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Tuesday, October 13 9:00 - 9:15

W1: Welcome Speech from the chairperson of ICITAMEE

Dr. Yessi Jusman, S.T., M.Sc

Tuesday, October 13 9:15 - 11:00

K1: Keynote Speech

Ali Akbar Pammu., B.Eng., Ph.D

Tuesday, October 13 13:00 - 15:00

11: Parallel Session 1 Room 1

Room 1

**13:00 Effect of Alkali Soaking Time on Physical and Morphological Properties of Agave Cantala Fiber.....N/A**

Ferriawan Yudhanto (Universitas Muhammadiyah Yogyakarta, Indonesia); Venditias Yudha (Institut Sains & Teknologi Akprind, Indonesia); Jamasri Jamasri (Universitas Gadjah Mada, Indonesia); Andika Wisnujati (Universitas Muhammadiyah Yogyakarta, Indonesia & Asia University Taiwan, Taiwan)

Agave Cantala is one of the potential lignocellulosic fibers. This study aims to determine the Cantala fiber's physical and morphological properties by alkali treatment on different soaking time. Physical test by Fourier Transform Infrared spectroscopy (FTIR) and X-Ray Diffraction (XRD) to analyze molecular chemical bond and degree of crystallinity index (CI) of Agave Cantala fiber. The morphology of the fiber was characterized by Scanning Electron Microscopy (SEM). The FTIR, XRD, and SEM test exhibited that fiber soaking 5 wt.% for 4 hours in NaOH (sodium hydroxide) solution at room temperature very effectively removal the hemicellulose and lignin in the fiber and causes the excellent surface roughness and increases the CI from 64.4% to 76.6%.

**13:15 Analysis of Tube Pitch Ratio Effect on Shell and Tube Heat Exchanger.....N/A**

Krisdiyanto Krisdiyanto and Sudarisman Sudarisman (Universitas Muhammadiyah Yogyakarta, Indonesia)

The researchers pay great attention to the heat transfer coefficient on shell and tube heat exchanger, which is affected by the shell and tube component dimension. Optimization can be held by calculating the best tube pitch ratio. The tube pitch ratio affects the heat transfer coefficient. In addition to affecting the heat transfer coefficient of change in the tube pitch ratio, it will also affect the pressure drop and stress that occurs, so that these two effects need to be investigated. The design of the heat exchanger in this study refers to documents published by TEMA. Tube pitch ratio variations in this research from 1.15-1.35. The smallest tube pitch ratio that can be examined is 1.15 because space will not fit. When the tube pitch ratio is reduced, the largest tube pitch ratio is 1.35 because if it is more than that value, the shell size needs to be enlarged. This research uses mathematical calculation methods and finite element software, the two results of these calculations are compared, and the error value is calculated to validate. The results show that tube pitch ratio increases, heat transfer increases, and pressure drop decreases. Changes in tube pitch ratio also have an effect on the average and maximum stresses even though the values fluctuate.

**13:30 Rheological Properties of Indonesia Honeys.....N/A**

Bhre Lenggana (Faculty of Engineering, Universitas Sebelas Maret, Indonesia); Ubaidillah Ubaidillah (Universitas Negeri Sebelas Maret Surakarta, Indonesia); Heru Sukanto (Sebelas Maret University, Indonesia); Saiful Amri Mazlan (Universiti Teknologi Malaysia, Malaysia); Kacuk Nugroho and Hari Nugroho (Universitas Sebelas Maret, Indonesia)

Honey is a food ingredient produced by bees. Some studies that have been done explained that honey is included in Newtonian fluids, but some others explained that honey is included in non-Newtonian liquids. Non-Newtonian liquids are liquids whose viscosity can change due to the influence of several factors such as temperature, time, and shear rate. Honey viscosity can change due to the influence of several factors including time, temperature, shear rate. The Arrhenius equation and the Carreau-Yasuda model explain that there is a relationship between honey viscosity and shear rate and temperature. Thus, the viscosity of honey can change significantly resulting in changes in its quality. A comparison between natural honey with forged honey has been explained by several researchers who revealed that the viscosity of natural honey is usually higher than forged honey. This occurs because of the composition of forged honey results in shear-thinning. This study aims to prove the relationship between shear stress and shear rate on honey viscosity which can be used as an initial reference for honey selection strategies based on rheological properties. In this study, various samples of honey were used as the object of study, such as forest honey, calliandra, rubber, longan, coffee, randu, multifloral, bitter, and riau. The results of tests carried out indicate that the shear rate, shear stress, and viscosity are interrelated. The results show that the viscosity of honey decreases with increasing shear rate. While the shear stress is directly proportional to the increase in increasing shear rate.

### **13:45 Characterization of a Flexible Based PI/PVDF Sensing for Pressure Sensor..... 18**

Khairul Azman Ahmad (Universiti Teknologi Mara, Cawangan Pulau Pinang, Malaysia); Noramalina Abdullah (USM, Malaysia); Siti Noraini Sulaiman (Universiti Teknologi MARA, Malaysia); Muhammad Khusairi Osman (Universiti Teknologi Mara (UiTM), Malaysia); Mohd Firdaus Abdullah (Universiti Teknologi MARA, Cawangan Pulau Pinang, Malaysia); Mohamad Faizal Abd Rahman (Universiti Teknologi MARA Penang Campus & Design Excellence Center (CEDEC), Universiti Sains Malaysia, Malaysia)

A pressure sensor has been applied in many application of pressure measurement for instant level water sensor, load sensor and flowmeter sensor. The high sensitivity of pressure sensors have been developed however the fabrication and technique are complicated and costly. A flexible based PI/PVDF pressure sensor has been developed and characterized. Four designs (Design 1-4) for different total length, gap and width of electrode fingers have been developed. All these four designs have been tested by load experimental method. The results show the highest pressure sensitivity is achieved by Design 4 of 0.753 mV/Pa. The wide range of pressure application is achieved by Design 1. It can conclude that a long total length with wide gap flexible pressure sensor has high-pressure sensitivity, instead of the short total length with a narrow gap between electrode fingers flexible pressure sensor has wide range pressure application.

### **14:00 The Use of Phase-Change Material on a Thermosyphon Solar Water Heater: Continuous and Gradual Discharging Characteristics.....N/A**

Muhammad Nadjib and Suhanan Suhanan (Gadjah Mada University, Indonesia); Joko Waluyo (University of Gadjah Mada, Indonesia); Indro Pranoto (Universitas Gadjah Mada, Indonesia)

The use of water as a heat storage material in solar water heaters (SWH) has disadvantages, including its low energy density, which requires a large volume of energy storage. Phase-change material (PCM) is a latent type of heat storage material that has the advantage of being a high energy density. Therefore, PCM is quite interesting to be applied to SWH systems. In the operation of SWH, it is necessary to know the characteristics of hot water usage. This paper aimed to determine the characteristics of a continuous and gradual discharging method on SWH that applies PCM. This study used a thermosyphon type of SWH. The tank was placed horizontally on the top side of the collector with a volume of 60 litres. Twenty-four cylindrical capsules containing paraffin wax were inserted in the tank. Thermocouples were installed on the waterside and the PCM side. Continuous and gradual methods were carried out in the discharging experiment. Experiments using a continuous discharging method given information that water temperature decrease continuously in the tank. Experiments with a gradual discharging method shown the contribution of PCM, which can transfer thermal energy to the water. The gradual discharging method explained that the SWH system produced hot water that can be used for bathing as many as five people every day with water temperatures of 45 °C at an average solar radiation intensity of 514.89 W/m<sup>2</sup>.

### **14:15 Effect of Different Reinforcement Material on Characteristics of Composite Friction Brake.....N/A**

Eko Surojo, Alfian Insani Fadil, Dody Ariawan, Nurul Muhayat, Wijang Wisnu Raharjo and Dharu Feby Smaradhana (Universitas Sebelas Maret, Indonesia)

The effect of different reinforcement material on mechanical and tribological properties of composite friction brake was studied. This paper aims to investigate the effect of rockwool and glass fiber on specific wear rate, friction coefficient, and flexural strength of composite. Composite specimens were manufactured utilizing a sequential processing as follows: mixing of composite ingredients, cold pressing of the mixture, hot pressing of the preformed specimen, and then post curing of the hot molded specimen. Hot press was carried out under a pressure of 20 MPa at 160 °C. Friction characteristics of composite were measured using pin on disc tribometer. Three-point bending test was carried out to obtain composite flexural strength. The results showed that rockwool had a higher effect on increasing coefficient of friction, specific wear and flexural strength of composite compared to glass fiber. Fiber fracture, fiber pull-out and void were found on the fracture surface of the bending test specimens.

### **14:30 Correlation Between the Properties in Jatropha and Used Cooking Oil Biodiesel.....N/A**

Wahyudi Wahyudi and Krisdiyanto Krisdiyanto (Universitas Muhammadiyah Yogyakarta, Indonesia)

As a fossil fuel alternative, biodiesel needs to be upgraded. Meanwhile, the important properties, especially its density, viscosity, heating value and flash point are related to one another. The correlation between these characteristics was investigated in a biodiesel mixture from jatropha and used cooking oils. Jatropha oil is a potential non-edible raw material, and mixing with used cooking oil can improve the quality. These oils are converted into biodiesel through a process of transesterification. Furthermore, both types of biodiesel were mixed in 11 composition variations, and subsequently, property testing was conducted including viscosity, density, heating value, and flash point. The results showed that there were correlation with changes in these characteristics. Also, the viscosity and flash point of the biodiesel were higher along with increasing density, while the heating value was lower. In addition, higher viscosity increases the flash point and decreases the heating value.

## **12: Parallel Session 1 Room 2**

### **Room 2**

### **13:00 Selecting an Ideal Site for Oscillating-Watercolumn (OWC) Wave Energy Converter for Hydrogen Production in the Southern Coast of Yogyakarta, Indonesia.....35**

Aries Taufiq Kurniawan (Gadjah Mada University, Indonesia); Rachmawan Budiarto (Universitas Gadjah Mada, Indonesia);

Ridwan Budi Prasetyo Prasetyo (Agency Assessment and Application of Technology Yogyakarta, Indonesia); Arief Budiman (Universitas Gadjah Mada, Indonesia)

The significant wave height and period in the South Coast of Yogyakarta were used to calculate the potential electrical energy generated using Oscillating-water-column (OWC) system. This system would be positioned in areas where ocean waves do not break during the lowest tides. Changes in bathymetry would affect changes in the height of waves and help determine the breaking waves' location. Electrical energy resulting from ocean wave energy conversion using the OWC system was used to determine hydrogen production's potential, possibly generated using the seawater electrolysis method. Pantai Baron (Gunung Kidul) and Pantai Baru (Bantul), located in Yogyakarta, Indonesia, were studied in terms of their properness to place the OWC system. Three points in each of the locations will be compared using the Analytical Hierarchy Process (AHP) method. The factors involved were the potential of hydrogen gas production, the OWC location suitability, potential disasters, the environment, and socio-economy. Pantai Baron is an ideal location for producing hydrogen gas using the electrolysis method utilizing electrical energy converted from ocean wave energy using the OWC system. The potential for hydrogen gases that can be produced is 640 kilograms per year.

### **13:15 Analysis of the Copper and Aluminum Heat Sinks Addition to the Performance of Photovoltaic Panels with CFD Modelling.....41**

Yusrin Abdullah, Zainal Arifin, ZA and Dominicus Danardono Dwi Prija Tjahjana (Universitas Sebelas Maret, Indonesia); Suyitno Suyitno (Sebelas Maret University, Indonesia); Mufti Putra (Universitas Sebelas Maret, Indonesia)

Increasing the temperature of the photovoltaic (PV) panels in operation due to excessive exhaust heat from solar radiation leads to decrease efficiency and reduce service life. This research uses a numerical model to study heat transfer in PV panels by adding a heat sink as a cooling device. The heat sink is a device consisting of a base and fins. In this study, it is made into four variations of base and fins, namely: 1) Al-Al; 2) Cu-Al; 3) Al-Cu; 4) Cu-Cu mounted on the bottom of the PV panel. The efficiency of a PV panel is determined by comparing the simulation results of a PV panel with four variations of the heat sink, using ANSYS-Fluent software. The simulation results are presented in the form of temperature distribution contours from the model and velocity profile of the fluid passing through the heat sink. From the research that has been conducted, a significant decrease in temperature occurs in the combination of Al-Cu with a reduced value of up to 22 °C so it can overcome excess heat and increase the efficiency of the PV.

### **13:30 Improve Engine Performance Using Twin Spark Plug Ignition.....N/A**

Budi Santoso, Cahyo Pambudi and Dominicus Danardono Dwi Prija Tjahjana (Universitas Sebelas Maret, Indonesia); Fitriani Imaduddin (Faculty of Engineering, Universitas Sebelas Maret, Indonesia)

Testing of an internal combustion engine is required prior to use in competitive energy-efficient vehicles. The ignition system on the spark ignition/SI engine can be modified to improve engine performance. This experiment aims to modify cylinder heads for two spark plugs and the setting of the ignition angle in SI engine. Investigations carried out by the method of changed load and fixed load for different ignition timing. The results show that the performance of a twin spark plug engine is relatively better than a conventional single spark plug ignition engine. Advancing 2 degrees from standard ignition time/angle in two spark plugs engine can increase the engine performance.

### **13:45 Ergonomic Path Planning for Autonomous Vehicles - an Investigation on the Effect of Transition Curves on Handling Behaviour.....50**

Muhammad Rehan Siddiqi (Royal Melbourne Institute of Technology & School of Engineering, Australia); Alireza Saharkhiz, Reza Nakahie Jazar and Hormoz Marzbani (Royal Melbourne Institute of Technology, Australia)

As vehicles transcend into higher levels of automation, a key factor that will determine a comfortable driving experience for the passengers will be the handling behaviour of the autonomous vehicles. Path planning will serve an important role in ensuring smooth and comfortable handling. The present study develops a well defined universal scale to define the handling behaviour of autonomous vehicles using different ergonomic path planning tools. Firstly, a reference track is designed to incorporate the worst handling. Followed by designing ergonomic roads using transition curves such as B-spline, Bezier and Hermite curves to investigate the impact of these curves on handling behaviour. Trajectory tracking of an 8 degree of freedom vehicle model is then studied using curvature dependent and curvature independent controllers to draw a comparison. Results are then compared and evaluated using a universal cost function to determine the optimal transition curve for handling. Results indicate that 3-point defined curves in general perform better handling with B-spline evaluated as the best handling transition curve for 4-point defined curves. Further research is recommended by utilising key characteristics of the transition curves like local control and non-uniformity.

### **14:00 The Effect of Hybrid Ratio on the Flexural Properties of Arenga Pinnata/E-Glass/Polyester Hybrid Fiber Composites.....N/A**

Sudarisman Sudarisman (Universitas Muhammadiyah Yogyakarta, Indonesia); Sinin Hamdan (University Malaysia Sarawak, Malaysia); Harini Sosiati and Krisdiyanto Krisdiyanto (Universitas Muhammadiyah Yogyakarta, Indonesia)

The effect of hybrid ratio on flexural properties of sugar palm fiber (SPF)/E-glass fiber hybrid-reinforced polyester composites has been investigated in this work. Before being used as reinforcement, the fiber was taken off from its original mesh, washed, underwent alkali treatment, and chopped into 10 mm long. The beams being tested were cut from various hybrid ratios of composite plates fabricated using cold pressed technique. The total volume fraction of fibers was kept constant at 0.21, where four different stacking configurations of 0-layer, 1-layer, 2-layer and 8-layer of E-glass fiber resulting in four hybrid ratios of 0.00, 0.13, 0.26 and 1.00 were fabricated, and 2 different beam span-to-depth ratios of 20 and 30 were tested. The E-glass was arranged unidirectionally and placed in the bottom of a mold, wetted using the matrix, and the SPF was then poured above the wetted E-glass arrangement in randomly oriented pattern. Specimen preparation and testing were carried out in accordance with the ASTM D790 standard, where the E-glass sides were

placed in tension sides of the beams. Failure modes were evaluated by close observation of the optical micrographs of representative fracture specimens. It was found that flexural strength, modulus and strain at maximum stress increase with the increase of hybrid ratio. Interlaminar shear failure was observed in SPF/polyester-GF/polyester interface. Following this, through-the-thickness crack was initiated at tension side and propagated toward compression side causing failure. This indicates that the SPF/polyester system was strong enough to withstand the applied compressive loading but weak in tension.

#### **14:15 Influence of Alkaline Treatment of Cantala Fiber on Flexural Strength of Composite Friction Brake.....N/A**

Akhmad Fauzan Priambada, Eko Surojo, Wijang Wisnu Raharjo, Nurul Muhayat and Dharu Feby Smaradhana (Universitas Sebelas Maret, Indonesia)

The paper aims to determine the influence of alkaline treatment of cantala fiber on the flexural strength of composite friction brake. The specimens were composed of cantala fiber, phenolic resin, NBR powder, graphite, fly ash, cashew dust, molybdenum disulfide (MoS<sub>2</sub>), and calcium carbonate (CaCO<sub>3</sub>). The research method used was compression molding to manufacture specimens using cantala fiber of 0%, 4%, 8%, and 12% volume without alkaline treatment or with alkaline treatment. The alkaline treatment was carried out by soaking the cantala fiber in an alkaline solution (5% NaOH) with a soaking time of 4 hours. The results showed that alkaline treatment on the cantala fibers increased the strength and Young modulus of composites particularly at 4% and 8% volume of fiber.

#### **14:30 Comparison of Corrosion Rate on Mild Steel Welded Joints Using Acid and Alkaline Solutions.....N/A**

Putri Rachmawati (Universitas Muhammadiyah Yogyakarta, Indonesia); Syamsul Maarif (Proklamasi 45 University, Indonesia)

Corrosion is a problem that must be handled in a construction plan. One way to overcome this is by predicting the corrosion rate of material under certain conditions. This study aims to determine the corrosion rate of mild steel welded joints using acid and alkaline solution media. The specimens are made from ST37 mild steel which is welded together. The specimens were divided into two, namely specimens that were not subjected to post-weld heat treatment (PWHT) and specimens subjected to post-weld heat treatment (PWHT). The specimens were immersed in an acid solution, namely 3% KCl and an alkaline solution, namely 10% NaOH for 100 hours, 200 hours, 300 hours, and 400 hours. The 3% KCl solution's corrosion rate had an upward trend, starting from 0.092 mmpy at 100 hours of immersion time to 0.16 mmpy at 400 hours of immersion time. The corrosion rate of 3% KCl is in a good category. In alkaline solutions, the corrosion rate trends to be constant, which is in the range of 0.01 mmpy to 0.024 mmpy. The corrosion rate at 10% NaOH is included in the excellent category. Specimens with a post-weld heat treatment (PWHT) process have a lower corrosion rate than those without a post-weld heat treatment (PWHT) process. A 3% KCl acid solution's corrosion rate was higher than the corrosion rate of 10% NaOH alkaline solution.

#### **14:45 Estimation of Performance in Counter Cross-Flow Heat Exchanger.....N/A**

Karthik Silaipillayarputhur (King Faisal University & College of Engineering, Saudi Arabia); Abdulaziz El-Sinawi (King Faisal University, Indonesia); Tawfiq Al Mughanam (King Faisal University, Saudi Arabia)

In this paper, design graphs, tables, and equations relating to performance of counter cross-flow heat exchanger (CCF hx) was developed. Equations derived previously to study the temperatures at intermediary passes and at the discharge were solved by means of MATLAB. The results from the MATLAB were used to generate graphs. Design graphs describe the functioning of the heat exchanger in terms of key dimensionless factors. These factors are heat exchanger effectiveness, capacity-rate ratio and number of transfer units. Design graphs aid engineers in choosing proper NTU and capacity-rate ratio for the heat exchanger. Likewise, correction factors were established to serve incompletely mixed situations in the heat exchanger.

## 13: Parallel Session 1 Room 3

### Room 3

#### **13:00 Characterization of Compact Asymmetric Biconical Antenna for IoT Applications.....75**

Farhan Fathir Lanang, Ratna Mayasari, Agus D. Prasetyo and Budi Syihabuddin (Telkom University, Indonesia)

This paper presents the characterization of compact asymmetric biconical antenna for IoT applications. A circular ring added in the middle of the upper cone to reduce the total dimension of the antenna and achieve better performance compared to common asymmetric biconical. The final design of asymmetric biconical has 65 mm (upper cone radius) × 111 mm (total vertical height) with the impedance bandwidth of 0.6 GHz - 6 GHz. The characterization observes the changes of each parameter from the design that affect the resonant frequency shifting and impedance bandwidth. Peak gain achieves from 1.9 dBi - 4.4 dBi with omnidirectional radiation patterns.

#### **13:15 Li-Fi Technology for Transmitting Data in Hospital Environments.....81**

Toha Ardi Nugraha (Universitas Muhammadiyah Yogyakarta, Indonesia & Czech Technical University in Prague, Czech Republic); Yudhi Ardiyanto (Universitas Muhammadiyah Yogyakarta, Indonesia)

Wireless communication implemented in hospital environments is used to enhance convenience for patients and caregivers. However, there is always the risk of disturbance from electromagnetic waves and interference toward the precision medical device. Therefore, this paper simulates an emerging light fidelity (Li-Fi) technology in hospital environments using a light-emitting diode (LED). In this paper, we simulate the Li-Fi with three types of transmission powers, two angles of the LED lamps, and the impact of the distances between LED lamps in the transmitter parts and photodetectors (PDs) in the receiver parts. This paper considers two sizes of the incidence angle ( $\beta$ ) and the irradiance angle ( $\alpha$ ). The simulations also implement interference mitigation using Channel Inversion Precoding (CIP). The simulations show the effectiveness of the proposed scenario-based CIP in terms of the data rate compared to the conventional implementations of the Li-Fi transmissions.

### **13:30 Correcting Block Attack on the 32-Bit Reduced NEEVA.....85**

Bety Hayat Susanti (Politeknik Siber dan Sandi Negara, Indonesia); Muhammad Bayhaqi (Badan Siber dan Sandi Negara, Indonesia); Mareta Wahyu (Politeknik Siber dan Sandi Negara, Indonesia)

NEEVA is a hash function algorithm with a sponge function structure. The algorithm is designed for sensor nodes on the Wireless Sensor Network (WSN). In this study, we employed the correcting block attack on the 32-bit Reduced NEEVA which is a simplification of the NEEVA algorithm. The attack aimed to find internal collisions of message sets and the combinations of message sets. The attack was carried out on 1 message block and 2 message blocks from the 32-bit Reduced NEEVA. The results showed that internal collisions and combination collisions were found in the 32-bit Reduced NEEVA algorithm. The search is performed by looking at each process in the  $f$  function of the first round in each correcting block and the  $f$  function of the last round. Collision arises due to the unbalanced Feistel process in the last round of function  $f$  on the 32-bit Reduced NEEVA. In addition, the modular addition process on the 32-bit Reduced NEEVA does not affect the collision found.

### **13:45 Resource Optimization Using Covariance and Correlation of Traffic in Cellular Network Clusters.....91**

Indar Surahmat (Universitas Muhammadiyah Yogyakarta, Indonesia)

Cellular networks in some countries play important roles in providing various communication services. Planning, implementing, evaluating, and optimizing are most common processes to maintain the networks. It is interesting to discuss the gap between planning and implementation. The difference between planning and implementation can lead to some problems, for instance, unequal traffic distribution. On the other hand, some research on traffic of cellular networks has been conducted and their results have also been published. However, it is only a few of them that dealt with technical optimization especially on small-cluster-based traffic. Therefore, this study focuses on traffic distribution among cells in a cluster. We use a correlation approach to measure the level of fluctuation similarities between a cell and its neighbours. A study case based on real modified data was analyzed to show the relevancy of our method. The result exhibits that it can be used for creating a rank of priority on how to share traffic of a cell in the cluster.

### **14:00 Implementation of GPS Attacks on DJI Phantom 3 Standard Drone as a Security Vulnerability Test.....95**

Jabang Aru Saputro, Mohamad Syahrul and Esa Egistian Hartadi (Politeknik Siber dan Sandi Negara, Indonesia)

An attack on a drone is a technique used to stop or obstruct the drone's working system. These attacks can also be used to determine security vulnerabilities to drones. The DJI Phantom 3 Standard is a wifi-based quadcopter. In this study, navigation attacks in the form of GPS jamming and GPS spoofing were carried out on the DJI Phantom 3 Standard drone. The goal of this GPS attack in this study is to determine and analyze the extent of vulnerability in the DJI Phantom 3 Standard commercial drone GPS. The GPS jamming attack uses jamming signals with the GNU Radio Companion (GRC) app. For GPS spoofing attacks using GPS-SDR-SIM tools to create fake GPS signals for drones. The GPS attack in this study uses the BladeRF X40 Software Defined Radio (SDR) device as the main device. The results of this study indicate that GPS jamming and GPS spoofing attacks can disrupt the GPS signal and even make the drone lose control.

### **14:15 Scheduling Smart Grid Network Traffic With Context-Awareness in Industrial Grade Router.....101**

Wan Siti Halimatul Munirah Wan Ahmad, Nurul Asyikin Mohd. Radzi, Mohammad Azmi Ridwan, Nurshazlina Suhaimy and Faris Syahmi Samidi (Universiti Tenaga Nasional, Malaysia); Muhammad Haqem Mohd Nasir (Universiti Tenaga Nasional, Malaysia); Fairuz Abdullah (Universiti Tenaga Nasional & Institute of Power Engineering, Malaysia); Aiman Ismail and Md Zaini Jamaludin (Universiti Tenaga Nasional, Malaysia); Mohd Nasim Zakaria (Tenaga Nasional Berhad Information and Communication Technology, Malaysia); Intan Shafinaz Mustafa (Universiti Tenaga Nasional, Malaysia)

Packet switching has slowly taken its place in the smart grid network, and this promising technology is capable of scheduling traffic according to priority assignment. However, a complex situation in the grid requires a flexible solution. A Context-Aware Traffic Scheduling (CATSchA) algorithm has been proposed and this particular work will validate the simulation with the hardware setup, in a controlled environment. The delay results for several test cases are presented, obeying the predefined ranking, and following fair treatment according to their data size and data rate, whenever necessary. Excellent throughput is also reported for all cases.

Wednesday, October 14 9:00 - 11:00

21: Parallel Session 2 Room 1

Room 1

### **9:00 Wind Speed Prediction in the Area of PLTB Tolo Jeneponto South Sulawesi Using Artificial Neural Network.....106**

Indar Chaerah Gunadin (Hasanuddin University, Indonesia); Safrizal Safrizal (Islamic Nahdlatul Ulama University, Indonesia); Marwan Rosyadi (PT Indah Karya (Persero), Indonesia); Agus Siswanto, MT. (Hasanuddin University, Indonesia); Syukriyadin Syukriyadin (Syiah Kuala University & Engineering Faculty, Indonesia); Zaenab Muslimin (Universitas Hasanuddin, Indonesia); Gassing Gassing (Hasanuddin University, Indonesia)

Forecasting the output power of a wind turbine is very much determined by the ability to predict wind speed at the location of the wind turbine placement. The results of this forecast are highly correlated with the operating patterns that will be applied to the electric power system and also with the system operating costs. Wind speed forecasting at PLTB Tolo Jeneponto, South Sulawesi, Indonesia is done by

taking wind speed data for the last 20 years. The method used in forecasting is an Artificial Neural Network. From the simulation results, it can be seen that the forecast error is 0.17883 percent. This shows that the ANN method can be accepted as a method in predicting wind speed.

#### **9:15 Voltage and Power Stability Characteristics for Photovoltaic Battery and Supercapacitor Hybrid System.....111**

Soedibyo Soedibyo (Institute Teknologi Sepuluh Nopember & Indonesia, Indonesia); Avian Lukman Setya Budi and Sjamsjul Anam (Institut Teknologi Sepuluh Nopember, Indonesia); Mochamad Ashari (Institute Teknologi Sepuluh Nopember, Indonesia); Adi Soeprijanto (Institut Teknologi Sepuluh Nopember, Indonesia)

Renewable energy, often referred to as clean energy, comes from natural sources or processes that are constantly replenished. At a smaller scale, we can harness the sun's rays to power the whole house-whether through PV cell panels or passive solar home design. The best PV-connected system has to be efficient and has a good stability in terms of Voltage and Power. The main constraint is that PV-battery system has very low stability when the irradiance is changing due to the time change and weather change. The purpose of this paper is to provide the storage system comparison for the photovoltaic. From the results, the characteristics obtained that the hybrid system give the better result in voltage and power stability to the system. The supercapacitor in the hybrid storage system give the contribution to absorb the oscillation effect, but give the less contribution to power distribution, except during the battery response time, supercapacitor provides the power for the system.

#### **9:30 Photovoltaic Voltage and Power Cell Characteristics Based on Air Quality Index and Pollution Percentage Level.....117**

Soedibyo Soedibyo (Institute Teknologi Sepuluh Nopember & Indonesia, Indonesia); Avian Lukman Setya Budi (Institut Teknologi Sepuluh Nopember, Indonesia); Ramadoni Syahputra (Universitas Muhammadiyah Yogyakarta & UMY, Indonesia); Sjamsjul Anam (Institut Teknologi Sepuluh Nopember, Indonesia); Mochamad Ashari (Institute Teknologi Sepuluh Nopember, Indonesia); Adi Soeprijanto (Institut Teknologi Sepuluh Nopember, Indonesia)

Photovoltaic is a technology that functions to convert solar radiation into electrical energy directly. Photovoltaics are usually packaged in a unit called a module. In a solar module consists of many solar cells that can be arranged in series or in parallel. Yet, there is a problem on the photovoltaic sizing, there are pollutions in the air that blocks the optimal irradiance going through the photovoltaic modules. This paper provide the accurate photovoltaic sizing by considering the air quality index and pollution level that affect the irradiance. From this paper, the results is the power to voltage characteristics will be decreased significantly with the increasing of air pollutant by measuring each percentage level of the dust pollutant. The characteristics is almost similar to linear functions for power, but significantly affects the voltage in constant increasing value of air pollutant.

#### **9:45 IoT Based System for Monitoring and Control of Gas Leaking.....122**

Saiful Zaimy Yahaya (Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia); Zainal Hisham Che Soh (Universiti Teknologi MARA, Malaysia); Khairul Azman Ahmad (Universiti Teknologi Mara, Cawangan Pulau Pinang, Malaysia)

Fire accidents due to gas leakage is a serious issue since it frequently causes loss of life and bad injuries. Recent advances in sensing techniques, microcontroller and IoT technologies have allowed the development of various techniques in detection and prevention of fire accidents due to gas leakage. This paper present an IoT based system for monitoring and controlling Liquefied Petroleum Gas (LPG), which is commonly used as cooking gas at home, in order to prevent leakage. NodeMCU is used as the controller of this system where it processes the data of gas concentration and flame occurrence from MQ-2 sensors and Flame sensors respectively, and decides on the action to be taken by the system to activate prevention devices. Blynk application is used as the platform to notify the user when a gas leakage has occurred, monitor the concentration of gas and control the fire prevention devices installed along with the system. With this system, the user is able to monitor the concentration of the gas in ppm on their smartphone, receive notifications and remotely take necessary action when gas leakage occurs.

#### **10:00 IoT Health Monitoring Device of Oxygen Saturation (SpO2) and Heart Rate Level.....128**

Marni Azira Markom, Asyraf Hakimi Abu Bakar and Erdy Sulino Mohd Muslim Tan (Universiti Malaysia Perlis, Malaysia); Arni Munira Markom (Universiti Teknologi MARA (UiTM) Johor, Malaysia)

People are normally suffering from body sickness such as heart disease, high blood pressure and diabetes when getting older. Thus, the health of elderly should be monitored to prepare for any emergency cases. This research presents a real-time monitoring system for elderly that is able to measure heart rate and Peripheral Capillary Oxygen Saturation Level (SpO<sub>2</sub>). The monitoring system is constructed using MAX30100 as front-end sensor and Node MCU (ESP8266) is used as microcontroller to collect and transfer the data to Cloud. Five healthy subjects have been chosen properly and their SpO<sub>2</sub> and heart rate level are collected. All data undergone a few processes for validation such as segmentation and filtering. For SpO<sub>2</sub>, the data are computed to IR/RED variables. Then, the IR/RED are processed to get SpO<sub>2</sub> ratio using empirically derived calibration curves in order to produce normal and abnormal results. For heart rate, a correlation test is conducted between the experimental reading with the reference reading. For the monitoring system, both SpO<sub>2</sub> and heart rate data are combined to obtain the final classification of normal and abnormal. The result of the correlation test shows strong correlation value ( $r_s=0.993$ ). The percentage error is calculated between the developed system with a commercial oximeter which is resulted with less 3% and 1.03 % for SpO<sub>2</sub> and heart rate, respectively. Based on the validation results, the monitoring system of SpO<sub>2</sub> and heart rate is ready to be used. Also, the IoT system allows many authenticated users to monitor the patient condition.

#### **10:15 Power Losses Contribution Tracking Using Power Flow Tracing Incidence Matrix Method Based on Renewable Energy Distributed Generator.....134**

Avian Lukman Setya Budi and Adi Soeprijanto (Institut Teknologi Sepuluh Nopember, Indonesia); Feby Agung Pamuji



(Institute Teknologi Sepuluh Nopember, Indonesia); Mohamad Ridwan (Center of Excellence for Automotive Control and System, Indonesia); Ni Aryani (Institut Teknologi Sepuluh Nopember, Indonesia)

Distribution and transmission of electric power is one of the important factors in the process of power flow from generators to customers. The energy sources used for the distribution of this power flow are also increasingly varied, one of which is renewable energy on the off-grid. Determination of the electricity contribution for each value of electrical energy between customers will be determined by first looking for the power used from each type of existing generator using the Power Flow Tracing method. By looking at the energy consumption with Incidence Matrix model, it can be determined how much the renewable energy source size by assuming that the quality of electricity provided by each generator is the same. For the simulation, the used system is IEEE 9-Bus system with given active load and reactive load, and the modified IEEE 9-Bus system with similar load for each bus represents the renewable energy source system. From the results, it is obtained that at the smaller scale, the contribution for each bus combined with renewable energy is being variative and minimize both the active and reactive power losses.

#### **10:30 Case Study of Multi Gap Arrester Failure in Indonesia.....140**

Muhammad Ridwan (Institut Teknologi Bandung & PT PLN (Persero), Indonesia); Achmad Syerif Habibie (PLN Research Institute & PT PLN (Persero), Electricity Company of Indonesia, Indonesia); Nur Widi Priambodo (PLN Research Institute, Indonesia); Kemas Muhammad Tofani (PT. PLN (persero), Indonesia)

As a tropical country, Indonesia has a relatively high intensity of lightning strikes. This condition requires utility company to design reliable lightning protection systems to maintain the availability of electricity to the customer. There are several ways to overcome lightning hazard, such as installing lightning arresters or ground wires to the distribution line. The need for a reliable arrester has encouraged many manufacturers to innovate in arrester designs; one of the developed arrester designs is the multi gap arrester. To determine its performance, a pilot project was carried out by installing multi gap arresters in an area where its intensity of lightning strike is high. After several period of installation, it was found that some of the arresters had a melted part; therefore, an investigation regarding this melted part is conducted and presented in this paper. Laboratory tests and software simulation were conducted to obtain the performance of the arrester, especially the capability to cut off the follow current and capability to handle the energy generated during short circuit. According to the laboratory test and simulations result, the installation of multi gap arrester at a certain distance from the substation has a potential to affect its capability to cut off the follow current; therefore, multi gap arrester specification and installation requirement should comply this finding. Protection system setting and insulation coordination should also be considered further before installing such type of arrester.

## 22: Parallel Session 2 Room 2

### Room 2

#### **9:00 Indoor Air Quality Monitoring System with Node.js and MQTT Application.....144**

Anindya Ananda Hapsari (Jakarta Global University, Indonesia & Indonesia, Malaysia); Devan Junesco Vresdian (Jakarta Global University, Indonesia); Muhamad Aldiansyah (Management and Science University, Malaysia); Brainvendra Widi Dionova (Jakarta Global University (JGU), Indonesia); Aulia Choiri Windari (Jakarta Global University, Indonesia)

Air pollution is always a problem that continuous to grow every time. Not only affects the environment, air pollution also affects human health so it needs to be dealt with quickly. Air quality in environment especially indoor area becomes something that is rarely considered. Even though we spend more time indoors, so it's also important to know the air we breathe. In today's modern era, air monitoring can utilize applications on our technology and internet devices, it can be an interesting and efficient thing to monitor. In this Internet of things project the monitoring system built by integrating software and hardware with device microcontroller and low-cost sensor MQ 135 and DHT 11. Node sensor produces data and processed with a microcontroller. The resulting data then immediately transmitted to the cloud by internet network using MQTT and combine with Node.js MQTT open source clients used to publish messages and subscribe to topics on brokers. Wireless Sensor Network also applied so sensor nodes can be placed anywhere and data can be acquired into one dashboard display. A web-based dashboard was built to facilitate access of information from existing air quality in different room.

#### **9:15 The Implementation of Neural Network Algorithm to Predict the Eligibility of Prospective Assistants.....150**

Asroni Asroni (Universitas Muhammadiyah Yogyakarta & UMY, Indonesia); Muhammad Hidayatullah and Slamet Riyadi (Universitas Muhammadiyah Yogyakarta, Indonesia)

E-learning has been able to store learning data accumulated from the beginning of students entering college in the initial semester to the final semester. The problems occurring are that each semester requires an assistant for each course with practical activities, and there are difficulties in determining for prospective assistants who have excellent abilities. Almost every course in the Department of Informatics Engineering courses has a teaching assistant. In each semester, the courses will always open vacancies for the registration of teaching assistants. The selection should refer to the data from the learning outcomes to measure the feasibility of prospective applicants. To obtain information, data processing was required, frequently referred to as data mining. The stages of this study began with searching for literature studies, selecting data mining methods following the desired results, collecting data, processing data with rapidminer devices, applying and testing models with neural network algorithms, discovering findings, and drawing conclusions. The data used in this study were e-learning quiz data, data availability, and students' final grades. The attributes employed were the average score of the quiz, attendance, final grade, and description. Attribute information was utilized as a label. In this study, the authors obtained an accuracy of 98.18%. In conclusion, the neural network algorithm was excellent in predicting the prospective assistant lecturers.

### **9:30 Advanced Development of a Prayer Schedule Bot Application on Telegram Using PHP.....N/A**

Asroni Asroni (Universitas Muhammadiyah Yogyakarta & UMY, Indonesia); Cahya Damarjati and Sofran Bahruruzi (Universitas Muhammadiyah Yogyakarta, Indonesia)

A bot is a web robot or an assistant with computer intelligence. The usefulness of a bot is very much starting from the web, messenger, and others. One application possessing a provider to make a bot is a Telegram. The development of technology, such as social media applications, has made them prevalent for the public, including most Muslims. Sometimes, people will be negligent in worshipping when using the application. Therefore, creating a prayer schedule bot is necessary to prevent people from doing so. A framework creation aimed to facilitate the stages of making a bot using a PHP programming language. The bot-making results could be utilized in various countries with the calculation method found in a bot, providing a preference for users. Telegram bot is preferred for smartphone users wanting storage efficiency and having an internet connection. In contrast, the conventional prayer scheduler application does not care much about the storage taken and does not have an internet connection.

### **9:45 Digital Lending High Level System Architecture in Indonesia..... 159**

Cornelius Sarungu (Bina Nusantara University)

Digital lending businesses have been flourishing recently in Indonesia. Despite of its influence on the customer segments and competition arena that quite intimidating to traditional banking business model, it still seek maturity on its technology. Automation become the key to gain maximum processing speed, but some aspects seems still not ready for it. While scoring model can be implemented using predictive machine learning algorithm, some customers background checking is still depends on third parties applications along with their maturity on the technology implementations. Another aspects we should continuously enhance as part of internal process improvement effort is our loan origination system and its components that become the center of gravity of the ecosystem. Adoptions of high end mobile app technology, provide the players with chance to create seamless user experience that brought comfort to the customers when using their platform. Those all technology stack should be planned on early stage of digital lending system development. Roadmap should be build, reviewed and enhanced in order to track the improvements to keep up with the fast pace of technology adoption in the arena. Proposed software system architecture in this paper is designed to be fit only in Indonesia, aligned with its local regulations and some national entities (i.e. national single ID server, local credit bureau) that must be included in the ecosystem.

### **10:00 Adoption and Utilization of Social Media Across Hospitals in Depok City.....N/A**

Badra Al Aufa, Wahyu Sulistiadi and Faizah Abdullah Djawas (Universitas Indonesia, Indonesia)

Businesses in various sectors have used social media. However, analyzes regarding the use of social media by hospitals in Indonesia are still understudied. This study aimed to investigate the adoption of social media by hospitals and the relationship between hospital social media utilization and several hospital characteristics. We conducted a cross-sectional review of hospital-related activity on three social media platforms: Facebook, Instagram, and YouTube. All 23 hospitals in Depok City, Indonesia, were included in this study. Social media adoption is related to whether the hospital has an account in the aforementioned social media. Utilization refers to the user activities specific to each social media platform, such as the number of Facebook page likes, Instagram followers, and YouTube subscribers. Eighty-seven percent of the hospitals under the study have an Instagram account, 65.2% have Facebook, and 47.8% have YouTube. Based on the hospital characteristics, private and grade B hospitals have higher adoption of social media compared to their counterparts' groups across all three social media platforms. There was no significant difference in the utilization of social media based on ownership, type, grade and size of hospitals.

### **10:15 The Prototype of In-Store Visitor and People Passing Counters Using Single Shot Detector Performed by OpenCV.....169**

Andes Herviana, Dodi Wisaksono Sudiharto and Fazmah Arif Yulianto (Telkom University, Indonesia)

Information related to the power hours of a mall or store is important. By typically knowing it, the manager of the store or the mall can wisely determine the staff planning decision. Without the right decision, it potentially decreases customer satisfaction. The decision can be defined by utilizing in-store visitors and people passing traffic patterns. The other problem also arises when the calculation of in-store visitors and people passing are executed manually, so it requires much effort. This study proposes a prototype design of the system which can automatically calculate visitors by utilizing Single Shot Detector (SSD) method. This method is performed by operating OpenCV library. It is used to detect a human object marked as in-store visitor or people passing. The embedded computer is conducted to process images captured by Pi Camera. Based on the study, the result accuracy is 65.08% for the system counts in-store visitors, and 66.12% for the system marks objects as people pass around in front of the store. Although the accuracy values obtained is not high, but all patterns show that the highest average values of in-store visitors and people passing occur on the days nearing weekend and also on the weekend, such as Friday, Saturday and Sunday. The peak time of in-store visitors (e.g. power hour) on Friday is between 12 PM and 1 PM. The peak time of in-store visitors on Saturday is between 3 PM and 4 PM, and on Monday, it is between 4 PM and 5 PM.

### **10:30 A Basic Concept of Image Classification for Covid-19 Patients Using Chest CT Scan and Convolutional Neural Network..... 175**

Irma Permata Sari, Widodo Widodo and Murien Nugraheni (Universitas Negeri Jakarta, Indonesia); Putra Wanda (Universitas Respati Yogyakarta, Indonesia)

On March 12, 2020 WHO announced the status of a global pandemic related to the increasing Covid-19 cases. The outbreak has hit around 188 Countries. Healthcare professionals have repeatedly performed laboratory tests to get the right results to patients, such as, check the chest CT images of the patient's lungs. This is an essential role in clinical treatment and teaching task. In this paper, we tried to classify chest CT image of Covid-19 patient. CNN produce spatial characteristic from images so it very expeditious way for image classification problem. Three techniques are evaluated through experiments. The results of the experiments show the test set has 1119

Covid-19 chest CT images and 446 normal chest CT images. The experiment results represent that our offer model delivered the highest accuracy score of 97.57% among the other models, Inception ResNet-V2 and Inception-V3.

## 23: Parallel Session 2 Room 3

### Room 3

#### **9:00 Design of PID Disturbance Observer with Neuro Fuzzy Inverse Model for Precise Temperature Control in Infant Incubator.....179**

Yoga Utama (University of Widya Kartika, Indonesia)

An infant incubator is a device that is often used in hospitals that serves to maintain the infant's body temperature, especially for premature babies to always be warm. The function of the incubator is very necessary since the growth and development of premature babies is still not perfect, causing the baby's condition vulnerable to health problems. Therefore, temperature control in an infant incubator is the most vital function to keep the temperature warm at a certain level. This study compared 3 controllers namely On-Off control, PID control, and PID-DOB control (PID Disturbance Observer) in controlling temperature at 35°C. The three controllers were given disturbance in the form of 4 variations in outside air temperature so that it affected the ambient temperature inside the incubator. The performance of the three controllers was calculated using the Integral Time Absolute Error (ITAE) criteria. The test results showed that the mean values of ITAE for On-Off control, PID control, and PID-DOB control were 486.353, 71.7314, and 1.5812, respectively. From these results it could be concluded that the PID-DOB control was the most effective control in regulating the ambient temperature in the incubator so that it was resistant to disturbance in the form of outside air temperature variations.

#### **9:15 Portable Automation Device for Television to Reduce Electricity Usage.....N/A**

Iswanto Iswanto, Is (Universitas Muhammadiyah Yogyakarta, Indonesia); Prisma Megantoro (Universitas Airlangga, Indonesia); Nia Maharani Raharja (Universitas Islam Negeri Sunan Kalijaga, Indonesia)

Almost all television sets are equipped with timers, but sometimes we ignore them. Because of falling asleep or suddenly left we forget to turn off the television, which finally turns on the television without anyone watching. In such cases, of course, there is electricity waste. This article discusses devising devices that can turn off the television when no one is watching without setting a timer that is already on television first and the device is portable for all television brands. The device is made as a detector of people's movements in front of the television, so the television lights up if people are watching it.

#### **9:30 Development of Measuring Instrument for Ground Water Content Using Gravimetric Method.....N/A**

Iswanto Iswanto, Is (Universitas Muhammadiyah Yogyakarta, Indonesia); Prisma Megantoro (Universitas Airlangga, Indonesia); Nia Maharani Raharja (Universitas Islam Negeri Sunan Kalijaga, Indonesia)

Measurement of groundwater content using the gravimetric (oven) method is a standard method that has very high accuracy, but this method must be done in a laboratory so that its application requires a lot of time and energy to get the value of groundwater content, or in other words this method or method ineffective and inefficient, therefore the author wants to develop a tool that can be used to measure the water content of ground media. This article discusses the measurement of ground water content, which in this case is used to measure four types of ground, namely, clay ground from the Gamping area, sand ground from the Tamantirto area, red soil from the Wonosari area and one ground from the Gamping area.

#### **9:45 Predictive Modeling of a Flexible Robotic Arm Using Cohort Intelligence Socio-Inspired Optimization.....193**

Ravi Sekhar (Symbiosis Institute of Technology, Pune, India); Priteshkumar Shah (Symbiosis International University, India)

Socio-inspired metaheuristics can accelerate industry 4.0 implementation. In the current work, cohort intelligence socio-inspired metaheuristic has been employed for predictive modeling of a flexible robotic arm system. Robotic arm acceleration was modeled based on robot structure reaction torque as the input parameter. This model had a second order transfer function structure consisting of one zero and two poles for better predictability of the robotic arm dynamics. The model parameters were estimated using Cohort Intelligence (CI) socioinspired algorithm. For comparisons, model parameters were also estimated by a nature inspired method - Genetic Algorithm (GA). Estimation results indicate that both CI and GA obtained similar FIT of system dynamics; 74.78 % and 74.27 % respectively. However, due to the higher number of the average function counts in GA (5480) as compared to CI (2379), the computation time for the best cost function was found to be much lesser in CI (10.65 seconds) as compared to GA (45.77 seconds). Thus, for similar fitting predictive models, the CI converges to the optimum model parameters much faster than GA. This indicates the superiority of the socio-inspired CI metaheuristic towards faster predictive modeling of complex robotic systems in industry.

#### **10:00 Accelerometer Based Electric Wheelchair.....199**

Hanifah Rahmi Fajrin and Subhan Bariton (Universitas Muhammadiyah Yogyakarta, Indonesia); Muhammad Irfan (PKU Gamping Hospital, Indonesia); Putri Rachmawati (Universitas Muhammadiyah Yogyakarta, Indonesia)

A wheelchair is a tool for facilitating patients moving from one place to another; it is used in a patient who suffered decreased muscle strength or people with motor system disabilities so that they experience a disruption in balance. The kind of wheelchair that is in demand is the electric wheelchairs. It is preferable because patients can use it independently. This study is on the electrical wheelchair utilizing the output signal from the ADXL335 Accelerometer sensor connected to microcontroller Arduino. When the patient's head moves to one side (nodding, looking up or tilting left and right) the Accelerometer ADXL335 sensor will make a reading process which is then processed in the microcontroller Arduino, then the Arduino will provide voltage to the H-Bridge Relay Driver to drive the DC motor so that the

wheelchair can move forward, backward or left and right. An ultrasound safety system is located behind the patient. The order execution test is carried out 25 times and obtained accuracy of 88% advance, right turn 84%, left turn 88%, reverse 92%. In accordance with the accuracy values are obtained that the electric wheelchair based on accelerometer can function properly.

#### **10:15 Centralization of Medical Gas Pressure Monitoring Based on ATmega328.....204**

Nur Hudha Wijaya (Universitas Muhammadiyah Yogyakarta, Indonesia)

Medical gas installation is one of the supporting services for the health facilities. However, a failure supply medical gas became a serious problem. It was caused by the gas pressure that was not properly controlled, so that the scale on the gas pressure regulator in the ward became inaccurate and difficult to read the medical gas pressure. Clear pressure readings and centralized monitoring are the essential thing to minimize a failure on the medical gas system, which is the aim of this study. The contribution of this research is to provide an innovation in medical equipment and medical gas monitoring in hospitals. This study uses an experimental method with testing in 2 different rooms, they are a medical gas pressure monitoring tool by displaying pressure information on seven segments and can be monitored centrally. By utilizing the pressure transducer PX2 and MPX5700 which are controlled by Atmega328, so that medical gas can be monitored properly. By using this medical gas pressure monitoring tool, the test was carried out at a medical gas pressure of 3 bars, 4 bars, and 5 bars, for medical vacuum at a pressure of 40 cmHg, 50 cmHg and 60 cmHg. From the process of making the tool and the tests, it can be concluded that the tool can work well in displaying the pressure on the seven segments display and the display on the computer. With the error that is still under tolerance, with a maximum error of 3% and a maximum error limit of 5%.

#### **10:30 Atmospheric Balloon Payload Ground Station Systems with Real-Time Antenna Tracker Integration.....209**

Rama Okta Wiyagi, Muhammad Khairul, Dimas Oktanugraha and Anna Nur Nazilah Chamim (Universitas Muhammadiyah Yogyakarta, Indonesia)

Atmospheric balloon payload is an instrument that was flown by atmospheric balloon that can measure vertical atmospheric parameters and transmit the data via radio telemetry to Ground Station. In this case, to obtain complete telemetry data is challenging. This condition happens because the position of the balloon payload when flying is erratic and can reach a long distance, in the other hand radio telemetry only transmitted in very low power, and operates in the UHF band causes the radio transmission distance is limited. The solution for this problem is a using directional antenna on Ground Station (GS). Directional antenna alignment using visuals will be difficult to do because the balloon is not visible if the distance is far. In this research offer Atmospheric Balloon Ground Station System software development and the integration of real-time directional antenna tracker based on the payload position. This software is used to represent real-time atmospheric parameter data and the actual position of the balloon payload. This software also calculated antenna tracker azimuth and elevation angle based on the payload last position so the antenna can track the payload position correctly.

Wednesday, October 14 13:00 - 15:00

31: Parallel Session 3 Room 1

Room 1

#### **13:00 Comparison of Background Subtraction and Frame Differencing Methods for Indoor Moving Object Detection.....214**

Yessi Jusman, Lentera Hinggis and Rama Okta Wiyagi (Universitas Muhammadiyah Yogyakarta, Indonesia); Nor Ashidi Mat Isa (Universiti Sains Malaysia, Malaysia); Faaris Mujaahid (Universitas Muhammadiyah Yogyakarta, Indonesia)

This study analyzes the method of moving object detection using video images by comparing two methods, namely background subtraction and frame differencing. The purpose of this research is to design a moving object detection system, then analyze the test results to determine a more reliable method. The video image used in the test is the result of recording using a camera type Logitech webcam C922 pro Hd 1080 P in avi format. This study uses two types of testing, namely qualitative testing in the form of motion detection methods and quantitative testing in term of frame per second values. The results of the study show in terms of the success of the frame differencing method that is more accurate in detecting objects. While in terms of computing the background subtraction method is faster in detecting objects.

#### **13:15 Detection of Sudden Pedestrian Crossing for Driving Assistance Systems.....220**

Siti Noraini Sulaiman (Universiti Teknologi MARA, Malaysia); Iza Sazanita Isa (Universiti Teknologi Mara, Malaysia); Rozan Boudville (Universiti Teknologi MARA, Malaysia)

Sudden pedestrian crossing is the major cause of accident on the road, especially in cities. Most of the results show that drivers tend to lose their attention and always feel drowsy while driving. Some of them just take it easy, not focusing and giving their full attention while driving on the road. Therefore, the main objective of this project is to build a driving assistance device that can detect sudden pedestrians crossing the road using Raspberry Pi microcontroller. This can be accomplished with the following methodological steps; Open CV is used to develop a detection algorithm where the Pi camera is used to capture the image and image processing algorithm as well as the fact that a warning system is programmed via Phyton language to give an early warning to driver. A buzzer sound is used to get the driver's attention to slow down the speed of vehicle or just to stop the car. At this vehicle's speed rate, the crashing can be reduced if the driver gets the notification earlier. In conclusion, such a warning system should be available in any car to warn drivers. By creating such device, it can contribute towards reducing the percentage of pedestrian death.

### **13:30 CNN Transfer Learning of Shrimp Detection for Underwater Vision System.....226**

Iza Sazanita Isa (Universiti Teknologi Mara, Malaysia); Siti Noraini Sulaiman, Nor Nabilah Norzrin and Mohd Ikmal Fitri Maruzuki (Universiti Teknologi MARA, Malaysia); Nur Azah Hamzaid (University of Malaya, Malaysia)

In deep learning, convolutional neural network (CNN) mostly apply common overland images instead of underwater images classifiers. Even though there are few classifiers that have been introduced in marine and aquaculture application, there is still limited sources of the underwater images such as shrimp images. Generally, most conventional management systems in shrimp aquaculture implemented manual techniques that highly depend on human to observe shrimp conditions. One of the major problems of shrimp aquaculture is the challenge of recognizing underwater images, despite the characteristic atmosphere such as the murky and turbid water conditions. Many models of image classification have been introduced in order to solve the issue of early detection in shrimp and ponds problems. However, there are several limitations of the proposed methods such as semi-intelligence or fully wired systems. Therefore, an intelligence computational method and wireless system or internet of things (IoT)-based system is crucial in making sure a precision aquaculture farming. This study conducted a transfer learning model for CNN real time shrimp recognition. This study aims to accurately assess the performance of the developed CNN model by evaluating shrimp images-based on intersection over union (IoU) between annotation and proposed models. The result shows the proposed model can successfully detect the shrimps with more than 95% accuracy. As a conclusion, the proposed model is able to detect the real time video recognition of underwater shrimp in ponds and is applicable in wireless farming.

### **13:45 COVID-19Net: A Deep Neural Network for COVID-19 Diagnosis via Chest Radiographic Images.....232**

Dhimas Arief Dharmawan (Universitas Muhammadiyah Yogyakarta, Indonesia); Latifah Listyalina (Universitas Respati Yogyakarta, Indonesia)

Recently, Corona Virus Disease 2019 (COVID-19) has rapidly spanned the globe. In particular, this viral disease has infected more than 400,000 peoples and has caused more than twenty thousand cases of death. Unfortunately, there is no specific therapeutic drugs or vaccines for the disease, such that an early screening protocol is highly required. Although nucleic acid detection using real-time polymerase chain reaction (RT-PCR) remains the standard, recent literature reported that radiological imaging of human chests had shown a more consistent result when used for COVID-19 diagnosis. However, performing a manual evaluation on chest computed tomography or CXR images is tedious and labour-extensive. In this paper, we present COVID-19Net, a deep neural networkbased algorithm to assist doctors in diagnosing COVID-19 through the radiographic images. In the experimental parts, our algorithm could diagnose COVID-19 and other related diseases like SARS, Streptococcus, ARDS, and Pneumocystis with average accuracy and area under the ROC curve (AUC) of  $> 99\%$  and  $> 0.99$ , respectively.

### **14:00 Text Summarization Application for Indonesian Twitter Document by Using Top-N Feature Selection Algorithm.....238**

Zul Indra (Universitas Abdurrab, Indonesia); Yessi Jusman (Universitas Muhammadiyah Yogyakarta, Indonesia); Doni Winarso (Universitas Muhammadiyah Riau, Indonesia)

The rapid development of information technology has changed many things in our lives. One of the most influential technological developments in our lives is the emergence of the internet. One of the phenomenal examples in the world of information technology is the existence of social media services. This service has replaced the habit of people looking for information and writing down its expressions. With a very high data growth rate, it has raised new problems for Twitter users. The large number of tweets sometimes causes difficulties in understanding the information. To solve this problem, one solution that can be applied is to summarize the information circulating on Twitter. Text summarization is a field of study in natural language processing (NLP). This algorithm aims to reduce the number of words in a document so that the information is easier to understand. NLP can be used to help us summarize tweet documents so that they are easier to understand. This study aims to develop tweet summarization software using the top-n feature selection algorithm. Based on the experiment that has been done, the application has succeeded in summarizing the tweet document by displaying the terms that have the highest weight. Hence, users can more quickly understand information from Twitter without having to read the entire tweet document.

### **14:15 Statistical Analysis to Determine the Ground Truth of Fatigue Driving State Using ECG Recording and Subjective Reporting.....244**

Junartha Halomoan, Kalamullah Ramli and Dodi Sudiana (Universitas Indonesia, Indonesia)

In 2018, the World Health Organization reported about 1.35 million deaths caused by traffic accidents, which are also the leading cause of death of children and adolescents globally. Therefore, an early-warning system is needed to prevent accidents caused by fatigue driving. Research on driving-fatigue detection has determined the ground truth of the fatigue state by designing tests for specific conditions, designing tests at particular times, and relying on subjective reporting. Because determining the ground truth of the fatigue state affects the results of fatigue detection, this paper advances this investigation of the ground truth of the fatigue driving state and driving times using electrocardiogram recordings and a questionnaire that subjectively captures drivers' fatigue states. After five test sessions and heart-rate statistical data analysis, the minimum time required to induce a fatigue driving state in a driving simulation was 90 minutes with a Chalder Fatigue Scale score of 16. The driving-simulation software also affected the drivers' heart rates, however, so better programmable driving-simulation software is needed to create specific conditions, such as traffic density and limited driving speed, to induce realistic fatigue driving states.

### **14:30 Experimental Assessment of the Concrete Slab With Different Depth and Diameter of Steel Rebar Using GPR and Image Processing.....249**

Ahmad Zaki and Yessi Jusman (Universitas Muhammadiyah Yogyakarta, Indonesia); Megat Azmi Megat Johari (Civil

Engineering Universiti Sains Malaysia, Malaysia)

The research focuses on the Ground Penetrating Radar (GPR) approach to examine the concrete slab's steel reinforcement bar (rebar). Experimental laboratory work will be carried out by preparing two concrete slabs, i.e., depth-based and diameter-based concrete slabs. This work also proposes to use image processing techniques to analyze images of GPR data (3-D image) of steel rebar. The k-means clustering and binary image are used to eliminate features from the image data to analyze the steel reinforcement. From the results, the pixels of area and diameter decrease in terms of increase the depth of steel rebar for a depth-based concrete slab. On the other hand, the diameter-based concrete slab results present the lower pixels of area and diameter in terms of decreased steel rebar diameter.

**14:45 The Effect of Term Weighting Selection on Cosine Similarity Algorithm for Evaluating Document Similarity.....N/A**

Sumarni Adi, Andi Sunyoto, Akhmad Dahlan and Ainul Yaqin (Universitas Amikom Yogyakarta, Indonesia)

Describing the level of similarity between documents can be measured by the Cosine Similarity algorithm. However, before the similarity of the document can be found, indexing is done first, so that the document can be recognized by the computer. There are many features that can be used for indexing, so it is important to select the right indexing feature so that the Cosine similarity algorithm can work optimally in the process of identifying and evaluating document similarities. Therefore, it is necessary to handle these problems. In this study, handling the selection of indexing features including indexing TF-IDF, W-IDF, TF-RF, and BM25 in the essay document of course assignments using the Cosine Similarity algorithm. The indexing feature works by providing an index for each term in the document and calculating the frequency of its appearance in each document so that it will provide a document similarity value in the cosine similarity algorithm used. Based on the results of the tests carried out, the use of the TF-RF indexing feature can identify a fairly large similarity value in the Cosine Similarity algorithm, namely 58.26%, while the TF-IDF, W-IDF, and BM25 indexing features obtained a fairly small similarity value in the Cosine Similarity algorithm. This shows that the use of TF-RF can be a solution as an indexing feature to measure document similarity using the Cosine Similarity algorithm because this indexing feature makes the distance between words smaller.

## 32: Parallel Session 3 Room 2

### Room 2

**13:00 Design and Implementation of Smart Card Based Secure Key Storage the Blockchain E-Voting Application.....259**

Damayani Suyitno and Barok Aladhirus (Politeknik Siber dan Sandi Negara, Indonesia); Rini Wardhani (National Crypto Institute, Indonesia)

E-voting is an application of in the election process. E-voting was developed to make the election process easier, safer and more practical. Blockchain technology is explained as a safe technology because of its distributed nature. Tso et al's e-voting is one of the e-voting mechanism that uses the ethereum smart contract blockchain. Tso et al e-voting application use asymmetric cryptography for the safety of its users in the form of Paillier's algorithm. This study proposed use of the AES-256 algorithm to secure key data on smart cards for e-voting process, SHA-256 for authentication, and secure communication protocols to secure the key in sending process. The key is stored in a ciphertext format with AES-256 encryption and SHA-256 as authentication algorithm. The results of implementing smart card prototypes as key storage in the Tso et al e-voting application shows that the proposed e-voting scheme has a key storage time of 0.774 seconds, a memory capacity of 572 bytes, with 0.472 seconds generation speed.

**13:15 Security Evaluation of LIGHTMAC: Second Preimage Attack Using Existential Forgery.....265**

Susila Windarta, Kalamullah Ramli and Dodi Sudiana (Universitas Indonesia, Indonesia)

Message Authentication Code (MAC) is a cryptographic hash function that uses the cryptographic key(s) to generate a MAC value or a tag. MAC security property that must be satisfied is the second preimage resistance; given an input, it is difficult to find different inputs with the same tag. A lightweight MAC called LIGHTMAC was introduced in 2016 by Luykx et al. The scheme uses lightweight block cipher as its encryption function. This paper discusses the application of a second preimage attack on the LIGHTMAC scheme using existential forgery methods. The purpose of this attack is to determine the resistance of LIGHTMAC's second preimage property. From observation and experiments with instantiation using SIMECK32/64, it is found that the attack is more efficient than brute force attacks with birthday attack complexity. Furthermore, a modification is recommended to avoid the second preimage attack on LIGHTMAC.

**13:30 A Decision Support System for Lecturer Performance Based on Arithmetic Formula.....N/A**

Salamun Salamun (Universitas Abdurrab, Indonesia); Diki Arisandi (Universitas Abdurrab & Multimedia University, Indonesia); Yessi Jusman (Universitas Muhammadiyah Yogyakarta, Indonesia)

The national rubric of lecturer performance is a document that contains instructions and rules for calculating lecturer performance, issued by the Ministry of Research, Technology, and Higher Education. Every lecturer who wishes to apply a promotion must refer to the latest rubric. The rubric also includes lecturers' performance calculations taken from the number of credit points. The lecturer's performance formula for this research is how to calculate lecturer working hours for 7-8 hours per day based on standard daily working hours following government regulations. The method is to calculate the lecturer credit point based on the formula which is contained in the rubric, then combined with the arithmetic formula taken from the weight of each question item. The score acquired by the system will generate a total of lecturer working hours. The results are a decision system that able to calculate lecturer working hours, as decision support for the top management of the University to assess the lecturer.

**13:45 Implementation of Multi-Entry Onscreen Keyboard Model on Android-Based Mobile Application to Prevent Shoulder Surfing Attack.....274**

Hermawan Setiawan and Rafif Masrur Rauf (Sekolah Tinggi Sandi Negara, Indonesia)

The increasing number of Android-based smartphone users and the usage of smartphones for electronic payments have led to the threat of shoulder surfing attacks of PIN and password theft. Various methods of preventing shoulder surfing have been created to keep PIN and password confidential, one of which is by customizing the keyboard graphically, textually, and patterns for entering passwords. Some of the existing methods lack complexity, security, and are impractical to use by themselves. Therefore, a shoulder surfing prevention method was created using a multi-entry onscreen keyboard (meosk) model which combines several textual authentication methods with the creation of entry model technique in order to maximize the usability and complexity. In this research, the implementation of multi-entry onscreen keyboard model was carried out on an Android-based mobile application to determine the level of security from shoulder surfing. Testing was done by simulating shoulder surfing attacks on application that has been built. The research results showed that multi-entry onscreen keyboard model can prevent shoulder surfing attacks by combining several methods and the results of chi square test were significant for all test variables.

**14:00 Tweet Sentiment Analysis for 2019 Indonesia Presidential Election Results Using Various Classification Algorithms.....279**

Febby Apri Wenando, Regiolina Hayami and Bakaruddin Bakaruddin (Universitas Muhammadiyah Riau, Indonesia); Ali Yunda Noverma Hakim, Ay (Universitas Gadjah Mada, Indonesia)

The Presidential general election on 2019 became one of the most popular topics on twitter nowadays. Sentiment analysis over Twitter offers people a effective way to measure the public's feelings towards their party and politicians. The society give their opinion about the pair of candidates that they are support through the social media. This paper addresses the sentiment analysis on Twitter data, The dataset was used based on the tweet on the @jokowi twitter account. The retrieval of data by using the Tweepy library with the Python 2.7 programming language. We utilized few of machine learning algorithm to build our classifier and classified the test data as positive and negative sentiment for the training dataset. This research proposes the weighting word method Unigram, Bigram, Trigram, N-Gram (1-2) and N-Gram (1-3) combined with several machine learning algorithms to compare the best algorithm.

**14:15 Internet of Thing and Automatics Control System on Quail Egg Incubator Using Human-Centered Design Method.....N/A**

Mitra Unik and Yulia Fatma (Universitas Muhammadiyah Riau, Indonesia)

The combination of the application of ACS and IoT technology allows it to be applied to several incubation machine devices. Several studies have used the monitoring features of the incubation machine automation. This research developed an automatic and remote quail egg incubation machine with complex features [1] such as temperature control, heating source, thermometer and hygrometer, humidity regulation, and egg rack operation. The focus of this research is to develop a quail egg incubator by applying the principles of Internet of Things (IoT) technology and Automatics Control System (ACS) to increase operational efficiency and production of incubation products. The human centered design (HCD) method is a method that is human-oriented or suppresses human existence in every process of developing the devices used in this study to build overall features. The results of unit testing of the quail egg incubation machine prototype device successfully operated all incubation machine units such as DHT sensors, water level, temperature automation, egg turning, monitoring device status on smartphones, LCD, operating history, and remote control system. The operation process test got positive results which were quite significant. Tests on the incubation process found the time needed for the tool to reach a temperature of 39.00°C, a humidity of 65% from an initial temperature of 26.90°C, an initial humidity of 82.4% was 37 minutes. From an initial temperature of 27.90°C, an initial humidity of 85.4% is 26 minutes. Field testing on incubation using quail eggs resulted in 91% hatching success of the total sample tested.

## 33: Parallel Session 3 Room 3

### Room 3

**13:00 The Role of Silica in Improving the Properties of Kenaf/Silica/Epoxy Hybrid Composites.....N/A**

Harini Sosiati and Muhammad Rahman (Universitas Muhammadiyah Yogyakarta, Indonesia)

Kenaf fiber and silica-reinforced epoxy hybrid composites with different types of silica have triggered research interest worldwide due to the role of silica in changing the composite properties. This study aims to determine the influence of silica loading on the flexural and impact strengths, and water absorption of the kenaf/silica/epoxy hybrid composites. Alkali treated kenaf fibers 5 mm in length and silica fume microparticles 400 mesh in size were used as the reinforcement materials for epoxy resin at a 30 wt.% concentration and were manufactured as hybrid composites by a hand-laying technique in cold press molding at approximately 5 MPa for around 40 minutes. The silica concentration ranged by 0, 2, 3 and 5 (wt.%). The results showed that both the flexural and impact strengths increased by 16% and 18%, respectively, at 2% of the silica concentration, but decreased at a concentration higher than 2 wt.%. The lowest weight gain of water absorption of 13.3% for 216 hours of water immersion was also shown by 2 wt.% of silica. The higher the loading of the silica particles, the more regions the particles need to be incorporated into the resin, leading to a reduction in the embedding of the fibers into the resin. These results were verified by scanning electron microscopy (SEM). Summary of the results showed that the addition of 2 wt.% of silica microparticles (400 mesh) into the kenaf/epoxy composite was an optimum value.

**13:15 A Simulation Study of the Airflow Distribution in the High-Cube Refrigerated Container.....N/A**

Muhammad Arif Budiyanto (Universitas Indonesia, Indonesia); Nadhilah Suheriyanto (Departement of Mechanical Engineering, Universitas Indonesia, Indonesia)

In the use of refrigerated containers, it is important to control the airflow and temperature of the cargo room to maintain the cooling performance. The aim of this study is to the simulation of airflow distribution inside the high-cube refrigerated container by means of computational fluid dynamics. The simulation of airflow distribution simulation was carried out on the two variation of inlet velocity i.e. low-speed fan mode at 32 circulations/hour and high-speed mode at 80 circulations/hour. The results show that airflow distribution in the high-speed fan mode can reach 78 percent of the total length of the refrigerated container, while in the low-speed fan mode show airflow distribution only reaches 52 percent of the total length of the refrigerated container. The results of this study are useful in planning the arrangement of refrigerated cargo carried.

### **13:30 Comparison Result of Hourly Solar Radiation Under the Clear Sky Condition Based on of Solar Radiation Model and Measured Data Experiment.....298**

Muhammad Arif Budiyanto (Universitas Indonesia, Indonesia); Muhammad Hanafi Lubis (Departement of Mechanical Engineering, Indonesia)

Indonesia is a country on the equator, and a tropical country with two conditions, rainy and sunny. Indonesia has a long cycle of solar radiation intensity which began from 8:00 until 16:00, the effective time being 5 hours on peak solar time. To know the efficiency power applicable to solar power technology, calculation of the solar radiation intensity is required. The purpose of this paper is to compare the hourly solar radiation under the clear sky condition based on the solar radiation model and measured data experiment. The solar radiation model proposed by ASHRAE has been compared and evaluated with measured data using statistical analysis. The measurement data used as validation data on the estimation of solar radiation based on the solar radiation model suggested by ASHRAE with the used coefficient A is 1000, B is 0.4 and C is 0.136. The results of the statistical analysis show good agreement between measurement and empirical models with the peak of solar radiation is 641 W/m<sup>2</sup> on 19 June 2019.

### **13:45 Identification of Gear Faults in an Industrial Fan Prototype Using Spectrum Analysis and Continuous Wavelet Transform.....303**

Berli P Kamiel, Agus Arianto and Muhammad Rahman (Universitas Muhammadiyah Yogyakarta, Indonesia)

Gear is one of the power transmission systems in industrial fans used to reduce the shaft rotation. The spectrum analysis can be used to detect gear fault advancement. However, the spectrum only applies to stationary signals. In industrial fans, changes in fan workload cause signals to become non-stationary. In addition, heavy noise often occurs in the gear vibration which immerses the gear vibration. The continuous wavelet transforms (CWT) is effective for this condition. The purpose of this research is to apply the CWT for the gear fault advancement in industrial fans. The time-synchronous averaging (TSA) is used as a preprocessing signal to reduce the unwanted vibration signal including noise. In this research, three different gear conditions are used i.e. normal gear (no fault), 50% (level 1) and 100% (level 2) gear fault advancement. The results of CWT are plotted into scalogram which gives both time and frequency information. The scalogram produced from vibration signals before and after TSA is compared and analyzed. The scalogram shows that the CWT after TSA gives prominent result to identify gear fault advancement. An increase in gear mesh frequency (GMF) amplitude is clearly observed and also the periodicity of frequency content is evident. The GMF amplitude of 50% and 100 % gear fault increases 2.5 times and 4 times to that of normal gear respectively. The comparison between the CWT and spectrum is also carried out where the CWT is proven superior.

### **14:00 Preliminary Design of Fish Hold Insulation on the 5 Gross Tonnage Fishing Boat.....N/A**

Achmad Fatchur Utama and Muhammad Hanzalah Huzaifi (Departement of Mechanical Engineering, Universitas Indonesia, Indonesia); Muhammad Arif Budiyanto (Universitas Indonesia, Indonesia); Hadi Tresno Wibowo (Departement of Mechanical Engineering, Universitas Indonesia, Indonesia)

Indonesia as a maritime country has enormous capture fisheries potential. On the other hand, the use of technology in catching and cooling fish catches is still very limited. This study aims to design a fish hold insulation for fishing vessels 5 Gross Tonnage as a solution in maintaining the freshness of the fish caught. Fishing boat using flat hull ship design has been used as a study case with the main dimension is length overall 8.2-meter, breadth 2.6-meter, draught 0.8-meter. Based on the calculation standards used, the fish hold insulation design is obtained of 4-meter length, 2-meter width and 1.5-meter height. From all existing load calculations, the total cooling load that must be provided by the evaporator to keep the fish hold room air temperature at 0 ° C is 472.4 Watt.

### **14:15 The Characterization of Electrochemical Machining Using Brass Tube Electrode on Aluminum Plates.....N/A**

Aris Widyo Nugroho, Dicky Adi Pratama and Sunardi Sunardi (Universitas Muhammadiyah Yogyakarta, Indonesia)

As an elective for conventional machining of hard materials and complex shapes without harming the devices and residual stresses, electrochemical machining has been advanced. This study examined the impacts of processing parameters on the Material Removal Rate (MRR) and the overcut (OC) of a custom-built electrochemical machine. Unmasked and masked aluminum plates with 0.5 mm thickness as workpieces were machined by an ECM with an outer diameter of 5 mm and 1 mm thick brass tube as an electrode in sodium chloride as an electrolytic solution. Tests were carried out using the advanced construction by altering the workpiece-to-electrode gap with a constant device movement of 0.375 mm/minute and 7-volt voltages. MRR in ECM was attained from weight loss measurement, whereas to determine the OC, open-source software (ImageJ) for image analysis was utilized. The results revealed an increase within the machining gap decreased mobility and conductivity of ions for conduction, causing lower MRR and overcut. Masked workpieces depicted lower MRR and OC but smoother in surface finish.

### **14:30 Newtonian Single Phase Adiabatic Flow Through Pipes.....N/A**

Karthik Silaipillayarputhur (King Faisal University & College of Engineering, Saudi Arabia); Houssam Chouikhi (King Faisal University, Saudi Arabia)



In this work, Newtonian single phase adiabatic flow through conventional carbon steel pipes was considered. Ready to use frictional pressure drop equations, flow rate tables and charts were developed for liquids having varying viscosities. These tables, equations, and charts will help piping engineers to choose the right pipe size for a given application, estimate the pressure drop without having to perform detailed calculations and to choose the right flow rate and/or velocity in a given piece of pipe. Commonly used pipe sizes in industries along with frequently encountered fluid kinematic viscosities were considered in this study. Ready to use equations were developed to determine the frictional head loss in a pipe, serving a fluid with a certain kinematic viscosity and flow rate. Likewise, the established tables define an acceptable flow rate in a pipe.