

FACULTY OF INDUSTRIAL TECHNOLOGY INTERNATIONAL CONGRESS  
(FoITIC)

# BOOK OF PROGRAM

## The 2<sup>nd</sup> FoITIC 20



Campus of Institut Teknologi Nasional Bandung  
West Java – Indonesia  
January 28– 30, 2020

Organized



Co-organized



University Partner





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UniversitiTeknikal Malaysia Melaka

Ts. Dr. Yahaya Abd Rahim

– Malaysia  
UniversitiTeknikal Malaysia Melaka  
– Malaysia

## **PREFACE**

### **WELCOME FROM THE RECTOR INSTITUT TEKNOLOGI NASIONAL BANDUNG**

Dear speakers and participants,

Welcome to Bandung and welcome to Itenas campus!

It is great pleasure for me to welcome you in campus of Itenas Bandung at the 2<sup>nd</sup> Faculty of Industrial Technology International Congress (FoITIC) 2020.

The theme for the 2<sup>nd</sup>FoITIC 2020 “Toward Reliability Renewable and Sustainable Energy Systems: Challenges and Opportunities”, is very relevant with the current hot issues about climate change, growing populations and limited fossil fuel resources.

We believe that scientists and researchers will hand in hand with industrial experts, to create and develop new renewable and sustainable technologies that enable human to make products and services more efficient, protect environment and keep people healthier.

I am deeply grateful appreciative to the Faculty of Industrial Technology Itenas, Indonesian Society Reliability, Institute of Electrical & Electronics Engineers Indonesia Society on Social Implication of Technology Chapter, IEEE CAS Hyderabad, delegates, organizing committee and many others who have contributed to the success of this conference.

I am confident that this event will serve to promote much valuable communication and information exchange among scientist – researcher and industrial expert.

May we have a successful, stimulating, fruitful and rewarding the conference.

Thank you.

**Dr. Iman Aschuri**

Rector

Institut Teknologi Nasional Bandung

## **PREFACE**

### **WELCOME FROM THE DEAN OF FACULTY OF INDUSTRIAL TECHNOLOGY, INSTITUT TEKNOLOGI NASIONAL BANDUNG**

Dear distinguished Guest, Ladies and Gentlemen,

Welcome to the 1<sup>st</sup> Faculty of Industrial Technology International Congress (FoITIC) 2017, which is organized by Faculty of Industrial Technology, Institut Teknologi Nasional (Itenas) Bandung, in conjunction with Indonesian Society for Reliability (ISR) and Institute of Electrical & Electronics Engineers Indonesia Society on Social Implication of Technology Chapter (IEEE Indonesia SSIT Chapter). In our Faculty, we have agreed that FoITIC event will be held every two years (biennial program).

The main theme for the 1<sup>st</sup> congress is “Towards Reliable Renewable and Sustainable Energy Systems: Challenges and Opportunities”. The congress will divide into 2 (two) main programs i.e. International Conference and international workshop.

The aim of the International Conference is invites academics, researchers, engineers, government officers, company delegates and students from the field of energy and other discipline to gather, present and share the results of their research and/or work, and discuss strategies for the future utilization of renewable and sustainable energy system.

Taking this opportunity, I would like to convey my sincere thanks and appreciations to our keynote speakers and invited speakers from Szent Istvan University Hungary, IEEE Indonesia SSIT Chapter, Indonesian Society for Reliability, University Malaysia Pahang and Indonesian Wind Energy Society, workshop facilitators i.e. IEEE Circuits and Systems (IEEE CAS) Hyderabad – India) and national and international scientific committee for their support of this important event. I would also like to invite all participants in expressing our appreciation to all members of the FoITIC 2017 organizing committee for their hard work in making this conference success.

Finally, we wish you all fruitful networking during conference and workshop, and we do hope that you will reap the most benefit of it.

Do enjoy your stay in Bandung, and thank you very much!

**Dr. Dani Rusirawan**

Dean Faculty of Industrial Technology – Institut Teknologi Nasional Bandung

and Chairman of FoITIC 2017

## GENERAL INFORMATION

### Conference Location

Faculty Building (Darmawan Building), the 3<sup>rd</sup> floor, Room 14301, 14303 A-B, campus of Itenas Bandung, Jl. PKHH. Mustapa No. 23 Bandung 40124, West Java – Indonesia.



### Registration

The registration desk is located in the Faculty Building (Darmawan Building), the 3<sup>rd</sup> floor. All participants must check in at their arrival there.

### Official Language

Official language of the conference is English.

### Oral Presentations

Only power-point presentations are allowed. Please, bring your presentation on a memory stick with you. The use of personal laptops is not allowed. Each oral presentation should not exceed 15 minutes including discussion time. Each presentation must be provided to the session chair during the break.

### **Conference Proceedings**

All accepted papers will be published in the official FoITIC 2020 e-proceeding with ISBN, at the latest two month after conference. During the conference, all the participants will be provided with an original full paper from author, in USB drive.

### **Jurnal Publications**

Selected and high quality papers will be invited to submit an extended version to one of the following Journals:

1. The special issue Elsevier's International Journal Energy, indexed by ISI web of sciences.
2. International Journal of Automotive and Mechanical Engineering (IJAME), indexed by Scopus.
3. Journal of Mechanical Engineering and Sciences (JMES), indexed by Scopus.
4. Elkomika, indexed by Directory of Access Journals, Google Scholar.

Only submissions that were presented at the conference by one of the authors may be invited to a special issue of the Journal Energy, and others Journals, as well.

## **ACKNOWLEDGEMENT**

The completion of this undertaking could not have been possible without the participation and assistance of so many people whose names may not all be enumerated. The contributions are sincerely appreciated and gratefully acknowledged. However, we would like to express our especial deep appreciation and gratitude to the following:

1. Institut Teknologi Nasional Bandung
2. Institute of Electrical & Electronics Engineers Indonesia Society on Social Implication of Technology Chapter (IEEE Indonesia SSIT Chapter)
3. Indonesian Society for Reliability (ISR)
4. Institute of Electrical & Electronics Engineers Circuits and Systems (IEEE CAS), Hyderabad India.
5. Universiti Malaysia Pahang.
6. Indonesian Wind Energy Society (IWES).

## **KEYNOTE SPEAKERS AND INVITED SPEAKERS**

### **Prof. Dr. Istvan Farkas (Szent Istvan University)**

Prof. Dr. Istvan Farkas is Director of Institute for Environmental Engineering System, Szent Istvan University (SZIU), Godollo – Hungary. He is also Head of Department Physics and Process Control and head of Engineering Doctoral School, at SZIU. He got Doctoral Degree from Technical University Budapest (1985). Presently, a lot of his activities devotes on International professional societies such as: International Solar Energy Societies (ISES), International Federation of Automatic Control (IFAC), European Federation of Chemical Engineering (EFChE), European Thematic Network on Education and Research in Biosystems Engineering, European Network on Photovoltaic Technologies, FAO Regional Working Group on Greenhouse Crops in the SEE Countries, Solar Energy Journal Associate Editor, Drying Technology Journal Editorial Board, etc. He was a visiting Professor in several universities: Solar Energy Applications Laboratory, Colorado University State University, Fort Collins - USA; Department of Energy, Helsinki University of Technology, Espoo - Finland; Institut for Meteorology and Physics, University of Agricultures Sciencies, Vienna - Austria; Laboratory of Bioprocess Engineering, The University of Tokyo - Japan.

### **Ahmad Taufik, M.Eng., Ph.D (Indonesian Society for Reliability)**

Ahmad Taufik, M.Eng, Ph.D (Graduated from Georgia Institute of Technology, USA – 1996) is a lecturer and a professional trainer and consultant. He is member of American Society for Metals (ASM) and American Society for Mechanical Engineer (ASME). He performs research in fatigue and fracture mechanics of oil and gas pipeline. Dr. Ahmad Taufik highly experienced in providing industrial training and consulting work more than 20 projects related to Pipelines Failure Analysis, Risk and Reliability Assessment, Repair Design, Pipeline Corrosion Protection in Oil and Gas Industries. Dr. Ahmad Taufik has been chairman and speakers for many Oil and Gas International Conferences in Indonesia, (INDOPIPE, MAPREC), Malaysia (ASCOPE), Singapore and China (IPTEC) for the last five years. He is founder of Indonesian Society Reliability (ISR) and presently he is a chairman of the ISR. Since 2006, he was work as part time lecturer at Dept. of Mechanical Engineering, Itenas.

## **Prof. Dr. SoegijardjoSoegijoko (InstitutTeknologi Nasional Bandung)**

SoegijardjoSoegijoko (born in Yogyakarta, 1942) earned his Engineer Degree in Telecommunication Engineering from the Department of Electrical Engineering, InstitutTeknologi Bandung (ITB), Indonesia, in 1964. His Doctor Degree (*DocteurIngenieur*) was obtained from USTL (*Universite des Sciences et Techniques du Languedoc, Montpellier, France*) in 1980. Additionally, he has also completed a number of non-degree or post-doctoral programs, such as: tertiary education (UNSW, Australia, 1970), VLSI Design (Stanford University – 1986; UNSW- 1991; Tokyo Institute of Technology-1984, 1985, 1990).

Since 1966, he joined ITBas a teaching staff at the Department of Electrical Engineering, (currently School of Electrical Engineering & Informatics) ITB, and appointed as a Professor on Biomedical Engineering in 1998. During his academic services at ITB (from 1966 – 2007), he has actively involved in the developments and operations of various units, e.g.: Electronics Laboratory, Master Program on Microelectronics, Inter University Center on Microelectronics, Biomedical Engineering Program (Undergraduate, Master & Doctorate programs), and Biomedical Engineering Laboratory. Although he has been officially retired in 2007, he has appointed as an adjunct Professor at ITB for some years. At present (August 2017), he is an adjunct Professor at the Department of Electrical Engineering, InstitutTeknologi Nasional (ITENAS) Bandung (Indonesia). His current research interests include: Biomedical Engineering Instrumentation, e-Health &Telemedicine Systems, and Biomedical Engineering Education.

He has published more than 100 international papers in the above mentioned research interests. Moreover, he (and his colleagues) have also authored five different book chapter titles (on biomedical engineering, ehealth& telemedicine) published by Jimoondang (Korea, 2008), Springer (Singapore, 2014), CRC Press – Taylor Francis (2016), and Springer (2017).

Currently, he actively involves in various societies within the IEEE that include: EMBS, SSIT, CASS, Computer, and Education, as well as SIGHT (Special Interest Group on Humanitarian Activities). He is currently the IEEE Indonesia SSIT Chapter Chair, EMBS Chapter Chair and actively involves in the Indonesian eHealth & Telemedicine Society (IeHTS) as well as the Indonesian Biomedical Engineering Society (IBES).

Prof. Dr. Ir. SoegijardjoSoegijoko is a *Life Senior Member* of the IEEE, and can be reached through: [soegi@ieee.org](mailto:soegi@ieee.org)

### **Prof. Dr. RizalmanMamat**

Prof. Dr. RizalmanMamat presently is Dean of Faculty Mechanical Engineering, Universiti Malaysia Pahang, Malaysia. He got Doctoral degree from University of Birmingham, United Kingdom in fuel and energy. Previously, he obtained his BSc and MSc from University Teknologi Malaysia (UTM). His field research interest is Heat transfer, Combustion, Internal Combustion Engine, Alternative Energy, Computational Fluid Dynamics, Propulsion System. Prof. Dr. RizalmanMamat was visiting Professor at Karlsruhe University of Applied ScienceGermany (2017), Faculty of EngineeringUniversitasAbulyatamaAceh, Indonesia (2017), Faculty of EngineeringUniversitas Gajah PutihAceh, Indonesia (2017), Department of Mechanical Manufacture & AutomationNingxia University,Yinchuan, China (2016), Department of Mechanical Manufacture & AutomationNingxia University,Yinchuan, China (2015).

### **Mr. SoeripnoMartosaputro (Indonesia Wind Energy Society)**

SoeripnoMartosaputro, graduated from UniversitasSebelasMaret (Bachelor) and University of Pancasila (MSc.). Presently, he is workedat PT UPC Renewables. Moreover, he is Chairman of Indonesia Wind Energy Society (IWES) and Chairman of Expert Board of Indonesia Wind Energy Association (IWEA). Previously he worked as a researcher at the National Institute of Aeronautics and Space (LAPAN), Aerospace Technology Center, particularly in the field of technology development and engineering of the Wind Energy Conversion Systems. He is active in the field of science and technology utilization in particular wind energy technology as speakers and resource persons in seminars nationally and internationally. He is member of the Asia Pacific Wind Energy Forum (APWEF), Indonesia National Committee World Energy Congress (KNI-WEC), Indonesia Renewable Energy Society (METI), and National Research Council (DRN). In 2012 – 2016, he was act as National Project Manager of WHYPGEN (Wind Hybrid Power Generation market initiatives Project) – UNDP Project.



## FINAL PROGRAM

Venue:

Faculty Building (Darmawan Building), The 3<sup>rd</sup> Floor, campus of Itenas Bandung

Jl. PKHH.Mustapa No. 23 Bandung 40124, West Java – Indonesia

Room for opening and closing ceremony: 14301

Rooms for Parallel sessions: Room 1 (14301); Room 2 (14303 A); Room 3 (14303 B)

	Time	International Conference Program
Day 1 January 28. 2020	16:00 – 19:00	Registration
		Welcoming reception
Day 2 January 29, 2020	08:00 – 08:30	Registration
	08.30 – 09.00	Opening ceremony: 1. Dean of FTI Itenas (Dr. Dani Rusirawan) 2. International Committee Chairman (Prof. Dr. Istvan Farkas) 3. Rector of Itenas (Dr. Imam Aschuri)
	09:00 – 09.45	<b>“Topic 1”</b> Professor. Dr. Istvan Farkas (Moderator: Dr. Caecelia)
	09:45 – 10:00	Coffee break
	10:00 – 10:45	<b>“Topic 2”</b> Professor Dr. RizalmanMamat (Moderator: Fahmi Arif, Ph.D)
	10:45 – 11:30	<b>“Topic 3”</b> Andi Kristianto, S.T., MBA. (Moderator: Lisa Kristiana, Ph.D )
	11:30 – 12:30	Lunch break
	12:30 – 13.00	Preparation for parallel session
	13:00 – 13:45	<b>“Topic 4”</b> Dr. Marisa WidyastutiParyasto (Moderator: NikenSyafitri, Ph.D)
	13:45 – 14:30	<b>“Topic 5”</b> Dr. Fahmi Arif

		(Moderator: NikenSyafitri, Ph.D)			
	14:30 – 17:00	Cultural Event			
Day 3 January30, 2020	12:45 – 13:00	Parallel session 1			
		Room 1	Room 2	Room 3	Room 4
	13:00	Speaker 1	Speaker 1	Speaker 1	Speaker 1
	13:20	Speaker 2	Speaker 2	Speaker 2	Speaker 2
	13:40	Speaker 3	Speaker 3	Speaker 3	Speaker 3
	14:00	Speaker 4	Speaker 4	Speaker 4	Speaker 4
	14:20	Speaker 5	Speaker 5	Speaker 5	Speaker 5
	14:40	Coffee break			
	15:00	Speaker 6	Speaker 6	Speaker 6	Speaker 6
	15:20	Speaker 7	Speaker 7	Speaker 7	Speaker 7
	15:40	Speaker 8	Speaker 8	Speaker 8	Speaker 8
	16:00	Speaker 9	Speaker 9	Speaker 9	Speaker 9
	16:20	Speaker 10	Speaker 10	Speaker 10	Speaker 10
	16:40	Closing Ceremony			
16:50	Refresment				

Parallel Session (Thursday, 30th January 2020)		
Room 1	Information Technology	
Time: 13:00 – 16:40		
Paper ID	Paper Title	Author & Affiliation
111	Model of Ubiquitous Precision Livestock System 4.0. : A Technological Review	IrawanAfrianto, Sri Wahjuni, TaufikDjatna (UnivesitasKomputer Indonesia– Indonesia)
113	Vulnerability Assessment for Basic Data of Education Website in	Atho’ NovianAwlarijal, Ahmad Almaarif, Avon Budiono(Telkom University – Indonesia)

	Regional Government X – A Black Box Testing Approach	
114	Analysis of Potential Security Issues in Regional Government X Website Using Scanning Method in Kali Linux	Jelita Putri Deviarinda, Avon Budiyo, Ahmad Almaarif(Telkom University – Indonesia)
115	Analysis of Potential Security Vulnerability on Website of Informatics and Communication Office of Regional X using Penetration Testing Execution Standard (PTES) Method	Aulia Fakhri, Ahmad Almaarif, and Avon Budiono(Telkom University – Indonesia)
131	Design of Numbering Machine Control System based on Omron CJ2M PLC with Omron NB10 Touchscreen HMI for Improving	EndangDjuana, GunawanTjahjadi, QoriRohman Putra (UniversitasTrisakti– Indonesia)

	Manufacturing in Motorcycle Assembling Industry XYZ	
146	The Usage of Quick Response Code and Captive Portal for Wi-Fi Security and Bandwidth	Muhammad Adam Nugraha, NyomanBogi Aditya Karna, RidhaMuldina Negara(Telkom University – Indonesia)
147	Design of IoT-Based Manufacturing Quality Control System with Exponentially Weighted Moving Average Chart	Bintang Wibawa Mukti, CahyadiNugraha, Fadillah Ramadhan (InstitutTeknologi Nasional – Indonesia)
148	Implementation of The Internet of Things for Xand R Control Chart in Quality Control	Aldi NahlaFirdaus ,CahyadiNugraha, Fadillah Ramadhan(InstitutTeknologi Nasional – Indonesia)
151	Haar Cascade Classifier Method for Real Time Face Detector in 2 Degree of Freedom (Dof) Robot Head	Dwi Agung Al Ayubi, Dwi Arman Prasetya, Irfan Mujahidin (University of Merdeka Malang– Indonesia)
155	Desicion Support System Using Topsis Method for	Mira MusriniBarmawi, Sofia Umaroh (InstitutTeknologi Nasional Bandung– Indonesia)

	Smartphone Selection	
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Room 2	Information System/ Business Management/ Industrial Engineering	
Time: 13:00 – 16:40		
Paper ID	Paper Title	Author & Affiliation
100	Success Implementation of E-Voting Technology In various Countries: A Review	SlametRisnanto, Ts Dr Yahaya Abd.Rahim , Prof Gs Dr Nanna Suryana(UTeM–Malaysia)
107	The Role of Technology and social transformation challenge in Industrial Revolution 1.0 – 4.0.	Fred SorituaRudiyanto, AgusSachari,SetiawanSabana, YannesMartinusPasaribu(Bandung Institute of Technology – Indonesia)
109	Design of Information System for the Protection of Indonesian Migrant Workers	Leonardi Paris Hasugian, Deden Abdul Wahab, YeffryHandoko Putra, RanggaSidik, and YusrilaYekaKerlooza(UniversitasKomputer Indonesia– Indonesia)
116	Machine Learning for Clustering Emotional Features in Public Opinion during the 2019 Presidential Candidate Debates in Indonesia	AgusSasmitoAribowo, YuliFauziah and Siti Khomsah(UPN "Veteran" Yogyakarta–Indonesia)
117	An Innovation Capability Model to Increase Micro, Small and Medium Enterprises (Msmes) Competitiveness in Indonesia: A Conceptual Model	Rochmah, Roosdiana Noor (Telkom University– Indonesia)
123	Determination Of The Shortest Route of Electrical Scooters Maintenance Patrol in Bandung Using Nearest Neighbor and Genetic Algorithm Approaches	Sely P. Oktaviani, Rispianda(InstitutTeknologi Nasional Bandung – Indonesia)
128	Study of GPR Method for Detecting Void in Concrete	Teddy Andriawan, Aloysius AdyaPramudita, ErfansyahYudhiEka

		Ali(Telkom University– Indonesia)
136	Economic Simulation of Indonesia's Clean Energy Policy: Shifting from LPG to Induction Stove	DzikriFirmansyah Hakam, MeiriTriani, I Putu Wirasangka, Siti Aisyah (PLN– Indonesia)
144	Study of Company Revenue Based on Production Planning Configuration Using Goal Programming Method	FajarAzhari Julian, Rispianda(Institute Technology National– Indonesia))
152	Detection of Decreased Kidney And Lung Function Through the Iris of the Eye Using the Method Convolutional Neural Network (CNN)	Juwairiah, HerrySofyan, Vincentius Dian Asa Putra, HerlinaJayadianti(UPN "Veteran" Yogyakarta– Indonesia)

Room 3	Electronics / Mechatronics	
Time: 13:00 – 16:40		
Paper ID	Paper Title	Author & Affiliation
110	Design of Microstrip Array Antenna with Beamforming Capability for 5G Communication	Adam TsanyMagrifaghibran(Telkom University– Indonesia)
119	Automatic Location using ADS-B Mode for Ground Vehicle	Marisa Premitasari, UungUngkawa, Adjie Putra Perdana (InstitutTeknologi Nasional – Indonesia)
133	Determination of Ignition Voltage in Tank Vehicles Carrying Gasoline and LPG in Electric Field Zone	IyusRusmana(InstitutTeknologi Nasional Bandung – Indonesia)
135	Wearable Microstrip Antenna with Defected Ground Structure for Breast Cancer Detection	Putri Angelia, Levy Olivia Nur, Bambang Setia Nugroho(Telkom University– Indonesia)
141	Design of Ultra Wide-Band Bowtie Antenna for GPR Applications	RaeidaWidyananda, Levy Olivia Nur, HeroeWijanto, YudaNugraha(Telkom University– Indonesia)
145	Design of Auto Height Check Machine Control System Based on PLC to Improve Quality the Complete Piston	SyahrilArdi, Chandra Kirana Kaomu(PoliteknikManufaktur Astra– Indonesia)

	Rod Assembly Process	
149	Design of Vivaldi Antenna at 0.9 – 6 GHz for Mobile Cognitive Radio Base Station (MCRBS)	Ferialia Fitri, HeroeWijanto, Aloysius AdyaPramudita, YudaNugraha(Telkom University– Indonesia)
150	Rectenna dual-band GSM and Wi-fi band for Low Power Wireless Electronic Device	Muhammad ZakiyBurhanudin, Samsinah Ilyas, SyahrulNugrahaSupian(Telkom University– Indonesia)
154	Design of Monitoring and Control of SCADA Systems on Curing Machine using PLC and HMI Wonderware InTouch	SyahrilArdi, Nanda Indah Angger Lestari(PoliteknikManufaktur Astra– Indonesia)
159	Speed Response Comparison of PD, PI, and PID Controller of BLDC Motor on an Autonomous Vehicle Prototype (AVP)	FachrurRazy Rahman, Mohammad Wirandi, Yusdianto (Metal Industry Polytechnic of Morowali– Indonesia)

Room 4	Energy / Mechanical Engineering / Chemical Engineering	
Time: 13:00 – 16:40		
Paper ID	Paper Title	Author & Affiliation
103	Overview of Graphene-Like-Graphite (GLG) Synthesis Technology from Green Petroleum Coke (GCP) as a High Capacity Anode Material for Lithium-Ion Batteries	UlyaQonita, Riza Murniati, Nugroho Adi Sasongko, dan Cepi Kurniawan(Universitas Negeri Semarang – Indonesia)
105	Measurement of Wastewater Turbidity Based on Total Dissolved Solids at Pancasila University	Muhammad Yaser ,UntungPriyanto, FauzieBusalim .(Universitas Pancasila– Indonesia)
106	Energy Management Strategy for Nickel Metal Hydride (NiMH) Battery and Proton Exchange Membrane Fuel Cell (PEMFC) on 3-wheel	D. R. Harahap, Wei-Chin Chang, S. Ariyono(PoliteknikManufaktur Negeri Bangka Belitung – Indonesia)

	Hybrid Electric Car Equipped With Continuously Variable Transmission (CVT)	
125	Effect of nanofluid concentration on the performance of PV/T collector under the tropical climate conditions of Indonesia	Amrizal, Muhammad Irsyad, Amrul , Agung Nugroho, Miftahul Aziz(Universitas Lampung– Indonesia)
127	Potential of Glycerol and Derivatives Based on Palm Oil as a Green Solvent	Syifa Tiara Saskia Mulya, Maria Agustina Rani Findriyani, Nugroho Adi Sasongko(Universitas Negeri Semarang– Indonesia)
129	Potential of Glycerol and Glycerol Derivatives Based on Palm Oil as a Green Solvent	Maria Agustina Rani Findriyani, Syifa Tiara Saskia Mulya, and Nugroho Adi Sasongko(Universitas Negeri Semarang– Indonesia)
134	Pressure Reducing Station Design for small scale business from 200 bar to 2 bar pressure	PratomoSetyadi, M.T. (Universitas Negeri Jakarta– Indonesia)
137	Enhancing the Nickel Recovery of Morowali Nickel Laterite in Atmospheric Citric Acid Leaching	Feby Aryanhi, Regna Tri Jayanti (PoliteknikIndustriLogamMorowali– Indonesia)
142	Particle Size Analysis of Morowali Nickel Laterite on Atmospheric Citric Acid Leaching	Wirawan, Regna Tri Jayanti(PoliteknikIndustriLogamMorowali– Indonesia)
143	Effect of Agitation Speed and Leaching Time for Nickel Recovery of Morowali Limonite Ore in Atmospheric Citric Acid Leaching	Regna Tri Jayanti, Yusdianto(PoliteknikIndustriLogamMorowali– Indonesia)
153	Specimen Test Making of Polypropylene High Impact (PPHI) Polimer Composite	Nuha D. Anggraeni, Alfian E. Latief, Ramadhan L. Tawadha, and Rifki R. Radliya (InstitutTeknologi Nasional– Indonesia)

	Reinforced with Natural Fibres using Hand Lay-Up Methods	
156	Evaporator Design With Ammonia-Water Mixture as Working Fluid for Kalina KCS34 Cycle On Electric Power Plant	Muhammad Pramuda N. S, Muhammad Ridwan, Agung Priambudi(Institut Teknologi Nasional Bandung – Indonesia)
158	Pilot Plant Biodiesel From Waste Cooking	Rif'ah Amalia, Hendrik E.G.P ,Achmad B. Ulum, and Eka S.N (Politeknik Elektronika Negeri Surabaya– Indonesia)
130	Feasibility Study of Thermoelectric Generator Configuration in Electricity Generation	W. Priharti, M. Ramdhani, F.R.J. Putra, A. Khansalya(Telkom University– Indonesia)

## **Model of Ubiquitous Precision Livestock System 4.0. : A Technological Review**

**IrawanAfrianto, Sri Wahjuni, TaufikDjatna**

**Abstract:**The development of the industrial revolution 4.0 which relied on the ability of ICT, made it possible to provide a faster, precise and accurate (precision) solution to a system. IoT with various sensors, able to provide data to the system more quickly, measured and whenever needed. The main objective of this study is to propose a model 4.0 Precision Livestock system that combines the ability of IoT and drones to monitor livestock biomass and herd cattle, wearable devices on livestock to provide location information and animal health, and utilize data communication networks using LoRa for coverage wider. This model integrates data sourced from these entities in the form of monitoring and analysis data, and produces precise information related to the location of livestock and the availability of feed on grazing land.

**Keyword:**IoT, drone, object detection, wearable device, LoRa.

## **Vulnerability Assessment for Basic Data of Education Website in Regional Government X – A Black Box Testing Approach**

**Atho' NovianAwlarijal, Ahmad Almaarif, Avon Budiono**

**Abstract:**The development of technology in the current era is growing more rapidly. One example is the spread of information is no longer using the print media but uses web media. The Department of Education in Regional Government X uses the website to disseminate information to outside parties. The Department of Education uses the web to manage basic data of education (dapodik). In the current era, information is very crucial. According to the Open Web Application Security Project (OWASP) in 2017 there are several vulnerabilities that often occur on websites such as injection flaws, sensitive data exposure, cross-site scripting (XSS), etc. This will impact the attacker in exploiting the system, retrieving information or important data on the web. Therefore, security must be ensured to maintain the integrity of the information on the website. One way to maintain the integrity of information on a website is by conducting vulnerability assessment. Vulnerability assessment is a series of actions to identify and analyze the possibility of security vulnerabilities in the system (ISACA, 2017). This paper provides a black box testing for vulnerability assessment of web application by mean of analyzing and using combined set tool to detect vulnerabilities.

**Keyword:**information, security, web application, vulnerability assessment, black box testing

## **Analysis of Potential Security Issues in Regional Government X Website Using Scanning Method in Kali Linux**

**Jelita Putri Deviarinda, Avon Budiyo, Ahmad Almaarif**

**Abstract:** The importance of website security is a top priority after data leakage or damage occurs. Website is a web page that is interconnected and contains a collection of information and can be accessed through the home page using a browser and internet network. According to the ministry of communications and information, 50% of the government's website is under threat from hacker attacks that can harm private information. Vulnerability assessment or process of identifying the weaknesses of a system can be an effective way to control and prevention against risks that occur. Given these problems, it is necessary to analyze the potential vulnerabilities on websites with vulnerability assessments aimed at preventing security vulnerabilities. In this study the analysis of potential website security loopholes was performed using scanning methods. The test is carried out with a vulnerability assessment using tools that are available on Linux and run on a virtual machine. Kali Linux is an operating system that has many tools including penetration testing, ethical hacking and network security assessment. This research was conducted using uniscan and nmap tools by scanning the target URL and assisted by using a web browser. The result of testing is to find a security vulnerability using a scanning method with tools and then giving the solution of the vulnerability it acquired.

**Keyword:** Security, Website, Vulnerability Assessment, Scanning, Kali Linux

# **Analysis of Potential Security Vulnerability on Website of Informatics and Communication Office of Regional X using Penetration Testing Execution Standard (PTES) Method**

**Aulia Fakhri, Ahmad Almaarif, and Avon Budiono**

**Abstract:** The development of technology can improve every individual, organization and even government in providing accurate, effective and efficient information. Local government X is the government that serves the public in administrative administration in the field of X. Government information in Regional X is managed by the Office of Communication and Informatics (Diskominfo) as an institution engaged in information technology. Diskominfo utilizes technological advancements to convey information to people in Region X and outside Region X through websites with the aim of providing information easily. Through technological developments, website security is important because it can prevent attacks from irresponsible people, because it can damage the system or endanger ongoing business processes. That way, we need to do a test of what is conveyed by this website that is by conducting a Vulnerability Assessment and Penetration Testing. Before conducting the test, we need to do a vulnerability analysis that is found. In this analysis process, a tester will do an analysis of the target website to find security holes that can be attacked. Testing will use the Penetration Testing Execution Standard (PTES) method. This method was chosen because it has stages that are clear and easy to understand.

**Keyword:** Security vulnerability analysis, website, PTES

## **Design of Numbering Machine Control System based on Omron CJ2M PLC with Omron NB10 Touchscreen HMI for Improving Manufacturing in Motorcycle Assembling Industry XYZ**

**EndangDjuana, GunawanTjahjadi, QoriRohman Putra**

**Abstract:** Engine numbering process is the earliest step in assembling a motorcycle engine and it is strictly prohibited to make slightest mistake. Because if it happens, it will disrupt the next process and / or jeopardize vehicle engine registration process required by National Police Department. However, in 2017 alone there have been no fewer than 200 engines produced with wrong number. This is because the existing machines are prone to errors, with protection system still has potential to make mistakes, and unavailability of human machine interface for operator monitoring the machine. In this paper we present a new design for numbering machine control system with more reliable protection logic, so that zero mistakes can be realized. Improved protection system includes checking repetition of process for the last 100 data, better type selection protection, protection of sequential numbering process, and acknowledgment using fingerprint scanner. The programming language used was made using structured text language which making it easier for programming, monitoring and troubleshooting. An intuitive interface has also been made using HMI touchscreen. Testing all input data protection logic shows very good results with 100% success rate, so that it can fulfil zero mistake requirement. In this way this machine can be declared ready for mass production.

**Keyword:** Human Machine Interface, Numbering Machine, Programmable Logic Controller

## **The Usage of Quick Response Code and Captive Portal for Wi-Fi Security and Bandwidth**

**Muhammad Adam Nugraha, NyomanBogi Aditya Karna, RidhaMuldina  
Negara**

**Abstract:** Internet of Things (IoT) allows different devices to communicate with each other without the compulsion to use outdated-fashioned communication styles such as data cables, external flash drives, and disks. Nowadays, people connect their smartphones to Wi-Fi in the public area by manually inputting a Wi-Fi password on their smartphones, which is regarded as a problem, mainly when the password is complex and confusing. This research demonstrates the feasibility of using the Quick Response (QR) code and the Captive Portal to guard the Wi-Fi password and to avoid unwanted users from exploiting the Wi-Fi public area. The public Wi-Fi users may scan the QR code to obtain the information they needed. Captive Portal is a router portal server that does not enable an internet connection before the users gets the authentication code. Simulation and experimentation are therefore necessary by using the ZXing QR code generator software to acquire the Wi-Fi QR code. Also, devices with a QR code scanner are desired to scan the code. As a result, the safety of the Wi-Fi public area is protected as the password is not revealed to the user.

**Keyword:** QR code, Wi-Fi, IoT, Captive Portal, ZXing

## Design of IoT-Based Manufacturing Quality Control System with Exponentially Weighted Moving Average Chart

**Bintang Wibawa Mukti, CahyadiNugraha, Fadillah Ramadhan**

**Abstract:** Quality control is needed for each manufacturing industry, so that product quality remains stable. Product variation is one of the factors that can reduce product quality, so quality control is needed. Control chart is one of the tools in statistical quality control that can be used to detect changes in product variations. One of the control charts that has a high sensitivity to the average shift is Exponentially Weighted Moving Average (EWMA) control chart. But in its implementation, the company still uses a manual process, starting from the process of data collection, data entry, to data processing into a control chart. Manual process can cause data collection errors and delays in quality decision. For EWMA control chart, the complicated calculation contributes additional difficulties for quality control implementation. The Internet of Things (IoT) is a concept that combines a device with other devices using internet connectivity, so that the distribution of data and information flow becomes faster and more accurate. Based on the IoT concept, a quality control design system is proposed that integrates data retrieval, data processing, control chart computation, and data display so that it can improve speed and accuracy in the process of making EWMA control chart. Based on testing, this system has been able to improve the accuracy of data retrieval and processing, speed up the process of making control charts, and integrate data collection, recording, and processing activities.

**Keyword:** statistical process control, internet of things, exponentially weighted moving average, digital caliper, web-based system.

## Implementation of The Internet of Things for X and R Control Chart in Quality Control

**Aldi NahlaFirdaus ,CahyadiNugraha, Fadillah Ramadhan**

**Abstract:** Quality control is one of the important things in an industrial enterprise, but in carrying out the process the enterprise is constrained by the speed, and accuracy produced by the quality control process. A set of basic quality control tools are X and R control charts. These basic charting is sometimes face speed and accuracy problem due to the required measurement, data recording, and calculation processes. Considering these problems, an appropriate, fast and accurate quality control system is proposed and prototyped for computing the quality control process with the assistance of the Internet of Things. This system's prototype uses digital calliper, microcontroller-based wireless data recorder, database, and web-based application environment. System test is comprised of accuracy verification, speed comparison for quality control process, and process integration evaluation. System test has shown that this quality control system has the accuracy and speed in calculating the quality control process, significantly compared to manual system, so that it can overcome existing quality control problems.

**Keyword:** Internet of Things (IoT), Statistical Process Control, Digital Caliper, X and R Control Chart , Web-Based System

## **Haar Cascade Classifier Method for Real Time Face Detector in 2 Degree of Freedom (Dof) Robot Head**

**Dwi Agung Al Ayubi, Dwi Arman Prasetya, Irfan Mujahidin**

**Abstract:** Robotics technology is growing and advancing. Robot is a very important work for modern human life today to facilitate all human work. This era of robotics advances began to replicating form and was able to mimic almost all human activities entirely, from robots that have vision, deportations, and human-like movements. Research Robot Head 2 degree of freedom (DOF) for face detector in real time use. The results obtained in the servo movement are angles to determine the detection of the captured face. For the real-time accuracy of the face detector in this study, the 3-student sample testing with the greatest precision was 95.25% with the fastest detection response time of 7 seconds.

**Keyword:** Raspberry Pi, face detector, Degree of freedom, Haar Cascade classifier, Robot head

## Decision Support System Using Topsis Method for Smartphone Selection

**Mira MusriniBarmawi, Sofia Umaroh**

**Abstract:** Nowadays smartphone has developed rapidly, within days and months, they will build many smartphone and with so many differences features such as more powerful processors, wider screen, more powerful front and back camera etc. Sometimes buyer has difficulties in determining which smartphone that most suitable with their needs. In this research, we implement TOPSIS method to support buyer in choosing the most appropriate smartphone, based on its feature and brands. TOPSIS, stand for Technique for Order of Preference by Similarity to Ideal Solution, is one of Decision support method based on calculation of positive ideal distance solution and negative ideal distance solution. Final output of TOPSIS calculation is order of priority of recommended smartphone's brand. TOPSIS was also applied in Decision Support System, where the output of this application was compared with the result of manual TOPSIS calculation

**Keyword:** TOPSIS, positive ideal distance solution, negative ideal distance solution, eighted normalized decision matrix

## **Success Implementation of E-Voting Technology In various Countries: A Review**

**SlametRisnanto, Ts Dr Yahaya Abd.Rahim , Prof Gs Dr Nanna Suryana**

**Abstract:** Electronic voting or known as e-voting is a technology developed for voting. The use of e-voting in the general election has been widely implemented. Some countries that have successfully implemented it are India, Brazil, Estonia and the Philippines, and other countries that have unsuccessfully tried or canceled to implement it are Argentina, United States, Belgium, Canada, and Japan, Mexico, France, Peru, Australia, Costa Rica, Finland, Guatemala, United Kingdom, Ireland, Italy, Kazakhstan, Netherland, Germany, Paraguay, Norway, Switzerland and others. In this study, we tried to present countries that have successfully implemented e-voting, analyzed them, and made conclusions upon the analysis. The result of this study is that the adoption of e-voting is not only about technology. Many factors are no less important that contribute to the successful implementation of e-voting in a country, so that other countries that plan to implement e-voting in the future can learn from the success of these countries.

**Keyword:**e-voting, general election, election technology

## **The Role of Technology and social transformation challenge in Industrial Revolution 1.0 – 4.0.**

**Fred Soritua Rudiyanto<sup>1</sup>, Agus Sachari<sup>2\*</sup>, Setiawan Sabana<sup>3</sup>,  
YannesMartinus Pasaribu<sup>4</sup>**

**Abstract:**The Industrial Revolution has been permanent related to technology society and human readjustment to the technology. The changed of technology society and human adaptation are impulse and reaction as a social being that sometimes conflicting each other so, therefore, need to look for the best solution to the clash and the social problems that emerged. Further understanding of the industrial revolution required a brief historical knowledge related to the industrial revolution. This article explains the background of several technology histories and the social life as supporting or the impact of the industrial revolution. Facing the challenges from the future need to be considered and forecast especially related to the present industrial revolution, particularly to the social impact that might be happened, that allowing generate pre solution to eliminate the friction among human.

**Keyword:** Challenged, History, Industrial Revolution, Social life, Technology

## **Design of Information System for the Protection of Indonesian Migrant Workers**

**Leonardi Paris Hasugian, Deden Abdul Wahab, YeffryHandoko Putra,  
RanggaSidik, and YusrilaYekaKerlooza**

**Abstract:** Indonesian Migrant Workers, called PMI, are Indonesian workers working overseas. The existence of PMI abroad is far from the control and monitoring of the government. Various cases that are often exposed in the mass media on PMI issues involved in killings, persecution, and so on are indicators that the involvement of various parties including the government has not been maximized. These issues should ideally be minimized if there is a form of communication, and the continuation of that is the response. Communication and response become one of the media for Indonesian Migrant Workers working abroad. Providing fast and accurate information needs to be designed. For that reason, the author designs website and mobile-based information systems by proposing hardware, software, brainware, and network design. The purpose of this research is to get a blueprint or design of information system to provide protection for PMI so that it can be manifested in hardware, software, brainware, and network development later.

**Keyword:** Indonesian Migrant Workers, Protection, Design of Information System

## **Machine Learning for Clustering Emotional Features in Public Opinion during the 2019 Presidential Candidate Debates in Indonesia**

**AgusSasmitoAribowo, YuliFauziah and Siti Khomsah**

**Abstract:** This research has produced a description of the emotions of streaming-video viewers of presidential candidate debates broadcasted on Youtube. In the first presidential candidate debate, the emotions of viewers were still neutral and tended to be feelings of pleasure and happiness. In the second to fifth presidential candidate debates, the dominant emotions were happy, angry, and sad. This research is known as emotion analysis, using comments from viewers of presidential candidate debates on Youtube as the data. Those comments were downloaded and then subjected to preprocessing for data cleaning, emotion feature extraction, and clustering using K-Means based on six basic types of emotions: anger, sadness, happiness, fear, surprise, and disgust. The aims to be achieved are to determine a more homogeneous cluster for each opinion in the presidential candidate debate videos and to provide an emotional label for each cluster formed. The results of the research are five clusters that have distinctive homogeneity, namely happiness, anger, neutral, surprise-angry-disgust, and sadness. Each cluster member was labeled according to its characteristics. After being divided for each stage of the presidential candidate debate, it can be seen that the journey from the first debate to the next debate period tended to increase the emotion of anger and reduce the emotion of neutral.

**Keyword:** Emotion Analysis, Clustering, K-Means, Basic Emotion

## **An Innovation Capability Model to Increase Micro, Small and Medium Enterprises (MSMEs) Competitiveness in Indonesia: A Conceptual Model**

**Rochmah, Roosdiana Noor**

**Abstract:** Globalization and the fourth Industrial Revolution have presented various opportunities but also disruption in the economy and social life. Although Indonesia's performance among ASEAN countries is very good, in 2019, Indonesia has experienced a decline in globally competitiveness. One of the low aspects is the innovation capability. As the main driver of the nation's economy, MSMEs must have the innovation capability to create innovation and make valuable contributions to the nation's competitiveness. It is very important to identify the factors that show innovation capability. This paper present the key constructs of Innovation capability and the developed conceptual model which shows an innovation capability model through a conclusive research. The model identifies three key innovation capability constructs, namely knowledge & technology output, knowledge utilization for product innovation, and innovation fund generation and other important factors to explain the constructs. The first two constructs constitute the technical aspect and the third construct indicate the financial aspect of innovation capability.

**Keywords:** innovation capability, competitiveness, MSMEs, conceptual model

## **Determination Of The Shortest Route of Electrical Scooters Maintenance Patrol in Bandung Using Nearest Neighbor and Genetic Algorithm Approaches**

**Sely P. Oktaviani, Rispianda**

**Abstract:**The increasing number of parking spot locations has increased the number of Electrical Scooters fleet maintenance patrols. For this reason, it is necessary to determine the best route and the shortest route. This is done so that the company can minimize maintenance patrol time. In this study, determining the number of routes is done using the Nearest Neighbor approach and determining the shortest route path using the Genetic Algorithm approach. Based on the results of calculations, the best number of routes that can be used is 3 routes with each patrol time of 460, 414, and 417 minutes. With this research, it is expected that company can minimize patrol time and shortest mileage.

**Keyword:** Electrical Scooters, Nearest Neighbor, Genetic Algorithm

## Study of GPR Method for Detecting Void in Concrete

**Teddy Andriawan, Aloysius AdyaPramudita, ErfansyahYudhiEka Ali**

**Abstract:** Concrete has a considerable influence on development (construction) throughout the world, including in Indonesia (Kandi, Ramang and Cornelis, 2012). From the statement of Y. F. Kandi, it can be concluded that the development progress in Indonesia is growing rapidly from year to year. Therefore it is necessary to check the quality of concrete to support the success of the project. Checking the quality of concrete is done because not all concrete prints are printed perfectly, there are still some concrete is not printed perfectly. If in a project using concrete that is not formed perfectly, it will endanger the building and all parties involved in the project (Lu, 2011). Checks carried out in the form of visual investigation to identify damage to concrete, especially voids so that the damage can be repaired immediately. Because the damage inside the concrete cannot be seen clearly, we need a media or a method to help check. Void inspect for large area is a problem that causes the utilization of GPR with the result that the detection is more efficient.

In this research, testing and analysis of voids on concrete using GPRMax based on the reconstruction of the generated signal, a medium is modeled to resemble a concrete containing voids in it. Because to detect damage inside the concrete can not be seen with the eye. The advantage of GPRMax is that it has the same function as the Ground Penetrating Radar (GPR) performance that can measure the depth and position of voids on the test object based on time travel and the samples produced in the reconstruction of the B-Scan signal.

**Keyword:** Ground Penetrating Radar (GPR), voids, GPRMax, concrete, signal reconstruction.

## **Economic Simulation of Indonesia's Clean Energy Policy: Shifting from LPG to Induction Stove**

**Dzikri Firmansyah Hakam, Meiri Triani, I Putu Wirasangka, Siti Aisyah**

**Abstract:** Indonesian government is facing the burden increase of state budget from the energy subsidy, especially Liquefied Petroleum Gas (LPG) subsidy. According to state budget plan of Indonesia (RAPBN) year 2019, the LPG subsidy (3 kg tube) year 2019 was estimated more than 70 Billion Rupiah. The subsidy nominal for LPG 3 kg tube is fluctuated because influenced by the uncertainty of world crude oil price where the LPG is the refinery product of crude oil. The increase of crude oil price in the global market could significantly increase the LPG subsidy of Indonesia's government. In the other hand, PLN as Indonesia's state-owned electricity company currently constructing new power plant approximately 35,000 MW that lead to the increasing of reserve margin in the power system that should be absorbed by the consumers. Recently, induction stove emerges by the Indonesia's government as a solution for those two issues above. However, the literature review regarding the economics and policy of the development of induction stove in Indonesia's electricity market is still limited. This research provides the economic valuation of induction stove compared to the utilization of LPG stove for each electricity and LPG tariff, i.e. subsidy and non-subsidy tariff. This research could serve as an academic reference for energy sector stakeholders in Indonesia in objective to implementing the clean energy policy to shift cooking technology from LPG stove to induction stove.

**Keyword:** Induction stove, LPG, energy subsidy, economic valuation, clean energy policy

## **Study of Company Revenue Based on Production Planning Configuration Using Goal Programming Method**

**FajarAzhari Julian, Rispianda**

**Abstract:** Production planning in company management is very important to manage. Production planning needs to consider various aspects. Starting from optimizing profits, minimizing production costs, maximizing the available resources. A Goal Programming Method is one method that can be used to optimize production planning, being able to solve problems to be optimal with more than one objective (multi-objective). UD. Lotus is a textile company, which aims to increase sales revenue, decrease production costs by maximizing regular work hours and optimize the use of available resources. The purpose of this study is to make an appropriate discussion to count the number of clothes produced and multiply the cost of production using the Goal Programming method. The results of the research determine the product combination optimization results from programming objectives increase more funds with the policies made by the company so far. The company's profit with a programming objective solution is exceed the company's profit target.

**Keyword:** Goal Programming, Multi Objectives, Production Planning

## **Detection of Decreased Kidney And Lung Function Through the Iris of the Eye Using the Method Convolutional Neural Network (CNN)**

**Juwairiah, HerrySofyan, Vincentius Dian Asa Putra, HerlinaJayadianti**

**Abstract:** Iridology is a scientific study of the shape and structure of the iris that can provide an overview of every organ in the human body. Research on computerized iridology has been carried out. Cases of decreased organ excretion through iridology that are commonly found are the organs of the lungs and kidneys. The purpose of this research using a deep learning approach namely Convolutional Neural Network to detect decreased function in the lungs and kidneys through the iris of the eye. The study of iridology and iris image obtained from iridologists. The cropping method is used to extract the identified part of the eye image. The cropping method consists of a median filter to remove noise, a hough circle transforms to get an iris circle and a region of interest to get the identified part. Image cropping results are used as training data and test data. The Convolutional Neural Network training process uses the VGG16 model with 2 classes, normal and abnormal. The results of Convolutional Neural Network research can detect decreased organ function in excretion through the iris of the eye. From 40 testing data with details of 20 right eyes and 20 left eyes, the accuracy is 90%.

**Keyword:** Iridology, Human Iris, Excretion, lung, kidney, Convolutional Neural Network, deep learning

## Design of Microstrip Array Antenna with Beamforming Capability for 5G Communication

Adam TsanyMagrifaghبران

**Abstract:** The fifth generation technology (5G) is a wireless network technology that offers access at very high data rates and greater capacity. One important element in realizing 5G technology is the antenna. Antennas with beamforming capabilities are one of the keys to 5G technology. Beamforming itself is an antenna's ability to direct the radiation patterns produced with certain characteristics. Based on previous research, antennas with beamforming capabilities can produce higher gain and wider bandwidth. In that study, antennas with high gain cause the value of SINR to increase, so that the resulting throughput is also higher. One type of antenna that can be used for 5G technology is a microstrip antenna. However, microstrip antennas have several disadvantages, including bandwidth and small gain. At present, the 28 GHz frequency is the most developed 5G frequency candidate. In this research, a microstrip antenna designed with beamforming capability can work at a frequency of 28 GHz. The antenna designed is an 8x8 MIMO array antenna arranged linearly. An array of antennas is carried out in order to increase the antenna gain. The antenna that has been designed is then performed beamforming simulation. The beamforming simulation is done by adjusting the phase difference at each antenna excitation. The desired beam characteristic is that it can point to 60 degrees with a beam width  $\leq 30$  degrees. The simulation results show that the antenna is able to work in the frequency range of 27.07 GHz - 28.77 GHz at a return loss limit of less than -10 dB with a bandwidth of 1.7 GHz and a gain value of 20.1 dB. Meanwhile, the beamforming simulation results by providing a relative phase difference between excitation of 45 degrees and 90 degrees, resulting in a radiation pattern with a beam characteristic approaching as desired. Setting the phase difference between excitation by 45 degrees produces a beam that leads to 61 degrees, with a beam width of 34.4 degrees. Meanwhile, the phase difference setting between excitation of 90



degrees produces a beam that leads to 64 degrees, with a beam width of 35.8 degrees.

**Keywords:** 5G Technology, Antenna, Microstrip, Array, Beamforming.

## Automatic Location using ADS-B Mode for Ground Vehicle

**Marisa Premitasari, UungUngkawa, Adjie Putra Perdana**

**Abstract:** To increase the ground vehicle safety on landing area, Federation Aviation Administration (FAA) published some regulations for flight operation standard to implement transponder technology on aircraft by January 1st, 2020. These transponder technologies, which implemented on aircraft transmitter, aimed to transmit the aircraft position (longitude and latitude) data using Automatic Dependent Surveillance-Broadcast (ADS-B) mode as its automatic location. The aircraft will then communicate with the ground vehicle through an Air Traffic Controller (ATC) to avoid collision around landing areas. This paper presents the test results of a transmission system that simulates the ADS-B data sending through a transponder from a ground vehicle on both static and dynamic environment. The data transmission system designed by implementing HackRF, as decrypts hardware for radio data and a transmitter as the hardware for decrypting the ADS-B data. Moreover, these systems used a mini-computer called raspberry to process the ADS-B data and send the GPS data to the ground vehicle at a real-time condition. Furthermore, Pulse Position Modulation (PPM) utilised to change the digital format data-to-data radio signal. Then, the hackRF transmitter which sends ADS-B data is captured by the receiver so ground vehicle coordinate will enable to detect by a receiver or radar. Results show time delays of 1-5 second for static test and 1-20 second for the dynamic test.

**Keyword:** ADS-B, longitude, latitude, ground vehicle, transmission

## **Determination of Ignition Voltage in Tank Vehicles Carrying Gasoline and LPG in Electric Field Zone**

**IyusRusmana**

**Abstract:** This study has been conducted through computer simulations of ignition voltages, and opened-voltage on fuel tank vehicles consisted of gasoline and LPG, which is caused by the intensity of the electric field. This study reported the condition when tank vehicles consist of 5,000 liters of gasoline was passing through the electric field zone then it showed the ignition voltages was 3014.15 Volts, for tanks consist of 16,000 liters gasoline showed 2818.66 Volts. Other conditions among tanks consist of 9500 kg LPG showed ignition voltage as much as 2773.93 Volts while in the critical fields were 4040.42 Volts/meters, 2396.82 Volts/meters and 2040.55 Volts/meters, respectively. By knowing the ignition voltage result among the conditions as mentioned above, this study concluded that the tank on vehicles consisted of 5,000 liters gasoline had the most sensitivity to fire, followed by the tank on vehicles consisted of 16,000-liter gasoline and 9,500 kg LPG.

**Keywords:** ignition voltage, open voltage, electric field intensity, critical electric field

## **Wearable Microstrip Antenna with Defected Ground Structure For Breast Cancer Detection**

**Putri Angelia<sup>1</sup>, Levy Olivia Nur<sup>2</sup>, Bambang Setia Nugroho<sup>3</sup>**

**Abstract:** A wearable antenna application has been spread in many fields including a solution in the medical application. One of their applications in the medical field is the detection for breast cancer in the human body. This paper reports the microstrip antenna for breast cancer detection at a frequency of 2.46 GHz made from wearable material. The proximity coupled and the addition of a defected ground structure to the ground plane is used to get a wider bandwidth. Detection of breast cancer is performed by using breast modeling or breast phantom.

The dimensions of the designed antenna are 39 mm x 46.5 mm and realized using Rogers RT6006 material. Based on the results of simulations that have been done, the antenna has a return loss value  $\leq -40.28$  dB and a VSWR value  $\leq 1.01$ . The antenna can detect cancer based on the different properties of materials in the breast phantom which affects changes in the value of S11 parameters.

Based on the simulation, if the size of the cancer is getting bigger, then the value of return loss obtained increases or heads to 0 dB. The value of return loss caused by the differences in electromagnetic absorption of different cancer materials.

**Keywords:** microstrip antenna, wearable antenna, breast cancer, cancer detection, breast phantom.

## Design of Ultra Wide-Band Bowtie Antenna for GPR Applications

Raeida Widyananda<sup>1</sup>, Levy Olivia Nur<sup>2</sup>, Heroe Wijanto<sup>3</sup>, Yuda Nugraha<sup>4</sup>

**Abstract:** Ground Penetrating Radar (GPR) is one technology that utilizes a radar system to determine the location of objects that are below the surface of the ground. In its current development, GPR uses an Ultra Wide-Band (UWB) radar system that works at frequencies between 10 MHz to 10 GHz [1]. The use of UWB radar systems are to get high resolution values which affect the level of accuracy in detecting objects. In general, in the implementation of the UWB radar system for GPR technology, antenna types such as bow-tie antennas, TEM Horn antennas, tapered slot antennas, spiral antennas, and vivaldi antennas are used [2]. The characteristic of antenna needed in GPR system must have wide bandwidth to examine the resolution of image. In this report, a bowtie antenna is investigated GPR applications. The bowtie antenna is used because this type of antenna has a smaller size and lightweight. The bowtie antenna design was carried out using RT-Duroid 5880 dielectric substrate with dielectric constant ( $\epsilon_r$ ) at 2.2 and thickness ( $h$ ) at 1.57 mm to get the low profile antenna dimensions. The bowtie antenna is operated in the range from 1,6 to 2,6 GHz for a VSWR  $\leq 2$ .

**Keywords:** Bowtie antenna, Ground Penetrating Radar (GPR), Ultra Wide-Band, Low-Profile Antenna, RT Duroid 5880

## **Design of Auto Height Check Machine Control System Based on PLC to Improve Quality the Complete Piston Rod Assembly Process**

**Syahril Ardi<sup>1</sup>, Chandra Kirana Kaomu<sup>2</sup>**

**Abstract:** This paper discusses research on improving the quality of the piston rod complete assembly process which is part of the OCU (Oil Cushion Unit) or rear assembly process. Piston rod complete functions to regulate fluid circulation when OCU experiences compression and rebound. The piston rod complete assembly process is a process of combining piston rods, dust seals, oil seals, rod guides, sub springs, valve stopper, leaf springs, non- return valves, leaf valves, special washer, pistons, and piston rings. A non-return valve, leaf valve, and special washer are thin circular plates. The part that has been assembled is checked in number and composition according to the standard. The problem in the complete piston rod assembly process is when the operator counts the number of non-return valves, leaf valves, and special washer according to the required amount. This is because of its very thin size and stickiness. Errors in the number of non-return valves, leaf valves, and special washer assembled will cause the piston rod complete to reject. Therefore, this study aims to provide a solution to these problems, namely designing an auto height check machine. This machine functions to check the number of non-return valves, leaf valves, and a special washer that has been assembled accurately. The auto height check machine control uses the Omron CJ1M-CPU11 PLC (Programmable Logic Controller) that is communicated with the Omron NS5-SQ10B-V2 HMI (Human Machine Interface). Input devices used are pushbuttons, selector switches, state switches, reed switches, emergency stops, and smart sensors. The output devices used are tower lamps and solenoid valves. Checking the number of non-return valves, leaf valves, and special washer using smart sensors. The result obtained after the existence of the auto height check machine is the reduction in the number of piston rod complete which rejects from 5 pieces per day to 0 pieces per day.

**Keywords:** non-return valve, leaf valve, a special washer, mesin auto height check, PLC

## Design of Vivaldi Antenna at 0.9 – 6 GHz for Mobile Cognitive Radio Base Station (MCRBS)

Feralia Fitri<sup>1</sup>, Heroe Wijanto<sup>2</sup>, Aloysius Adya Pramudita<sup>3</sup>, Yuda Nugraha<sup>4</sup>

**Abstract:** Mobile Cognitive Radio Base Station (MCRBS) is a system for disaster area. This system provides a network for an area after disaster for evacuation activities. MCRBS system works in 0.9 – 6 GHz frequency range to support the second generation of mobile communication system (2G) up to the fifth generation of mobile communication system (5G) frequency candidate. An antenna is one of MCRBS components with function to transmit and receive electromagnetic signals. To support MCRBS system, an antenna with Ultra-Wideband (UWB) characteristic will be needed in communication services that facilitated by MCRBS system. The Vivaldi antenna is one of UWB antennas that has wide bandwidth and high gain for UWB applications. It was invented by P. Gibson in 1979. The antipodal Vivaldi antenna which is one of Vivaldi antenna types has been designed using FR-4 material and copper. The antenna will use quarter wave transformer and array method. Based on the results of simulations conducted, the antenna has a return loss  $\leq -10$  dB, a VSWR  $\leq 2$ , with 5.1 GHz bandwidth, gain 11.13 dBi, and unidirectional radiation pattern to support MCRBS system.

**Keywords:** Ultra Wideband, Vivaldi antenna, Mobile Cognitive Radio Base Station

## Rectenna dual-band GSM and Wi-fi band for Low Power Wireless Electronic Device

Muhammad Zakiy Burhanudin<sup>1</sup>, Samsinar Ilyas<sup>2</sup>, SyahrulNugrahaSupian<sup>3</sup>

**Abstract:** Wireless sensors that operate all day long is required to have high capacity and long life battery. Especially if the sensor is placed in a remote area, replacement of batteries become not easy to conduct. As development of telecommunication system is growing rapidly, it leads to abundance of Radio Frequency signal in many places and it can be used for wireless devices with low input power. This can be achieved by using rectenna, a combination between antenna and rectifier. In this paper a rectangular patch dual band rectenna with resonant frequency of 1.82 GHz and 2.438 GHz is proposed. The antenna is fabricated on a rogers RT 5880 with dielectric constant of 2.2. The rectifier model used is a cockroft Walton voltage multiplier configuration with the hsms-2820 diode. The gain of the proposed antenna at frequency of 1.81 GHz and 2.43 GHz is 3.26 and 4.75 dBi respectively. The experiment shows the rectenna is able to turn on the led lights with a 1.5 V forward voltage by using RF signal source from hotspot tethering and wifi router consecutively. Measurements show that rectenna is capable of producing an output voltage up to 3.8 V and its efficiency reaching 81.76 %. Measurement and simulation results are contained as supporting information.

**Keywords:**RF signal, Rectenna, dual-band, wireless sensor, rectifier

## **Design of Monitoring and Control of SCADA Systems on Curing Machine using PLC and HMI Wonderware InTouch**

**Syahril Ardi<sup>1</sup>, Nanda Indah Angger Lestari<sup>2</sup>**

**Abstract:** In this era, IoT applications in the manufacturing industry, especially in developing industry 4.0 continues to develop widely and rapidly. In this case, research related to the design and application of the Industrial Internet of things in the world of automotive manufacturing industry that produces tires for 2-wheeled vehicles. In the process of making a marketable tire, the process that is passed is the process of mixing, topping, extruding, bead wire, tire assembly, spraying, gimlet, and curing tire. In the last process, namely the curing tire, there is a process of collecting counter data which is carried out by the operator EBS (E-business switch), where the counter data collection is still done manually. After the data is retrieved, the EBS operator will input data into the EBS system. This process is considered inefficient because it is quite a time consuming, and the level of human error is quite high. This paper discusses the design and application of the SCADA System (Supervisory Control and Data Acquisition) on 6 curing machines using HMI Wonderware InTouch application, which functions for monitoring and control systems. In the PLC control system, it utilizes the Mitsubishi QJ71E71-100 Ethernet module as its communication module and uses Microsoft Access as a database. By designing this system, the level of accuracy produced is much higher. While EBS operators can monitor production results via a PC (Personal Computer) both in the interface, as well as data acquisition recorded in Microsoft Access.

**Keywords:** Curing tire, PLC, SCADA, HMI Wonderware InTouch, Microsoft Access

## **Speed Response Comparison of PD, PI, and PID Controller of BLDC Motor onan Autonomous Vehicle Prototype (AVP)**

**FachrurRazy Rahman<sup>1</sup>, Mohammad Wirandi<sup>2</sup>, Yusdianto<sup>3</sup>**

**Abstract:** This research goals are determine the characteristics of the BLDC motor speed system and check the system response during simulation using 3 types of controllers. Three types controllers are PD, PI, and PID controllers. Before doing the simulation, the value of Kp, Ki, and Kd was determined mathematically. The simulation using SIMULINK / MATLAB software. Based on the simulation results, the best simulation results are obtained by the PI controller. This can be seen from the response of the system that becomes better in tracking the given setpoint.

**Keywords:** BLDC Motor, PD,PI, PID, PI-Anti Windup, controller, SIMULINK, MATLAB

## Overview of Graphene-Like-Graphite (GLG) Synthesis Technology from Green Petroleum Coke (GPC) as a High Capacity Anode Material for Lithium-Ion Batteries

UlyaQonita, Riza Murniati, Nugroho Adi Sasongko, dan Cepi Kurniawan

**Abstract:** This study examines the use of graphite anodes as an anode material on lithium-ion batteries (LiBs). Graphite synthesized from Green Petroleum Coke (GPC) residue. GPC is used as raw material because it is more environmentally friendly and cheaper, so it can reduce production costs. Graphite synthesis is carried out by GPC graphitization at 2700°C. Graphene like graphite (GLG) uses the Brodie method, which is known to have a large capacity and is fast chargeable. SEM characterizes the morphology and crystal structure of GLG, and its electronic properties are tested in half and or in one battery cell. From the analysis results, it knows that GLG has the most capacity high compared to raw material (GPC) and graphite.

**Keywords** :Anode Lithium-ion Battery, Green Petroleum Coke (GPC), Graphite, Graphene like Graphite (GLG).

## Measurement of Wastewater Turbidity Based on Total Dissolved Solids at Pancasila University

Muhammad Yaser<sup>1\*</sup>, Untung Priyanto<sup>2\*</sup>, Fauzie Busalim<sup>3</sup>.

**Abstract:** Groundwater is polluted by industry, house and laboratory disposal. It is necessary to measure the value of water turbidity quality. Application of prototype design of tool design in this study will provide solutions. It is expected that the results of the research analysis and measurement of water turbidity and do the filtering to get the quality of clean water quality and can be reused. The method is carried out by monitoring the process of Total Dissolved Solids (TDS) using Arduino-based Turbidity Sensor with digital display and using short message service (SMS) display network. Implementation steps to maintain the quality standard of water quality before being discharged into the groundwater catchment around the Engineering Department Pancasila University (FTUP) campus, the FTUP Green plan educational institution becomes the Green Campus. The results obtained show that the measuring instrument is functioning properly and it has average error value about 0.98 %.

**Keywords:** Measurement, Wastewater, Turbidity, Water Quality, TDS (Total Dissolved Solids).

## **Energy Management Strategy for Nickel Metal Hydride (NiMH) Battery and Proton Exchange Membrane Fuel Cell (PEMFC) on 3-wheel Hybrid Electric Car Equipped With Continuously Variable Transmission (CVT)**

**D. R. Harahap, Wei-Chin Chang, S. Ariyono.**

**Abstract:** Proton Exchange Membrane Fuel Cells (PEMFC) have higher energy conversion efficiencies than the internal combustion engine (ICE) which are also attractive to apply in the automotive sector, its ability to use hydrogen also become a reason why this technology is becoming popular as an alternative solution to solve the energy crisis. An objective of this research is to design the strategy to manage the energy from the fuel cell and observe the energy consumption, maximum speed, and the ability of the vehicle powertrain to climb the slope. A small electric vehicle was modelled using Advanced Vehicle Simulator (ADVISOR) software developed by the National Renewable Energy Laboratory (NREL). From this experiment, the vehicle primary power source was using a 200W small PEM fuel cell stack combined with AA-type batteries of nickel metal hydride as a backup energy source of each battery that has 1.2 V and 1.9 AH. The PEM fuel cell stack and NiMH battery performance were examined using an electronic load to meet the power requirement of the hybrid vehicle. The experiment results shows that the operation range of the fuel cell maximum power was set in the range of 40%-60% to withdraw power from NiMH battery and keep the fuel cell run in its high-efficiency domain. When the vehicle power is lower than 40% of the fuel cell maximum power, the battery will supply the power for the vehicle, and the fuel cell will shut off. When the required power is bigger than the fuel cell's maximum power, the battery will supply power to balance it. The car can drive on the sloping road with 3.5% gradability, the fuel consumption in 100 km about 40.6 L/100 km. In 5 seconds, the car can reach 33.9 m and reach 0.4 km need 26.1 seconds.

**Keywords:** NiMH battery, PEMFC, Hybrid Electric Vehicle, Energy Management, rubber belt CVT

## **Effect of Nanofluid Concentration on The Performance of PV/T Collector Under The Tropical Climate Conditions of Indonesia**

**Amrizal, Muhammad Irsyad, Amrul , Agung Nugroho, Miftahul Aziz**

**Abstract:** Solar energy is a very potential and most abundant source energy available and it is free of cost in consuming this type of energy. Flat plate solar collector is a device that can convert solar radiation into the thermal energy and can be implemented to PV/T solar collector. In this study, a modified flat-plate PV/T solar collector was built by attaching the thermal collector underneath the PV collector surface. The application of nanofluid in PV/T solar collector as a heat-absorbing medium needs to be developed and characterized in different environments condition. The effect of low concentration nanofluid on the thermal performance of the PV/T collector was investigated according to EN 12975-2 standard. The low volume fraction of the nanoparticles used in the present study were 0.3%, 0.6% and 0.9%, respectively. The efficiency of the system was compared to the water as a base fluid performed in low latitude tropical region (Bandar Lampung climate). The experimental result shows that an increase of zero thermal efficiency up to 12% which is obtained by using nanofluid at the volume fraction of 0,9%.

**Keywords:** Solar energy, PV/T collector, nanofluid

## Potential of Glycerol and Derivatives Based on Palm Oil as a Green Solvent

Maria Agustina Rani Findriyani<sup>1</sup>, Syifa Tiara Saskia Mulya<sup>2\*</sup>, Nugroho Adi Sasongko<sup>3</sup>

**Abstract:** The need for more environmentally friendly and sustainable chemicals has led to a large amount of research into the processing of renewable raw materials. Palm oil is a potential source of energy. As an agrariacountry, Indonesia has a great potential to play a role in the palm oil industry. Moreover, in 2007 Indonesia was recorded as the largest producer and exporter of palm oil in the world. Until 2010, the total area of oil palm plantations in Indonesia reached 7.8 million hectares. In the past 15 years the production of palm oil increased almost five times, from 4.8 million tons of crude palm oil (CPO). The increase in the production capacity of the biodiesel industry causes high production of raw glycerol because glycerol is a by-product of biodiesel, so it must be accompanied by market expansion and increase in added value so that the price of glycerol is not low. Glycerol can be used as a green solvent. Glycerol is capable of dissolving many organic and inorganic compounds, including complex metal-transitions. The use of glycerol as a solvent also has several notable disadvantages, such as high viscosity (1200 cP at 20°C) and low solubility of compounds and gases that are very hydrophobic, which limits the possibility of their use. Weakness of viscosity is usually overcome by heating above 60 °C or by using co-solvent. Glycerol with a higher level of purity (80-99%) is needed as raw material for the cosmetics industry, pharmaceutical industry, paper industry, paint and varnish industry, textile industry, food industry, tobacco processing, oleochemicals, and lubricants. Glycerol is used as a precursor for the production of various chemical commodities such as 1,2-propanediol, 1,3-propanediol, ethylene glycol, propanol, hydrocarbons, acrolein, dihydroxyacetone, glyceric acid, syngas, hydrogen, glyceril ether, glyceril ester, glycerol carbonate, 1,3-dichloro propanol, polyglycerol and glycerol acetal and ketal through several methods such as fermentation, hydrogenolysis, pyrolysis, oxidation, etherification, dehydrasesterification, carboxylation, halogenation, polymerization and glycerol acetalization.

**Keywords:** Green Solvent, Glycerol, Palm Oil, Glycerol Derivatives, By-product Biodiesel

## **Pressure Reducing Station Design for Small Scale Business from 200 Bar to 2 Bar Pressure**

**PratomoSetyadi, M.T.**

**Abstract:** This research aims to create a design tool for pressure reducing station for tube cradle 200 bar where the initial temperature of the CNG is -40°C. As an environmentally friendly fuel, many advantages gained when using CNG, among others: huge gas reserves, produced in the country, it's cheap, and friendly environment. Reducing pressure from 200 bar to usable pressure at 2 bar never been easy as cheap. Small business like restaurants and caterings are looking for fuel sources that cheap and safe in usage. CNG in distribution are tubed in 200 bar cradle and not easy to use instantly, despite its cheap price and high calorie given.

These studies are either research and development methods and the results of this research generate a pressure reducing station, which can lower the pressure to 2 bar. By discharging it into heat pump system, reducing pressure from 200 bar to 2 bar in cheap and safe way are accomplished. The reducing station has been tested as heat exchanger and volume control to maintain its safety and performance. The fluid flow of discharge obtained in one minute in a State of constant is 1.3188 m<sup>3</sup>/s. Economically, the system constructed in cheap and affordable and easy to apply. So it can be used for the fuel needs of the restaurant, small and home-based business.

**Keywords:** compressed natural gas, pressure reducing station, small scale business

## **Enhancing the Nickel Recovery of Morowali Nickel Laterite in Atmospheric Citric Acid Leaching**

**Feby Aryanhi, Regna Tri Jayanti**

**Abstract:** Morowali has a lot of laterite ore deposits which is one of the mineral resources containing several kinds of metal elements, consist of Iron (Fe), Silicone (Si), Nickel (Ni), Chromium (Cr), Manganese (Mn), Calcium (Ca), Phosphate (P), Zinc (Zn), Vanadium (V), and Scandium (Sc). Nickel is a metal that have high economic value because it various benefits, such as the production of stainless steel, electric plates, coins, batteries, and catalysts. There are two common nickel laterite processing that are pyrometallurgy and hydrometallurgy. In this study, hydrometallurgy method is applied to process nickel laterite of Morowali. An important step in this process line is ore leaching. This research is conducted to find a condition in atmospheric leaching of Morowali nickel laterite. This investigation work deals with varying the concentration of citric acid of 0.5 to 2.0 M and reaction time 10 to 120 minutes. The constant parameter are leaching temperature (K), stirring speed (rpm), and particle size (mesh). The results showed that the higher concentration of citric acid, the higher nickel recovery. The good conditions is obtained at concentration of citric acid 2.0 M and leaching time of 120 minutes, it proved by the amount of nickel recovery reached 1197.50 ppm.

**Keywords:** laterite ore, atmospheric leaching, citric acid, hydrometallurgy, and nickel recovery

## Particle Size Analysis of Morowali Nickel Laterite on Atmospheric Citric Acid Leaching

Wirawan, Regna Tri Jayanti

**Abstract:** Atmospheric Pressure Acid Leaching (APAL) is one of nickel laterite processing which has a big potential to be applied in industry. The leaching process is significantly influenced by the particle size effect, agitation leaching speed, and leaching time. This research demonstrated that particle size has important role to determine leaching performances of nickel laterite. The main focus of this research is to study the effect of particle size of Morowali nickel laterite in order to increase nickel recovery on atmospheric citric acid leaching. Particle sizes of nickel laterite used on this experiment are 50 mesh, 100 mesh, 150 mesh, 200 mesh and range of leaching time of 10, 20, 30, 60, 90, 120 minutes. Other constant operating conditions applied in this study are concentration of citric acid (M), agitation speed (rpm), leaching temperature (oC). The results shown that the amount recovery of nickel tend to increases with smaller particle size of nickel laterite. But this research work indicated that particle size 100 mesh achieved good recovery of nickel at 2824 ppm.

**Keywords:** Particle size, Atmospheric leaching, Citric acid, Nickel laterite, Hydrometallurgy.

## **Effect of Agitation Speed and Leaching Time for Nickel Recovery of Morowali Limonite Ore in Atmospheric Citric Acid Leaching**

**Regna Tri Jayanti, Yusdianto**

**Abstract:** This research work deals with atmospheric citric acid leaching of limonite ore from Morowali, Central Sulawesi by applying agitation speed and leaching time parameters. The composition of limonite ore treatment was characterized by X-Ray Fluorescence (XRF) method. Its contain dominated by iron 84.2 % and enrichment nickel content up to 5.15 %. The microstructure image of limonite ore was observed by Scanning Electron Microscope (SEM) whereas nickel recovery was confirmed by Atomic Absorption Spectroscopy (AAS). Leaching process was conducted by using citric acid in a flask on a magnetic heated stirrer at constant temperature. The effect of agitation speed on atmospheric leaching in citric acid indicated enhancement of nickel recovery. The agitation speed ranges employed were 100 to 1000 rpm with leaching times of 10 to 120 minutes. This study revealed that atmospheric citric acid leaching of limonite ore from Morowali under the condition temperature 70 oC, acid concentration 1 M, agitator speed 1000 rpm could recover nickel of 2824 ppm at 120 minutes of leaching time.

**Keywords:** Atmospheric leaching, Limonite ore, Agitation speed, Citric Acid, Leaching time.

## **Specimen Test Making of Polypropylene High Impact (PPHI) Polymer Composite Reinforced with Natural Fibres using Hand Lay-Up Methods**

**Nuha D. Anggraeni, Alfian E. Latief, Ramadhan L. Tawadha, and Rifki R. Radliya**

**Abstract:** Pineapple and hemp is one type of natural fibre that is widely grown in Indonesia and has good mechanical properties. The use of hemp and pineapple fibres as reinforcing and high impact polypropylene (PPHI) materials that are widely used in the automotive industry as a matrix in composites for applications in the automotive field studied. In this research, the process of making bending test specimens using ASTM D 69 standard for PPHI reinforced composites and pineapple fibre uses the hand lay-up method, with meshing below 120 and 10% volume fraction. As a result, in order to make homogeneous specimen, good setting at temperature 250 by normalizing cooling and stirring process to enable PPHI and pineapple fibre.

**Keywords:** composite, PPHI, nature-fibre, ASTM 69, hand lay-up

## **Evaporator Design With Ammonia-Water Mixture as Working Fluid for Kalina KCS34 Cycle On Electric Power Plant**

**Muhammad Pramuda N. S, Muhammad Ridwan\*, Agung Priambudi**

**Abstract:** Natural hot spring can be used as a heat source for generating electricity by using a Kalina Cycle KCS34 technology with ammonia-water mixture as the working fluid. An Evaporator is one component of the Kalina KCS34 cycle to change the phase of the working fluid. The purpose of this research was to obtain evaporator design for the Kalina KCS34 cycle. Simulation using cycle tempo was conducted to define the inlet and outlet temperature of the evaporator. These temperatures will be used in designing the evaporator was designed using Log Mean Temperature Difference and energy balance methods. The dimension of the evaporator was evaluated with the pressure drop, the effectiveness of the heat exchanger, and standards. The evaporator was using 4 pass shell and tube type with inlet and outlet temperature of the hot fluid (heat source) at 80 °C and 50 °C respectively and the inlet and outlet temperature of the cold fluid (working fluid) at 45 °C and 64 °C respectively. The dimension of the evaporator is 2,5 m in length, 34 tubes per pass with 19,15 diameter. This results in the capacity of the evaporator at 77,41 kW and 75% effectiveness.

**Keywords:** Kalina cycle, Heat exchanger, the working fluid, ammonia-water, LMTD

## Pilot Plant Biodiesel From Waste Cooking

**Rif'ah Amalia, Hendrik E.G.P ,Achmad B. Ulum, and Eka S.N**

**Abstract:** Methyl ester or biodiesel is an alkyl ester compound that is produced through an alcoholic process (transesterification), between triglycerides methanol or ethanol with the aid of alkaline catalysts into alkyl esters and glycerol. Methyl ester is produced through a transesterification reaction between used cooking oil and methanol with a mole ratio of 6:1, the reaction is accelerated using base catalyst. The method used in the production of methyl ester is pilot plant batch scale which adopts a large scale industry with modifications according to the desired design. Base catalyst variations were carried out at 0,1% w/w, 0,3% w/w, 0,5% w/w, 0,7% w/w, and 0,9% w/w. The productions of methyl ester consists of three processes namely pre-treatment, transesterification reaction, and post-treatment. Quality test of methyl ester (post-treatment) consists of density, kinematic viscosity, total glycerol, and acid numbers. Known from the result of the research, the overall quality of methyl ester are appropriate according to the Indonesian National Standard on Biodiesel.

**Keywords:** Biodiesel, Pilot Plant, Waste Cooking Oil, Transesterification

## Feasibility Study of Thermoelectric Generator Configuration in Electricity Generation

W. Priharti\*, M. Ramdhani, F.R.J. Putra, A. Khansalya

**Abstract:** Thermoelectric generator (TEG) is a device that can directly convert heat into electrical energy based on temperature gradient. Higher temperature gradient produce higher generated energy. This study aims to analyse three different configurations of TEG in order to obtain an optimum temperature gradient. The configurations were (a) TEG only, (b) TEG attached to heat sink and (c) TEG attached to heat sink and enclosed by ceramic. TEG attached to heat sink was found to be the best configuration with the highest generated voltage and power of 0.35 V and 11.33 mW respectively. Using this configuration to store the energy, the increase of 19% capacity of 3.7 V 200 mAh LiPo battery was obtain within 300 minutes.

**Keywords:** Waste heat, electricity generation, thermoelectric generator, thermoelectricity



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