcapsule characterization showed that propolis microcapsules have powder form; typical of propolis, and has a brownish yellow color. The particle shape is uniform and round and has a particle size 9.32 μm - 14.61 μm ; encapsulation efficiency of 11.22% - 83.04%; moisture content 5.58% - 11.84%; water solubility 98.19% and 98.31%. The propolis microcapsule functional group has O-H bonds, C = O ester compounds, and C-H compounds, and the results of the activity test on *Candida albicans* with the highest inhibitory power diameter of 10 mm and 7.33 mm showed bee propolis microcapsules *Tetragonula* spp. has the potential as an antifungal.

Paper ID: 69

Voltage Stability Improvement Using Load Shedding and Static VAR Compensator (SVC): Study Case of Senayan-Sambas Power System

Kurniadi Ramadhan, Krisandi Yonathan, I Made Ardita, Fauzan Hanif Jufri and Agus R. Utom

Disturbances in the power system may lead to voltage instability in the system. This paper discussed voltage stability when anticipating disturbance by load shedding operation combined with Static VAR Compensator (SVC). Load shedding scheme with voltage relay is used when there is disturbance such as loss of generation. In the case of the load shedding is forbidden due to the existence of high priority loads, then it is required to install the SVC to overcome the disturbance. SVC can be used to minimize load shedding for power system disturbance anticipation. In the simulation, it is shown that the combination of the load shedding operation and the utilization of SVC with 30 MVAR capacitive rating can save the high priority load of 15 MVA.

Paper ID: 71

Medical Image Analysis using Deep Learning: A Review

Syed Qamrun Nisa , Amelia Ritahani Ismail, M. A. B. MD Ali and Mohammad Shadab Khan

Over the recent past, deep learning is one of the core research directions which has gained a great deal of attention due to its outstanding performance in the area of medical image analysis. This paper aims to present a review of deep learning concepts related to medical imaging. We examine the use of deep learning for medical image analysis including segmentation, object detection and classification. Deep learning techniques including convolutional neural networks (CNNs), recurrent neural network (RNNs) and autoencoder (AE) are also discussed in this paper.

Paper ID: 73

Study on Short Circuit Current Contribution after Photovoltaic Solar Plant Integration in Lombok's Distribution Network

Grace Missrani, Nayara Nabila, Fauzan Hanif Jufri, Dwi Riana Aryani and Agus R Utomo

In order to increase the portion of renewable energy in the national energy mix, photovoltaic (PV) system is mostly used due to its feasibility. One of the distribution systems in Indonesia which implements the PV solar plant penetration is in Lombok. Integrating PV system to the utility grid increases the contribution of a short circuit to the grid. This study was conducted to see the short circuit contribution in the corresponding system. The study was simulated by using ETAP, which was focused at three different points, 150 kV buses of Kuta Substation, 150 kV bus of Sengkol Substation and 150 kV bus of Paokmotong Substation. The obtained short circuit currents slightly increase after the connection of four different PV capacities, i.e. 2.806 kA at 150kV bus. From these results, it can be concluded that the contribution of short-circuit due to the penetration of solar PV plant is very small.

Paper ID: 74

Time and Cost Optimization of a Nuclear Reactor Project Using Combined-Method

Ganjar Putro Indratoro, Djoko Sihono Gabriel, Farizal and Topan Setiadipura

The high initial capital in engineering, procurement, and construction (EPC) project in nuclear reactors has made it one of the obstacles in the construction of nuclear reactors, especially in Indonesia. Another obstacle is the construction takes a long time to complete. The solution to this problem is to build a Generation IV nuclear reactor, namely the High Temperature Gas Reactor (HTGR), which is one of the types of Small Modular Reactor. This type has a characteristic with a minimalist geometric so that the cost and time required will be lower. In Indonesia, HTGR will be built in Puspptek Area, Serpong, South Tangerang, Banten. The HTGR project, also called the Experimental Power Reactor (Reaktor Daya Eksperimental – RDE), suffered a setback schedule caused by high costs in terms of EPC project. A method is needed to optimize the time and cost of this EPC project. This study aims to obtain a cost and time optimization method for the EPC project on HTGR and increase the saving of the time and cost for the EPC project on RDE as an HTGR case study in Indonesia. A proposed method used in this study is a combined method of multi-objective optimization that produces Pareto Front with the Analytic Hierarchy Process (AHP) as a tool in making the best decisions from an optimal set of Pareto Front. The best result obtained from the optimal alternative solutions with the weight of time and cost criteria of 0.5, respectively, is total cost of IDR 1,656.47 billion and total time of 300 weeks. With the maximum cost of this EPC project amounting to IDR 2,200.00 billion and the maximum time of 336 weeks from BATAN's document, this result increases cost saving by 24.71% and time saving by 10.71%.

Paper ID: 75

A Method to Improve Frequency Stability Using Location-based Load Shedding: Study Case of Senayan-Sambas Power System

Krisandi Yonathan, Kurniadi Ramadhan, I Made Ardita, Fauzan Hanif Jufri and Agus R. Utomo

Disturbances may occur in a power system such as loss of generation that can affect the frequency stability. This paper presents a method to improve frequency stability by a controlled load shedding. The loads which will be released are determined by its distance from the generation point so that it can quickly recover the system's frequency. Hence, the distance between the loads and the generation is determined through the analysis of reactive power. Four scenarios are employed in this study in accordance with the quantity of generator trip. As a result, this method can minimize the loss of loads by 18 % with the frequency recovery time of 28 seconds when one generator trip. In the case of two and three generators are out of work, this method results in 35,76 % loss of loads, but with frequency recovery time is 24 seconds and 14 seconds, respectively.

Paper ID: 76

Planar Microstrip Array Antenna with Rectangular Configuration Fed with Chebyshev Power Distribution for C-Band Satellite Application

B. Pratiknyo Adi Mahatmanto and Catur Apriono

A C-band satellite receiving antenna requires high gain and narrow beamwidth at around 4 GHz frequency. Microstrip antennas, which have a low profile characteristic, have remained promising for various wireless applications. This paper proposes a rectangular patch antenna design that arranged by planar arrays and Chebyshev feeding technique to achieve high gain and low sidelobe levels for C-band applications. The antenna design is simulated and parameterized by using CST Microwave Studio. The results show an increase of gain and decrease in the side lobe level obtained from the model using the Chebyshev technique compared to the uniform power divider technique. With the proposed feeding of the 4x4 array antenna, it achieves gain and sidelobe level of 16 dB and -28.5 dB, respectively. The 8x8 array antenna with the Chebyshev technique reaches gain performance, and sidelobe level of 20.2 dB and -24.3 dB, respectively. Meanwhile, the 16x16 microstrip array antenna can achieve gain and sidelobe level of 24 dB and -23.8 dB. These results indicate that the proposed array design can contribute to design an antenna suitable for C-band applications.

Paper ID: 77

Optimum Location for PV Implementation Based on Load-flow Analysis Using Newton-Raphson Method for Lombok Electrical Network

Muhammad Daffa El Hakim, Agustinus Aditya Budi Kusuma, Dwi Riana Aryani, Fauzan H. Jufri, Faiz Husnayain, Ginas Alvianingsih and Agus R. Utomo

Practically, the photovoltaic system has an average efficiency of around 15-20%. With this range of value, it is highly recommended for the system to gain the maximum efficiency possible. This paper consists of load-flow study that aims to analyze the optimum location for solar PV implementation by evaluating the voltage drop of the examined system. The study is performed by modeling the power system of the Lombok electrical network. Afterward, a 10 MWp PV solar plant is integrated at several points in either transmission or distribution bus. This study is carried out by the ETAP program to calculate and process the data based on the Newton-Raphson method. The result of the data processing shows that the best interconnection for PV implementation on grid-solar power plan interconnected system located in Lombok is on GI Mantang substation. That 150-kV bus area is the most optimum location to integrate the PV system with the grid system with the voltage drop appeared on that bus is 1.471%.

Paper ID: 78

Effect of Curing Duration and Environment on Mechanical Properties and Bonding Strength of Composite-Metal

Muhamad Arifin, Dimas Nugroho, Yadi Hermayadi and Badrul Munir

Glass Fiber Reinforced Polymer (GFRP), is recently very popular among other material, due to its economic value and good mechanical property. Utilization of composite material in industry especially in oil and gas company is mainly for facilities repair i.e tank, separator and subsea pipeline. Underwater marine application during a subsea pipeline repair is very challenging for the composite to be able to generate cross link by wet curing process. This study evaluated several factors that might affect the mechanical property of the composite which is carried out wet curing process. GFRP composite which consist of two different hardener polyamine and siklikamine Studies are conducted in several variable like curing time, distilled water, above water and underwater environment. Result of the study showed that the composite with polyamine hardener was failed to create cross link underwater and unable to form polymerization while composite with siklikamine was successful but with lower mechanical properties with the one manufactured at the surface above water, like tensile strength down 10 percent and bonding shear strength between metal and composite down to 16 percent.



Paper ID: 80

Evaluation of The Implementation of Fixed Broadband Access Provision Policy in Indonesia

Ria Rizki Yuliana and Muhamad Asvial

The Indonesian Government established a facilitation policy in order to increase fixed broadband penetration in Java region. This research focuses on the evaluation of the implementation of fixed broadband services provision facilitation policy in terms of policy, industry and business models development as well as the incentive schemes. The research was conducted through Regulatory Impact Analysis (RIA) as an effort to accelerate fixed broadband penetration in Indonesia. The results of the study are expected to provide recommendations that can encourage the growth of fixed broadband penetration in Indonesia for supporting national development growth and competitiveness at the global level, as well as improving quality of life Indonesian society. Based on the results of the analysis, there are several issues that have been detected overall. But there are two major issues that must be solved immediately by the government. First, there is a need to establish a derivative regulation from the RPI as a strong legal basis in carrying out these policies that can eliminate regulation gaps. Second, there is a need to evaluate the business model or financing scheme in this program so it can be more in line with the conditions of the community, legal regulations and the main purpose to create a multiplier effect that can increase fixed broadband penetration in Indonesia.

Paper ID: 83

Contagion Analysis of Asian Financial Conditions Towards Indonesian LNG Price as an Investment Strategy

Andy Noorsaman Sommeng, Adityo Hapsoro Sakti, Mikael Januardi Ginting, Sonya Pebriani, Muhamad Sahlan, Heri Hermansyah and Anondho Wijanarko

Indonesia has been exploiting liquid natural gas as a source of state revenue through its sales to various countries. Conditions classified as shocks causing fluctuations in the world economy gives a contribution to financial markets movements in countries. Asia, which contains mostly developing countries may be affected in terms of their financial condition due to various types of shocks which classified as the black swan. As examples, the 2011 earthquake in Fukushima, Japan conduce nuclear leaks which were used as an energy source; and in 2016 when prices oil fell below 50 US dollars per barrel. Being a producer of Liquefied Natural Gas (LNG), Indonesia contribution on this energy source to Japan and several other in Asian regions can be affected by shocks events on those countries. Through accurate predictions with actual values, Indonesia might make the right decisions on sales of LNG to Asian countries. Predictions in this study are conducted through the use of contagion effect analysis method based on local correlation on the distribution of market index data of a certain country, which reflects a shock on that country, towards Indonesian LNG prices produced from Bintuni, Papua. This method is basically a practice from Inci et al. (2011), a scientific study that defines contagion as a structural shift of the relationship between market evidenced by a change in the correlation coefficient. Steps can be taken after having the best prediction on how the markets conditions will appear right after a shock.

Paper ID: 84

Development of Rainwater Utilization Scheme as an Alternative of Water Source at a Hotel

Haifa Siti Alkautsar and Djoko Sihono Gabriel

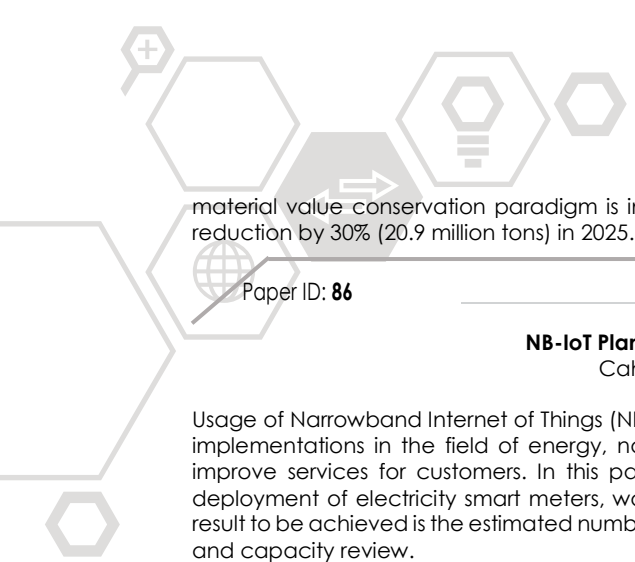
Human needs for water varies from requirement of drinking water up to sanitary purpose. In Indonesia, it tends to utilize one type of water supply standard to cover all needs which causes clean water deficiency that will trigger environmental problem. To resolve the problem, we must create alternative water source, in which is rain water. This research focused on Hotel Sector, based on its consumption rate. The main purpose is to develop rainwater utilization scheme as an alternative of water source in a hotel, that depends on rainwater potential, water demand category and water quality criteria. By using the rainwater harvesting method, the potential of rainwater that falls on the roof area and the walls of the hotel can be calculated. This research indicates that development of rainwater utilization scheme will divide water into several qualities and remove the tendency to use one type of water to cover all needs that will affect clean water saving for the volume of 2,398 m³/year from the local water supply with financial saving IDR 45 million/year.

Paper ID: 85

Impact of Design for Material Value Conservation on Flexible Plastic Packaging towards the Life Cycle of Plastic Materials

Muhammad Fatchi Alfadjri, Djoko Sihono Gabriel and Rahmat Nurcahyo

In 2018 China and Indonesia became the biggest contributors to plastic waste reaching the ocean, which were 8.8 million tons and 3.2 million tons of plastic waste, because there are still many companies that design plastic packaging without thinking about their recycle abilities. This study aims to prove whether the application of the material value conservation paradigm at the beginning of the design process of flexible plastic packaging to a product packaging, will increase the life cycle and value of flexible plastic packaging that has been used. This will make flexible plastic packaging waste feasible to be recycled and profitable for recycler and collector of plastic flexible packaging waste. Literature studies are conducted to obtain definitions of the variables used in the study. Data collection was carried out in the form of a survey of 400 samples of flexible plastic packaging commonly used today. Then the survey results are mapped based on the plastic design category in accordance with the paradigm of material value conservation. The application of the



material value conservation paradigm is in line with the Presidential Regulation 97/2017, namely implementing waste reduction by 30% (20.9 million tons) in 2025.

Paper ID: **86**

NB-IoT Planning in Jakarta Area for Smart Meter Utilities

Cahyo Nugroho and Gunawan Wibisono

Usage of Narrowband Internet of Things (NB-IoT) is predicted to grow in the future with various applications. One of its implementations in the field of energy, namely smart meters, is expected to increase production efficiency and improve services for customers. In this paper, we intend to conduct an NB-IoT planning analysis to support the deployment of electricity smart meters, water smart meters, and gas smart meters utilities in the Jakarta area. The result to be achieved is the estimated number of evolved node B (eNodeB) needed to service the area from coverage and capacity review.

Paper ID: **87**

Universitas Indonesia Welding Center Sub Sea Personel Qualification Gap Analysis

Andy Noorsaman Sommeng, Hascaryo Rat Kusumo, Mikael Januardi Ginting, Sonya Pebriani, Muhamad Sahlan, Heri Hermansyah and Anondho Wijanarko

Today, commercial diver requirements for underwater jobs in the Indonesian oil and gas industry are still referring to international standards, such as qualification and certification from the well-known international association. Welding Center Sub Sea Universitas Indonesia (WCSS) established to generate qualified and competent commercial diver for underwater NDT inspection jobs. The objectives of this research are to analyze the qualifications gap between WCSS UI commercial diver and international standards for underwater NDT inspection jobs. The result shows that WCSS UI personnel still has qualifications gaps from international standards for each category. For commercial diving category 70% compliance, for underwater NDT inspector level 3.1U and 3.2U are 73.33% and 30% respectively. Recommendations to improve qualification gaps such as to add training syllabus as per standards, training facilities and last but not least is having real-world qualified and certified professional instructors.

Paper ID: **88**

Prediction of Electricity Load Growth of Tangerang City using SIMPLE-E

Andi Aulia Putra, Nayusrizal N, Indira Untari, Gunawan Wibisono and Chairul Hudaya

The electricity load growth should be planned appropriately to meet energy demand in a certain area. Electricity consumption growth is generally proportional with the economic and population growth. Using historical data on Gross Domestic Regional Product (GDRP) and population growth, the electricity load growth in the near future can be statistically predicted. The relationship between economic and population growth trend and total customers as well as the demands of contract electricity energy growth trend could be connected by the linear regression method to predict electricity energy consumptions. Through a Simple Econometric Simulation System (SIMPLE-E) program run in Microsoft Excel application, linear regression trend can be calculated. The purpose of study is to predict the growth of electricity consumption in Tangerang City-Indonesia, for the next ten consecutive years (2019-2028). Customer data that will be analyzed consist of five segments, which are Residential (R), Commercial (B), Industry (I), Public (P), and Social (S). Those can be combined with Gross Regional Domestic Product and human population using Multiples Linear Regression in SIMPLE-E. The correlation between dependent variables (total customers and contract of power) and independent variables (population and GRDP) will be computed in SIMPLE-E through rate value of correlation R, Adjusted R, and Durbin Watson test. The Actual trend data of total customer, contract power from 2012 to 2018, is compared to model equation from linear regression. The calculation of error use Root Mean Square Percentage Error and Mean Percentage Error, shows that the total error is less than 5%, meaning the simulation is scientifically accepted. This study shows that the average growth of electricity consumption in Tangerang city from 2019 to 2028 is 5.63%. It means that every 1% growth of economy in Tangerang will increase electricity load consumption for 0.94%.

Paper ID: **89**

Molecular Docking Study of Anti-Inflammatory Biomarkers in Sulawesi Propolis as Potent Inhibitors of Cyclooxygenase-2

Darin Flamandita, Muhamad Sahlan, Kenny Lischer and Diah Kartika Pratami

NSAIDs seemingly arrived in their usage limitations as inflammatory drugs due to showing several side effects including gastrointestinal ulcerogenic activity and kidney dysfunction. Inflammatory response is known to be primarily controlled by Cyclooxygenase-2 (COX-2), thus suggesting it to be an important target for identifying novel inhibitor. Recently, *Tetragonula biroii* aff. stingless bee species from Sulawesi was known to have anti-inflammatory biomarkers, namely alpha-tocopherol succinate, xanthoxyletin, and deoxy-podophyllotoxin. Present study aims to discover new potent inhibitor of COX-2 from mentioned propolis by in silico approach. This experiment was used AutoDock Tools 1.5.6 to prepare the structure of ligand and protein, AutoDock Vina to evaluate the binding affinity and LigPlot to visualize in 2-dimensional graphic of the binding pose. Docking studies amongst three candidates revealed that xanthoxyletin found to be the most potent inhibitor of COX-2 with binding affinity of -9.4 kcal/mol.



Paper ID: 90

Question Answering Systems: A Survey and classification
Ammar Arbaeen and Asadullah Shah

Rapid growth in the field of data science and widespread usage of information retrieval techniques has enabled the humans to retrieve the most accurate information. The diverse and humongous data availability in various formats introduces enormous challenges for data retrieval using Information Retrieval techniques. This paper highlights the Question Answering (QA) system that enables the user to express questions and retrieve the relevant answers in natural language. The QA system consists of four major modules that include Natural Language Question (NLQ) processing, documents processing, passages processing and answer processing. Basically, this intelligent QA system integrates several techniques from many fields such as natural language processing, information retrieval, and knowledge representation in order to process NLQ and retrieve the most concise answer from stored document. This paper provides a comprehensive survey on numerous question answering systems, their general architecture, types and working in detail.

Paper ID: 91

Newly Installed Subsea Pipeline Potential Failure Analysis Using Risk FMEA Method

Andy Noorsaman Sommeng, Rivaldi Madyatama, Mikael Januari Ginting, Dony Soelistiyono, Muhamad Sahlan, Heri Hermansyah and Anondho Wijanarko

With good inspection and quality control, the pipeline will meet the best performance. But, there are no pipe inspections that are suitable for the pipes that newly installed, because the visibility of the anomaly is still unclear. Meanwhile in the oil and gas industry, the subsea pipeline is forced to work 24 hours a day for one year, or even for decades. One of the tools used to help control quality is to use the Failure Modes and Effects Analysis method (FMEA). The use of FMEA is able to identify the risk of failure that occurs while the pipeline is operating. The purpose of this study is to analyze the failure modes that cause the failure of subsea pipelines using the FMEA method, get the greatest failure risk in the value of the RPN (Risk Priority Number), provide proposed improvements for the next pipeline.

Paper ID: 92

Effect of Repetitive Recycling on the Optical Properties of Polypropylene Based on Material Value Conservation Paradigm

Tiara Verita Yastica , Djoko Sihono Gabriel and Rahmat Nurcahyo

Good quality of plastic packaging waste has the potential to be recycled, as it can be used as raw material for the next packaging products. Recycling is preeminent due to the grave necessity of decreasing plastic production rate, especially for packaging industries which are known to use more plastic compared to other sectors. Material value conservation is a new paradigm which can be implemented through a new category of design for recycling in order to avoid value degradation. Implementations of this paradigm has produced better quality processed plastic waste with higher selling price. Applied with this paradigm, recycled plastic pellets can be a viable alternative as raw material based on its mechanical properties, even after the 8th stage of recycling. This study aims to reveal the effect of repetitive recycling on the optical properties of polypropylene with implementation of material value conservation paradigm, to strengthen previous evidence of the implementation of the material value conservation paradigm on plastic packaging whether repetitive recycling plastic packaging can be a viable alternative as raw material based on its optical properties. Optical properties observed in this research were based on the American Society for Testing and Materials (ASTM) standards, which are consisted of colour (ASTM D2244), gloss (ASTM D2457) and transparency (ASTM D1746). The colour properties still have good quality after repetitive recycling. The maximum of degradation level found on gloss is 6.35% and the maximum of degradation level on transparency is 22.22%. The result of this study indicated that even after the 8th stage of recycling, plastic pellet of polypropylene still can be a viable alternative as raw material based on its optical properties, with more attention on transparency property.

Paper ID: 95

Development of Greywater Utilization Scheme as an Alternative of Water Source at a Hotel

Yaumil Akhir, Djoko Sihono Gabriel and Rahmat Nurcahyo

—Hotel is one of the biggest water consumers. The water needs category in hotels varies from drinking water requirements to garden irrigation needs where each requirement has different water quality criteria. But in Indonesia, all water needs in hotels are met with one water quality, which is clean water. This causes waste in limited clean water resources and the cost of procuring clean water at the hotel. The use of greywater as an alternative water source in hotels is a way to reduce the consumption of clean water in hotels. The use of greywater can be maximized by processing greywater according to each water quality criterion needed at the hotel. Therefore, this research was conducted to aim for developing a scheme for utilizing greywater to meet water requirements in a hotel based on the category of water quality needs and criteria. The potential of greywater in a hotel is reviewed through literature studies and case studies in a fivestar hotel in Jakarta. The results showed that the use of greywater in hotels has the potential to save up to 65.20% of clean water consumption, equivalent to 43.04 m³/day and save water supply costs of IDR 10,607,000 per year.

Paper ID: 98

Quality Analysis and Lifetime Prediction of SF₆ in High Voltage Gas Insulated Switchgear (GIS) at CSW Bulungan

Ratri P. Dewimaruto, Amien Rahardjo, Rudy Setiabudy, Fauzan H. Jufri and Faiz Husnayain

This paper represents the relation between moisture content and dew point of SF₆ gas using the Magnus method to prove that the main circuit breaker in the high voltage gas insulated switchgear is the most fragile compartment. This paper also provides that pressure can be used to forecast the Lifetime of SF₆ gas by using Time to Failure method.

Paper ID: 99

Analysis of Discharge Rate and Ambient Temperature Effects on Lead Acid Battery Capacity

Muhammad Alif Fatullah, Amien Rahardjo and Faiz Husnayain

Battery is a medium for storing electrical energy. Batteries convert the chemical energy contained in active material into electrical energy caused by the electrochemical oxidation-reduction reaction. Batteries can be applied to various types of human needs, such as UPS (Uninterruptible Power Supply), solar cells, etc. One type of batteries that is widely used today is lead-acid battery. In order for the battery to work optimally and have the appropriate life, the battery condition must be considered properly. Two factors that must be considered is the ambient temperature and discharge current. Ambient temperature can affect battery parameters such as Voltage, capacity and battery life. Battery discharge current is influenced by the load associated with the battery. The load used needs to be adjusted to the battery capacity that will be used so that the discharge current produced by the battery is in accordance with its rating of use as the discharge flow generated by the battery can affect the battery's capacity. Therefore, research on the effect of environmental temperature and current discharge on lead-acid batteries with a deep-discharge method is required to see the battery capacity at different ambient and discharge temperatures.

Paper ID: 100

Optimization of Point-to-Point CO₂ Pipeline Transportation in Carbon Capture Utilization Sequestration Application

Bimo Agung Wicaksono and Nelson Saksono

CO₂ is the anthropogenic gas that has major contributes to GHG emissions and global warming. CCUS is an attractive technology solution that can reduce CO₂ emissions and also can create more valuable products of CO₂ through EOR. Because of economic reasons, utilization of CO₂ for EOR has never been applied in Indonesia even though there have been studies that claimed success. The optimum design considered to reduce investment costs. Commercialization of CO₂ from gas sweetening facilities requires an infrastructure for transportation of the captured CO₂ to the injection well. Economic consideration is the main driver in selection of CO₂ transportation options. For large volume of CO₂, pipeline is considered as a cost-effective technology for CO₂ transport. In this study we looking for the optimum design of CO₂ pipeline by comparing two phases of CO₂ in transporting large volumes of CO₂ over shorter distance. The result show that gaseous phase of CO₂ offer more economical value instead of supercritical CO₂ at 44 km distance. The supercritical CO₂ give higher economic value when the distance is above 150 km.

Paper ID: 101

Rainwater Harvesting Scheme as Additional Source of Clean Water at an Apartment

Frieska Ariesta Syafnijal, Djoko Sihono Gabriel and M. Dachyar

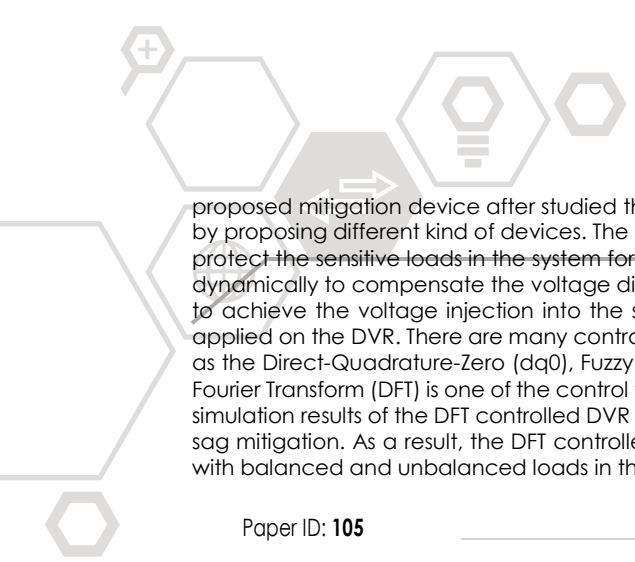
Increased population growth is linear to the proportional of the need for housing. Amid the difficulty of providing land for housing, the apartment is the option. Clean water supply for apartment needs is a major concern for developers. The increasingly shrinking source of surface water and excessive extraction of ground water is a factor in finding cheap and easily obtained raw water sources. DKI Jakarta with 2500-3000mm of rainfall per year has the potential of rainwater that can be utilized. The Rainwater Harvesting system is used for rainwater collection. The potential of rainwater can be known by analysing hydrological data using annual rainfall. Criteria of water quality for using in apartments is arranged based on the number of volumes as needed and the result of rainwater laboratory tests. It is known that rainwater can supply around 13.93% clean water needs for a month at December. According to the estimated calculation, the value of savings obtained if applying the rainwater harvesting scheme is IDR 3,769.60 per m.

Paper ID: 104

Mitigation of Voltage Sag Caused by Unbalanced Load by Using DFT Controlled DVR

Dur Muhammad Soomro, Yew Wei Keat, Mazhar Hussain Baloch, Mohd Noor Abdullah, Nur Hanis Mohammad Radzi and Zubair Ahmed Memon

This paper describes the source of voltage sag occurring in the power system. Voltage sag can occur in the system by means of having line faulty, inrush current drawn by loads and switching operation. However, the unbalanced load in the system causing voltage sag is studied here. In this paper, the pattern of voltage sag caused by balanced three phase (3 ϕ) and unbalanced single phase (1 ϕ) loads are studied and compared. The percentage of voltage sag caused by both cases are calculated using voltage sag calculation formulae by keeping definition values of sag between 10% - 90% as stated in IEEE Std. 1159-2009. While the percentage of voltage unbalance in the system caused by 1 ϕ unbalanced loads is calculated by using voltage unbalance formulae. The philosophy of voltage sag mitigation is studied by using a



proposed mitigation device after studied the causes of voltage sag. There are several researches that have been done by proposing different kind of devices. The Dynamic Voltage Restorer (DVR) is one of the most cost-effective methods to protect the sensitive loads in the system for mitigating the voltage sag. The voltage sag is mitigated by injecting voltage dynamically to compensate the voltage differences between normal input supply and disturbed output supply. In order to achieve the voltage injection into the system dynamically to mitigate voltage sag, a control technique has to be applied on the DVR. There are many control techniques which are applied on the DVR to mitigate the voltage sag, such as the Direct-Quadrature-Zero (dq0), Fuzzy Logic (FL) and Space Vector Pulse Width Modulation (SVPWM). The Discrete Fourier Transform (DFT) is one of the control techniques which is implemented on the DVR in this paper. The modeling and simulation results of the DFT controlled DVR were carried out by using MATLAB/Simulink to validity the performance of the sag mitigation. As a result, the DFT controlled DVR was successfully designed and 100% mitigated the voltage sag both with balanced and unbalanced loads in the system.

Paper ID: 105

Design of Low-Cost Energy Metering Device for Direct Load Control and Air Conditioning Energy Monitoring in Building

Nurian Satya Wardana and Iwa Garniwa

High consumption of electricity from air conditioners increases the potential for wasted electricity if the use of air conditioning is not controlled properly. Ability to control air conditioning is therefore a very significant subject for both the electric power utility and consumer. In some developed countries, this is realized by a program called direct load control. However, full scale implementation of direct load control is hampered by expensive equipment needed at the consumer-side, one of which is network-connected energy metering device. This paper presents a low-cost internet-connected energy metering device capable of many types of measurements, including electrical current, voltage, power, and energy. This device is tested to work on 220 V per phase system and current range of up to 100 A per phase.

Paper ID: 108

Digital Literacy and the Attitude of Educators Towards MOOC Platform in GCC Countries

Hana AlQaidoom and Asadullah Shah

This study is pursued to identify the digital literacy level required to implement Massive Open Online Course (MOOC) by educators in higher education institutions (HEIs) of Gulf Cooperation Council (GCC) countries. It is also intended to determine the attitude of educators in GCC towards the adoption of MOOC as a prospective e-learning initiative in education. In the light of that, proposing a unified GCC MOOC platform based on the information obtained is also considered as one of the main aspects to carry out as part of this study. MOOC is adopted by few higher education institutions in the Gulf countries; however, very little researches have been conducted to highlight the importance of digital literacy on educators' attitude towards educational technologies initiatives in GCC countries. There are also rare studies that cover the attitude of educators towards the adoption of MOOC in GCC. Most of the studies focus on the perception and attitude of learners and users but not the educators. This study will utilize "Digital Literacy Scale" (DLS) to measure the level of digital literacy of educators. While "Unified Theory of Acceptance and Use of Technology" (UTAUT) model is adapted to identify the attitude of educators towards MOOC as an e-learning platform. Consequently, this will lead to proposing a unified MOOC for GCC countries. Questionnaires will be administered on a sample of educators from universities and colleges in GCC countries that apply MOOC. In addition, observations and focus group interviews will be implemented to answer the questions of this study.

Paper ID: 109

Calibration of 100 A/50 mA Instrument Current Transformer Energy Meter Using Bisection Method

Renardi Ardiya Bimantoro, Amien Rahardjo, Faiz Husnayain, Dwi Riana Aryani, Chairul Hudaya

Instrument current transformers (CTs) are widely used in various types of electrical energy measurement. Eddy current losses, losses of hysteresis, a saturation of CT, and inevitable flux leaks could lead to errors including errors in the ratio and phase angle. Improving the accuracy of CT measurement could be achieved in many ways. In this study, a bisection calibration method to overcome the error by implementing correction factor integrated with the Arduino codes is investigated. The reliability of this system has been tested in two different situations, which are a constant and variable load experiments. The result shows that the readout of the developed instrument using 100 A/50 mA CT could achieve the deviation value of less than 2%, confirming the excellence accuracy of energy meter.

Paper ID: 110

Solar Irradiance Estimation at Certain Location Using Artificial Neural Network and ASHRAE Clear-Sky Mode

Muhammad Fadhil, Adji Prastianto, Amien Rahardjo, Fauzan H. Jufri and Faiz Husnayain

Solar energy is one of the renewable energies with great potential in tropical countries including Indonesia. Harvesting solar energy through a photovoltaic system has a major challenge due to its intermittency and uncertainty as well as the unavailability of the measured data at every location. The purpose of this study is to estimate the solar irradiance at certain location by employing the ASHRAE Clear-Sky model and the local weather information through an Artificial Neural Network (ANN) algorithm. The ASHRAE Clear-Sky model is used as the basis of maximum irradiance which will be calibrated by considering the local weather information. The estimation model is developed by using a backpropagation

algorithm of ANN. The proposed method is simulated at the department of electrical engineering Universitas Indonesia. The result shows that the proposed method can provide an accurate estimation of solar irradiance.

Paper ID: 111

Authentication System Comparison on Android Application

Haekal Febriansyah Ramadhan, Yohan Suryanto, Alfian Presekal and Ir. Kalamullah Ramli

Authentication is a form to confirm the validity of the data that user put. Authentication systems are widely used on many things especially things for protecting and limiting access to data so that it only can be accessed by specific entity. One example of authentication system is application security on hand phone. There are many ways to authenticate application on hand phone, for example fingerprint, password, pattern, etc. Nowadays, there are some new type of authenticate system on hand phone application like GPS and shaking phone. In this paper, all of these authentication system will be compared by their effectiveness, user-friendly, and efficient.

Paper ID: 112

Performance Implementation of Multi-access Edge Computing at Indonesia Telco Operator

Marazuddin Budianto Harahap and Gunawan Wibisono

Increased data traffic continues significantly, especially in Indonesia. Based on a survey conducted by daily social, it is said that in 2018 the penetration of Internet users in Indonesia is up to 50% of the population in Indonesia or amounting to 132.7 billion people. 91% of Internet use is accessed from a smartphone or tablet. Data traffic on PT XYZ cellular operators is increasing every year. In 2017, up to 2 million Tera-Byte of traffic is handled. This has become a problem in terms of traffic and capacity at PT XYZ as the operator that handles traffic from users. Thus, a solution to these problems is needed, so that XYZ operators can continue to be competent in serving users in terms of data packages or Internet access. Based on the literature and previous information, the addition of the amount of processing capacity and processing of data packages is the answer to these problems. The additional capacity can be done by means of three alternative solutions, namely: the addition of the GGSN module, the implementation of the Multi-access Edge Computing (MEC) architecture or the addition of the GGSN to existing networks. In this study, an analysis of the feasibility of Multi-access Edge Computing (MEC) for PT XYZ operators will be conducted. An analysis of three alternative possibilities will be carried out. The analysis carried out in this study is seen from the aspect of technological feasibility. The results of this study indicate two choices can be implemented, the MEC implementation solution is the best choice, which has sufficient ability to handle traffic for the next several years and its flexibility. The implementation time of MEC can be done when it enters October 2020, where traffic requires additional capacity.

Paper ID: 113

LoRa Network Planning for Smart Meter Utilities in Jakarta and Tangerang Area

Wahyu Krisyanto and Gunawan Wibisono

The electrical submersible pump that was used for lifting oil from the formation, cannot work properly because it often experiences a gas lock because of the produced associated gas in the well bore. To overcome this, the associated gas has to be discharged through the casing annulus and vented to the atmosphere. This venting system potentially causes the air pollution. Therefore, 5 MMSCFD of associated gas that was produced at Y Platform needs to be utilized by delivering it to the process platform. Technical feasibility study for utilization of 5 MMSCFD of associated gas suggests the installation of additional facilities, i.e. a 55 "OD x 8'0" S/S scrubber, 8" 5700 ft-long pipeline, and a compressor. The compressor discharge pressure has to be 400 psig so that the gas can be used as a feed at a gas turbine or gas plant for further treatment. This project is economically feasible since the NPV, IRR, annual revenue, and payback period values are US\$ 136.9 million, 157%, US\$ 11.1 million and 8 months respectively.

Paper ID: 114

Comparison of Automatic Indonesian Plate Number Recognition Using K-Nearest Neighbour And Neural Network Method

Anggoro Gagah Nugroho, Yohan Suryanto, Alfian Presekal and Ir. Kalamullah Ramli

Number plate is a type of motor vehicle identification. Every motorized vehicle operating on the road is required to complete the vehicle with a license plate or Motor Vehicle Number (TNKB) that matches the area code, registration number and validity period. Number plates in Indonesia there are 3 colors used, namely black, red and yellow with each color for different functions. With the number of vehicles in Indonesia, the number plate recognition system is automatically created can be implemented to facilitate various things in the registration of number plates including checking license plates when in the parking area, finding stolen vehicles or cars that violate red lights. In this study there are 2 the method often used for automatic number plate recognition is KNN (K-Nearest Neighbor) and NN (Neural Network). So from that the purpose of this final project is to compare the two methods in terms of the accuracy of reading each character.

Paper ID: 115

Voice User Interface Optimization Based On Android Speech API and PocketSphinx for Indonesian Language on Radio Internet Application

Whisnu Samudra, Alfian Presekai, Yohan Suryanto and Ir. Kalamullah Ramli

Radio Broadcast has an important role to provide information and entertainment to the public. Various kinds of information and entertainment can be conveyed clearly so that it is easily understood by listeners. Along with the development of technology, the term internet radio emerged. The use of internet radio has continued to increase since its appearance, especially in motorists. However, when a driver operates the internet radio, the driver's view will be neglected from the road so that it can be dangerous. Therefore, it takes an interaction between the driver and the device through sound commonly called the Voice User Interface. This internet radio application was developed on the Android platform and by using Android Speech API and PocketSphinx.

Paper ID: 116

Valuation of Indonesian Biodiesel Formula Prices By The Characteristics-Related Palm-Based Biodiesel' Pricing System

Dwitya Nur Fadilah, Bambang Heru Susanto and Cahyo Setyo Wibowo

Bio-based economy trend has grown rapidly as response of combating global climate issues, and change fundamental habit for energy consumption from conventional to renewable. Biodiesel is one of future biofuels which has gaining market share as surrogate petrol diesel in vary sectors. There are various natural resources to produced biodiesel with different characteristics. Presence of mono-saturated and polyunsaturated fatty esters generated deposits and affects degradation of qualities in case handling process and storage occurred inappropriate. Meanwhile, current index price is not reflected the quality of biodiesel. This research proposes to discover market index price formula of Indonesian biodiesel in current pricing system by adding characteristics-related at the structure price behavior. Investigating quality of biodiesel from various feedstock measured by several standardization parameters such as oxidation stability (OS), acidity number (TAN), and kinematic viscosity (KV) to determined reference price and set at an alpha value (α) = 107.544 Δ OS - 1679.355 Δ TAN - 430.223 Δ KV + 56.172 with R-square and confidence level of F-test are 84.7% and 100%, respectively. The result of statistical model approach was used to calculate index price of palm-based biodiesel treated on time series storage period of three months gave the highest premium price Rp 1,441/L in first week at all storage conditions (10oC, 15oC, 25oC, 30oC, and 43oC) and the highest discount price Rp 404/L in 13th week at 43oC. Validation model in this study finds correlation on both quality specifications and spot prices as market reflected price formula, thus enhance pricing fairness in the green industrial business strategic.

Paper ID: 117

COMPRESSIVE SENSING IMAGE RECONSTRUCTION WITH TOTAL VARIATION AND L2,1 NORM FOR MICROWAVE IMAGING

Icha Fatwasauri and Mia Rizkinia

Prevention of tumor and cancer can be done by early detection using a scanner such as Computed Tomography (CT) Scan and Magnetic Resonance Imaging (MRI). However, those modalities have high production cost and considerable size. The alternative used to overcome this problem is use microwave imaging. Microwave imaging requires large measurement data to improve image quality. To overcome these weaknesses, this research process is algorithmic reconstruct the microwave images with lower number of measurements using Compressive Sensing (CS) approach. CS enables reconstructing a signal from a smaller number of measurements than which is required in the conventional sampling method. this research contributes by adding spatial information using total variation (TV) and solving the problem of optimization using Alternating Direction Method of Multipliers (ADMM). This research were analyzed qualitative and quantitative. Parameter used in quantitative analysis are value of MSE and SSIM. The results of this research shows that the proposed algorithm successfully implemented the reconstruction of CS by adding TV in terms of image quality and quantitative parameters.

Paper ID: 118

Performance Analysis of Solar-Powered Submersible DC Water Pump

Raden Adhitya Ardiansyah, Muhammad Luthfi and Chairul Hudaya

In a rural area, where electricity supply is limited, water accessibility for the society generally becomes a major concern. Here, we proposed the alternative solution which is an integrated solar-powered water pump system using the DC concept. We investigated the optimum condition and the power conversion before and after the installation of photovoltaic (PV) panels. The correlation between the total water lift and flow rate has been determined as one the parameter designing the PV panel integration by assuming the total water lift as independent variables (H0, H1, H2, and H3 with 1-meter increment) and the electrical power as a dependent variable (the power supply only comes from battery). Using these schemes, we calculated the efficiency of these four different conditions were 2.73%, 12.21%, 18.44%, and 15.34%, respectively. Meanwhile, after PV panel integration in which the total head H1 = 1.33 meter as dependent variables and PV modules as independent variables, the efficiency of the submersible Water DC pump powered by a PV module of 4x30 Wp and 6x30 Wp reached 11.92% and 11.78% subsequently.

Paper ID: 120

High-Gain Rectangular-Fins Shaped Balanced Antipodal Vivaldi Antenna Array Extended by Dielectric for wide-band Imaging Application

Faraz Ahmed Shaikh, Sheroz Khan, AHM Zahirul Alam, Syed Faiz Ahmed, Zeeshan Shahid and Talha Ahmed Khan

In this paper, we propose an Ultra-wideband Balanced antipodal Vivaldi antenna embedded with equal rectangular shaped fins (RF-BAVA) for wide-band imaging application has been introduced. Further, dielectric substrate which elliptical in shaped with low permittivity constant value has been used in the extension of array antenna in H-plane in order to enhance the radiation characteristic of an antenna(RFBAVA-D). The proposed single element of an antenna designed on special purpose dielectric-material Rogers RT/Duroid 5880 with thickness of 1.57mm and relative permittivity of $\epsilon_r = 2.2$ by including 15 slits of same dimension on both arms of an antenna. The dimension of each element is 60.75mm x 66mm approximately. Particularly in the case of microwave imaging and its based application a stability of high gain is considered as an important requirement. So, the H-plane array-antenna principal approach has been adopted to improve antenna gain and polarization performance of array antenna based imaging system. The elements in H-plane almost cover entire ultrawideband (3GHz-to-10.5GHz) frequency range with the reflection coefficient $S_{11} < -10$ dB. Based on the simulation results, the array elements with extended dielectric-director in H-plane arrangement offering high-gain up to 13dB with stable radiation pattern and good impedance bandwidth frequency on all ports while the single antenna element produces around 11dB. A targeted stable gain with low side-lobe level has been achieved in H-plane configuration with better directivity instead of single antenna element. The design and parametric evaluation of RF-BAVA-D has been verified using CST simulation software.

Paper ID: 121

An Implementation of Electroencephalogram Signals Acquisition to Control Manipulator through Brain Computer Interface

Talha Ahmed Khan, Muhammad Alam, Kushsairy A. Kadir, Sheroz Khan, M.S. Mazliham, Faraz Ahmed Shaikh, Syed Faiz Ahmed and Zeeshan Shahid

Brain computer interface (BCI) technology can be used to design a robotic arm whose decision would be based on the brain activity and brain signals. This proposed design can be more beneficial for the paralyzed people and the patients who are suffering from Amyotrophic lateral sclerosis (ALS), Locked in syndrome (LIS), or neurodegenerative disease. Due to these disease patients would not be able to hold and grip the objects properly. Extensive literature review showed that various EEG signal analysis has been completed with the accuracy of 70% to 85%. The suggested solution would be beneficial to the patients in terms of performing every day functions easily like draws opening, holding dishes and opening and closing of doors as well with more accuracy. In the proposed research electroencephalogram signals were observed and used to classify the type of the motion. Data acquisition comprised of three stages amplification can be considered as cost effective signal conditioning. High pass filter, low pass filter and then converted from analog to digital. Open vibe software was used to design the basic neuron scenario for the brain signals and then classified into alpha and beta waves. Robotic arm movement was based on the alpha and beta waves were performed precisely. Simulated results proved that proposed research worked better and can be acknowledged as cost effective. Researchers showed the successful execution of the brain wave signal classification with less false alarm rate for the robotic arm movement by modulation, digitization of the brain signal.

Paper ID: 122

Street lighting Poles Top Solar Power Generation for Typical Housing Area in Kuwait

Naser A. N. Muhaisen, Sheroz Khan, Musse Mohamud Ahmed, Mohamed H. Habaebi and Nabil A. Ahmed

The need for energy is on the rise every year in Kuwait. Currently, largely, generation is fossil fuel-based consisting of power generating stations, transmission lines made from high pylons or towers, and distribution – all networked together in a complicated huge power system, the safe operation and stability of which demands for a generation a extra-bit larger than the consumers' demand. This paper presents a logical study as a solution to the increasing demand on electricity from Kuwaiti consumers from alternative source of solar. This study focuses on presenting a scenario of generating electricity from solar panels on top of street lighting poles in Kuwait. A detailed study has been conducted of street lighting poles types varying in sizes, lengths and the consumption of each lighting pole in Kuwait. This paper discusses the possibility of installing solar systems on all Street lighting poles; thus, the size of different solar systems has been calculated suitable to the length of each lighting pole. It will further highlight how to handle the shortage of generating electricity and cover a part of the growing demand using solar panels installed on street lighting poles. An allocated section of the city with installed streetlight poles solar panels make what is like a micro-grid which will prove helpful in meeting some of the energy demand. The resulting micro-solar system is connected directly with the electrical grid and through it; the generated electricity from the solar system will be injected into the electrical grid during the day without using storage batteries. This process, without batteries, allows avoiding extra costs in terms of purchase, installation and periodic maintenance for batteries.