BOOK OF ABSTRACT & PROGRAM

ATASEC 2020
The 2nd Annual Advanced Technology, Applied Science and Engineering Conference 2020
Good morning, Ladies and Gentlemen, Dear Colleagues,

It gives me great pleasure to extend to you all a very warm welcome on behalf of Politeknik Negeri Malang and to say how grateful I am to all guests and presenters of The Second Annual Technology, Applied Science and Engineering Conference (ATASEC 2020) and 11th Joint National Seminar on Engineering 2020.

I also would like to convey my special appreciation to Mr. Indrazno and Mr. Rosa Andrie, as the chairman of the conference and all committees, which comes from a combination of all engineering majors in Politeknik Negeri Malang, who are responsible for the implementation of these conference.

We are very grateful to be able to continue to hold this conference at the second time, despite of the limitations due to covid19 pandemic. Our plan was, to welcome all participants of conference to visit our beautiful city Malang, However, even though we cannot meet face to face we can still carry out this conference virtually with enthusiasm and joy.

The ATASEC 2020 has a theme “Welcoming Industry 4.0 through Advanced Technology, Science and Vocational Engineering Education”. As for SNGBR 2020 theme “Implementasi Penelitian Terapan Multidisipliner Bidang Rekayasa melalui Kolaborasi Pendidikan Tinggi Vokasi dengan Industri”. These theme will be a media for sharing knowledge from researchers and industry from all fields of advanced technology and science. These conferences will be attended by 5 distinguish keynote speakers:

1. Prof. Nobuo Funabiki, from Dept. of Electrical and Communication Engineering, Okayama University, Japan.

2. Prof. Madya Dr. Rosli bin Omar, from Dept. of Electronic Engineering, Universiti Tun Hussein Onn Malaysia, (UTHM), Malaysia.

3. Dr. Eng. Anggit Murdani, ST., M.Eng., Vice Director on Student Affair and a senior lecturer in Machine engineering department, Politeknik Negeri Malang.

4. Ir. Anang Yahmadi, MengSc, Executive Vice Director, Divisi Perencanaan Pengadaan Strategis, PT. Perusahaan Listrik Negara (National Electrical Company), Indonesia.

5. And Mr. Nana SutiksnA, Practician QA/QC from Oil and Gas Industry.

Please accept my high appreciation to all 5 keynote speakers for joining here with us today.

Ladies and Gentlemen,
Such a conference is an extraordinary opportunity, as a good time to share knowledge from a variety of affiliates and also a variety of concentrations in the scope of the field of Advanced Technology, Science and Vocational Engineering Education. Thank you also to all experts, researchers, lecturers who come to share their knowledge today.

I am sure you that we will have fruitful and rewarding exchanges today. I wish you all a very success with this important conference and I look forward to learning about the outcome.

So, let me now open these conferences officially by wishing you a delightful and vibrant day.

BISMILLAH HIRROHMAN NIROHIM.

Thank you.

Malang, 5th August 2020

Director of State Polytechnic of Malang

Drs. Awan Setiawan, MMT., M.M.
August 5th, 2020

About Conference

The 2nd Annual Advanced Technology, Applied Science and Engineering Conference 2020 (ATASEC 2020) was held online cause of Covid-19 Pandemic by using ZOOM platform on August 5th, 2020. ATASEC 2020 theme is Welcoming Industry 4.0 through Advanced Technology, Science and Vocational Engineering Education. ATASEC 2020 addresses emerging challenges and innovations in industry 4.0 era in the field of applied science, technology, engineering and vocational engineering education. The conference will be enriched with renowned keynote speakers.

1. Prof. Nobuo Funabiki
2. Prof. Madya Dr. Rosli bin Omar
3. Dr.Eng. Anggit Murdani
4. Ir. Anang Yahmadi, MEngSc
5. Nana Sutiknsa

Aim and Scope

ATASEC 2020 aims to provide a platform for academicians, researchers, students and practitioners to promote and to share ideas and knowledge and to create international networks for sustaining development of the science and technology in the future.

The scope of the conference will cover but not be limited to:

- Artificial Intelligent Technology
- Information Systems Technology
- Mechatronics and Robotics Technologies
- Electrical Power Systems Engineering
- Electronics and Microelectronics Engineering
- Telecommunication Engineering
- Mechanical Engineering
- Computer Science and Engineering
- Chemical Engineering
- Civil Engineering
- Industrial and Manufacturing Engineering
- Environmental Science and Engineering
- Education, Vocational Engineering and Technology
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- Dr. Bebeh Wahid Nuryadin (UIN Sunan Gunung Djati Bandung)
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- Indrazno Siradjuddin, Ph.D., Politeknik Negeri Malang, Indonesia

Co-Conference Chair

- Erfan Rohadi, Ph.D., Politeknik Negeri Malang, Indonesia

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ATASEC 2020 ONLINE CONFERENCE RULES AND ETIQUETTES

Oral Presentation

- Please change your Zoom ID according to this format: “Abstract_No Name” example “ABS101 James Smith”. The host will use this format to acknowledge participants to join the meeting as well as to address questioner during the QA session.
- Please mute your microphone during the conference
- We encourage every participant to activate their videos during the conference, so please ensure you wear a proper outfit and keep your good manners during the conference
- All the participants are required to fill out the online attendance form. The link will be provided through chat box
- The certificate will be given to the participant that filled out the attendance sheet
- After the keynote speech, there will be a QA session. Participants wanting to ask some questions please send it through chat box to the moderator. The moderator might read the questions, or the moderator might ask the questioner to deliver their questions. Therefore, please wait and keep muting the microphone until the moderator asks you to deliver the questions.
- Please try to join the keynote meeting room before the conference day to ensure you can join the meeting. The link to the keynote meeting is https://zoom.us/j/93612066938?pwd=WVhOK1RUbHNXUkxLWHBHWGxiWUUwUT09

Or you can join by this ID:

  o Meeting ID : 936 1206 6938
  o Password : ATASEC2020

Participants can join anytime to test their connections or Zoom setup

Parallel Session

- Each participant should deliver the presentation at a maximum of 8 minutes.
- The presentation will be followed by 4 minutes QA session.
Book of Abstract and Program

- The list of participant names, their room and links can be found in the attached file.

Publication

All accepted abstracts must be presented in the conference to be entitled to submit the full paper. Committee will not accept full paper submission of non-presented abstracts.
**SCHEDULE**

*Note: The time is in Waktu Indonesia Barat (WIB GMT+7)*

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<td>08:00-08:15</td>
<td><strong>Opening ceremony and greetings</strong>&lt;br&gt;ATASEC 2020 short report by the chairman&lt;br&gt;Dr. Indrazno Sirajuddin&lt;br&gt;Welcoming speech and event opening by the director of State Polytechnic of Malang&lt;br&gt;Drs. Awan Setiawan, MMT., M.M.</td>
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<td><strong>Presentation by keynote speaker 1</strong>&lt;br&gt;Keynote speech by Prof. Nobuo Funabiki&lt;br&gt;15’ Question and answer&lt;br&gt;Moderator: Dr. Erfan Rohadi</td>
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<td><strong>Presentation by keynote speaker 3</strong>&lt;br&gt;Keynote speech by Ir. Anang Yahmadi, MEngSc&lt;br&gt;<strong>Presentation by keynote speaker 4</strong>&lt;br&gt;Keynote speech by Dr.Eng. Anggit Murdani&lt;br&gt;<strong>Presentation by keynote speaker 5</strong>&lt;br&gt;Keynote speech by Nana Sutiksnna&lt;br&gt;15’ Question and answer session (The QA session is held after all keynote speakers have delivered their speeches)&lt;br&gt;Moderator: Dr. Erfan Rohadi</td>
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## PARALLEL SESSIONS

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**Meeting ID:** 938 2437 8820  
**Passcode:** ATASECR1  
**Link:** https://zoom.us/j/93824378820?pwd=T2JwL0ZNa0VJSW8rUDhWSmFVmlZ6Zz09  
**Host:** Ratih Indri Hapsari, S.T., M.T., Ph.D

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**Room**: 3  
**Date/Time**: Wednesday, 5th August 2020, 13:00-15:30  
**Meeting ID**: 958 2639 2259  
**Passcode**: ATASECR3  
**Link**: https://zoom.us/j/95826392259?pwd=MFdOYXBKWXhxUVA5V3gxT2lzazBWZz09  
**Host**: Mohammad Noor Hidayat S.T., M.Sc., Ph.D

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**Room**: 4  
**Date/Time**: Wednesday, 5th August 2020, 13:00-15:30  
**Meeting ID**: 971 8656 9162  
**Passcode**: ATASECR4  
**Link**: https://zoom.us/j/97186569162?pwd=eFdnVzdwNVFpU1A4eXoyRDluYzF3QT09  
**Host**: Yan Watequlis Syaifudin S.T., M.MT.

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**Room**: 6  
**Date/Time**: Wednesday, 5th August 2020, 13:00-15:30  
**Meeting ID**: 914 2361 2874  
**Passcode**: ATASECR6  
**Link**: https://zoom.us/j/91423612874?pwd=a0R0Z1ZFM25TRE12NXFYY11NSTVmdz09  
**Host**: Dr. Muhammad Akhlis Rizza, S.T., M.T.

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**Room**: 7  
**Date/Time**: Wednesday, 5th August 2020, 13:00-15:30  
**Meeting ID**: 975 3842 3988  
**Passcode**: ATASECR7  
**Link**: https://zoom.us/j/97538423988?pwd=WkxaTjFKOUJkcNtQ1FvV0JmOWJ3UT09  
**Host**: Ferdian Ronilaya, S.T., M.Sc., Ph.D

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Developing Vocabulary Card base on Augmented Reality (AR) for learning English

Imam Fahrur Rozi, Eka Larasati, Vivin Ayu Lestari
Politeknik Negeri Malang

Abstract
The application of technology in the world of education can affect the quality of students in understanding learning material because technology is one of the important elements to assist in the teaching and learning process. One educational application that can be developed is Augmented Reality (AR) technology. AR is one of the learning media that can be used to combine virtual objects or objects into a real environment with the virtual world to be able to interact in realtime. English is a foreign language that must be mastered. In learning English, students need to be given adequate vocabulary learning that can be provided through reading or listening activities. The importance of adequate vocabulary in English to support the smoothness of oral communication, where there are 2 things that inhibit the ineffectiveness of oral communication namely students do not have adequate vocabulary mastery and do not know how to use vocabulary in their spoken language. Effective and interactive learning media will facilitate students in learning vocabulary. This research an instructional media based on augmented reality vocabulary cards will be made for learning English vocabulary. Learning English vocabulary developed is a basic vocabulary consisting of object recognition and greeting. The learning media will display real objects and sounds making it easier for students to learn and understand English vocabulary both in correct pronunciation and writing.

Keywords: Augmented Reality, Vocabulary card, English vocabulary

Topic: Artificial Intelligent Technology
Abstract

Radiological examination has a very important role in determining the diagnosis of dental problems and making decisions about the right type of treatment according to the case indications. Dental x-ray is a medical procedure for taking pictures of the inside of the mouth using radiation fluid, where the results are used diagnostically to help the dentist see the entire structure of the jaw bone and teeth, and dental problems that cannot be seen directly.

Dental radiographic interpretation, which is generally performed by dentists, is a time-consuming and error-prone process due to high variations in tooth structure, low experience levels, and fatigue factors experienced by dentists. The workload of a dentist and the occurrence of misdiagnosis can be reduced by the existence of a system that can automatically interpret the x-ray results.

To overcome these problems, a model will be developed to be able to detect objects in the dental panoramic x-ray images using R-CNN, one of the methods in Deep Learning. Deep Learning is an artificial intelligence function that modeled the workings of human brain in processing data and creating patterns for use in decision making. With the detection of objects in panoramic x-ray image automatically, it is expected to save time, improve the quality of dental care, and also the quality of diagnosis made by dentists.

Keywords: object detection; dental image; deep learning; R-CNN

Topic: Artificial Intelligent Technology
Object Recognition Using Cognitive Artificial Intelligence Knowledge Growing System

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Abstract

Object recognition has been a challenge for an intelligent system. There have been various approaches to develop such system by utilizing machine learning especially which are based on neuron that is, neural network and deep learning. Common problems when using those approaches are the first one is dataset availability and the second one is the number of data. Lack of data causes neural-based approaches cannot be well operated, while a small number of data causes systems low accuracy results. From another point of view, a considered-new technology from Cognitive Artificial Intelligence (CAI) perspective called as Knowledge Growing System (KGS) which may cope with such problems. With the capability to build its own knowledge from nothing, KGS is able to carry out recognition while developing its knowledge regarding the phenomenon it is trying to recognize. In this research, we showed KGS capability to perform object recognition as it is developing knowledge when interacting with such object directly. We did a benchmark on face recognition use case with some common machine learning methods to show their performance on a small number of data, and KGS showed good results. In this research, we also explore the new mechanism for KGS to perform such recognition.

Keywords: Cognitive Artificial Intelligence, Intelligent system, Knowledge Growing System, object recognition

Topic: Artificial Intelligent Technology
Optimal Multi-Layer Perceptron Parameters for Early Stage Diabetes Risk Prediction

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Abstract

Diabetes is an alarming threat to people around the world because the number of diabetics is increasing every year. Diabetics with other complications have a very high risk of death. Therefore, the use of technology to predict the risk of early diabetes is needed. Neural Network as one part of artificial intelligence plays a role in solving prediction problems with satisfying results. In this study, a multi-layer perceptron neural network is used to predict the risk of early stage diabetes with optimal parameters from the optimization results using Improved Crow Search Algorithm. The test results prove that the multi-layer perceptron with optimal parameters is able to provide better accuracy compared to other algorithms such as Decision Table, J48, PART, and Random Forest with the highest accuracy values of 97.69% and 96.92% for one and two hidden layers, respectively. This proves that the proposed solution can be used to predict the early stage diabetes risk.

Keywords: crow search algorithm, diabetes, health care, neural network, multi-layer perceptron

Topic: Artificial Intelligent Technology
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Abstract

Most of solid waste in Indonesia is organic waste. Organic solid waste is potential to be used as Solid Recovered Fuel. One of these is vinasse, which is a side result of the bioethanol industry will be utilized as a substrate of organic waste treatment. The aim of the research is evaluating the characteristics of Solid Recovered Fuel from the results of organic waste treatment with the addition of vinasse using the biodrying method. The research was conducted by making biodryer reactor, which have five stages and conducting application test of biodryer reactor by entering the organic waste and vinasse with mass ratio (0, 10, 20, 30, 40 %) for organic waste into tray biodryer reactor with air flow rate of 2 L/min for 9 days. The resulting Solid Recovered Fuel performed characterization of moisture content, ash content, the combustion continuity, and heating value. The results showed that the biodryer reactor was successfully made with dimensions of 165 x 50 x 70 cm consisting of five stages tray biodryer with a size of each stage tray biodryer of 60 x 45 x 5 cm. The best Solid Recovered Fuel which has highest heating value obtained from organic waste with 10% vinasse rate. It has moisture content of 11.56%, ash content of 63.88%, the combustion continuity of 0.0135 gram/second, and heating value of 3912.56 cal/gram.

Keywords: Biodrying Reactors; Organic waste; Solid Recovered Fuel; Vinasse

Topic: Chemical Engineering
Enhancement in synthesis of citronellyl laurate flavour by combined effect of ultrasound and immobilized lipase as heterogeneous biocatalyst

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Abstract

This study aims to improve the performance of heterogeneous biocatalysts by using the combination of immobilized and ultrasonic lipases in the esterification reaction for the synthesis of citronellyl lauric flavors. Synthesis was conducted out through the reaction of citronellol with lauric acid by using immobilized lipase and ultrasonic. The results showed that immobilized lipase provided stability for up to 9 weeks and could be reused for 5 cycles of reactions. Immobilized lipase 473 U / gram was applied to the synthesis of citronellyl laurate with a reaction time of 75 minutes, 450C, with and without ultrasonic. The result of citronellol conversion with ultrasonic is 3.6 x higher than conventional method. It shows that the immobilization method provided stability to the biocatalyst, but because it had a limited internal mass transfer so the rate of reaction of ester formation reduced. On the other hand, ultrasonic contributed to increase the dispersion and collision of substrate molecules, reducing reaction time, and intensifying catalytic processes. Thus, the combination of immobilized enzyme and ultrasonic methods can be applied to biochemical processes widely.

Keywords: citronellyl laurate, immobilized lipase, reuse, stability, reaction time, ultrasonic

Topic: Chemical Engineering
Biodegradable foam is a natural packaging as an alternative to styrofoam. Sago starch is used to produce biodegradable foam because of its high production quantity, low cost, and high biodegradability. Starch based biodegradable presented remain sensitive to water, further improvement in their water resistance is necessary. The problem can be solved by coating the foam with a hydrophobic material which prevents contact of water with the starch. In this work, Beeswax was used as a coating due to its hydrophobicity. The variables used in this study were beeswax coating concentration at 0%, 2%, 4%, 6%, 8%, 10% and beeswax coating time at 30, 60, 90, 120, 150 seconds. Baking process was used to develop the sago starch-based foam at 80 oC for 1 hour 20 minutes. Results showed that Beeswax coating increased the water resistant of the foam, but not significant effect on tensile strength. Biodegradable foam with 4 % beeswax concentration at 150 seconds coating time exhibited an excellent properties with a value water absorption, biodegradability and tensile strength at 1.92%, 73% in 28 days, and 0.09 MPa respectively.

Keywords: Biodegradable foam, Beeswax, coating, sago starch, water absorption

Topic: Chemical Engineering
THE EFFECT OF FERMENTATION TIME AND ADDITION OF CRUDE CELLULASE TO CONCENTRATION OF BIOETHANOL IN BAGASSE FERMENTATION

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Abstract

Bagasse is a solid waste from the sugar cane milling process in the sugar industry. Bagasse contains lignin, cellulose and hemicellulose, which through the fermentation process by Phanerochaete chrysosporium can produce crude cellulase, furthermore crude cellulase and other enzymes can be used in bagasse fermentation to produce bioethanol. The purpose of this study was to determine the effect of fermentation time and the addition of crude cellulase to the yield and concentration of bioethanol produced in bagasse fermentation. The research was carried out with the stages of the process: Preparation of raw materials (bagasse), Preparation of crude cellulase, Fermentation process, Product analysis (Bioethanol). The variables used in the experiment were fermentation time (96, 120, and 144 hours) and the addition of crude cellulase (10%, 20%, 30%, 40%, and 50% (v/v)). Analysis of crude cellulase activity using the DNS method, while the analysis of bioethanol concentration using the chromatography method. The results showed that the maximum yield was 16.24% and the highest bioethanol concentration was 11.04% and obtained at the time of fermentation of 144 hours and the addition of crude cellulase by 50% (v/v).

Keywords: Bagasse, Bioethanol, Cellulase, Fermentation, Lignocellulose, Phanerochaete chrysosporium

Topic: Chemical Engineering
Gas transportation is usually done using pipes. As was done in one of the Gas Companies. In gas transportation consists of suppliers (Station A) and receivers (station C). From the supplier to the receiver goes through a very far pipe. Gas that passes through the pipeline has a composition consisting mostly of methane, but it is undeniable that there is still heavy carbon and impurities in the gas. Heavy carbon and various impurities contained in the gas will disrupt gas transportation in the pipeline because it can cause condensate. Condensate consists of heavy carbon and impurities which changes phase into liquid. The occurrence of liquid is caused by external and also internal influences, especially on the temperature and pressure that is treated to the gas. Condensate in the pipe will cause obstruction or decrease the volume in the pipe and otherwise it will cause internal corrosion. In the Gas Company there is an offshore pipeline that has the deepest depth of 70 meters. This elevation allows condensate inundation to occur in the offshore pipeline. The purpose of this study was to determine the effect of operating conditions on the occurrence of the existing condensate phase in the offshore pipeline between Station B and Station C, which is 105 km away. The method used is the collection of gas composition data through gas chromatography analysis at station A, piping specifications, operating conditions at station B, and hysys aspen simulation.

Keywords: Condensate, Offshore Pipeline, Natural Gas

Topic: Chemical Engineering
[ABS-69]
STUDY LITERATURE of MAKING DRY CELLULASE ENZYMES FROM
Trichoderma reesei, Aspergillus niger and Bacillus subtilis

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Abstract

Cellulase is an enzyme that can degrade cellulose. This enzyme can catalyze cellulose into its glucose monomers. Making Dry Enzymes Cellulase is an option for the scale needs of factories in maintaining these qualities. This study aims to determine the activation of enzymes from three different microorganisms, namely Aspergillus niger, Bacillus subtilis, and Trichoderma reesei before and after the freeze-drying process. Zhaos study (2018) obtained the results of cellulase enzyme activity from Trichoderma reesei of 3.4 IU / mL with advantages in the media used. In the study of Aspergillus niger, Rosyida (2018), using an optimal temperature of 37o C and cellulase enzyme activity was obtained at 0.229 IU / mL. In Yandris (2012) study, cellulase enzyme activity from Bacillus subtilis was 0.907 IU / mL due to the administration of higher CMC levels compared to Sholihatis (2015) study. Based on research conducted by Melpin (2015), the addition of sucrose can increase the stability of total protein and lysozyme activity. The optimum glucose concentration of 60 mM. The presence of optimal sucrose concentration can maintain protein stability in cellulase enzyme activity following this study.

Keywords: Dry enzyme cellulase, Enzyme activity, Aspergillus niger, Trichoderma reesei, Bacillus subtilis

Topic: Chemical Engineering
Green diesel is an emerging option to solve the increasing consumption of diesel (fossil based fuel). It involves converting readily available vegetable oils and animal fats to alkane hydrocarbons that can be considered to be drop-in replacements for petroleum-based fuel component. This review journal investigate the results of diesel-like hydrocarbon fuel by catalytic thermal decarboxylation of Mg-Zn basic soap by saponification using NaOH from kapok oil. Specifically, it outlines a comparative assessment of the operating parameters of the temperature and mole ratio of Mg-Zn catalyst to select the appropriate path based on the desired conversion, yield and selectivity. The results show that kapok oil can produce diesel equivalent biohydrocarbon products by reviewing the main composition of the kapok oil which containing linoleic acid. An increase in the temperature of the decarboxylation reaction can increase the conversion to green diesel products, n-heptadecane. The result from experiment showed that the highest conversion of decarboxylation of kapok oil is 65% at 475°C. However, high temperatures can cause decreased selectivity due to the production of undesirable products like in the decarboxylation experiment of soybean oil which showed that the yield at 400°C is decreased to 25%. The mole ratio of Mg-Zn used in the decarboxylation reaction does not have a significant effect on the yield of green diesel products.

**Keywords:** Green diesel, Kapok oil, Decarboxylation, Saponification

**Topic:** Chemical Engineering
Syngas production from catalytic cracking of glycerol based on modified zeolite catalyst

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Abstract

Increased biodiesel production has an effect on increasing the availability of glycerol, where glycerol is a by-product of biodiesel production. So far, the use of glycerol is less than optimal where only a small portion is used as an additive in the food industry. So it needs efforts to utilize glycerol becoming a more valuable product. Based on its characteristics, glycerol is potentially converted with catalytic cracking process produced gas that are enriched in H2, CO which is known as synthesis gas (Syngas). Syngas is the main ingredient in the petrochemical industry, besides syngas can also be used as an alternative fuel due to its heating value. The main objective of this research is to study the conversion of glycerol to syngas with the catalytic cracking process, the effect of the ratio of catalyst to glycerol and reaction temperature on product yield. This research was carried out in a semi batch reactor filled with Ni / ZSM 5 catalyst which was flowed by Nitrogen gas at 350, 400, 450 and 500 °C reaction temperature variations with catalyst ratios of 0, 3, 4 and 5%. Gas products were analyzed using Gas Chromatography (GC) to determine the composition of the constituent gases which are CO, CO2, H2 and the catalyst characterization was carried out by the BET, XRD and AAS methods. The highest yield was obtained at a process temperature of 500 °C with a catalyst ratio of 3% which produced 49.45% of Syngas with the Hydrogen selectivity of 23.9%

Keywords: glycerol, syngas, Ni/ZSM-5, catalytic cracking, semi-batch reactor

Topic: Chemical Engineering
Literature Study of Immobilization of Xylanase Enzymes from Aspergillus niger, Trichoderma viride, and Bacillus subtilis Using the Sol-Gel Method

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Abstract

Xylanase has many benefits, but many obstacles to produce it. Common microorganisms produce fungi and bacteria such as Aspergillus niger, Trichoderma viride, and Bacillus subtilis. Various methods can do enzyme immobilization, one of it is entrapment in the form of sol-gel. The purpose of this study is to find out the value of xylanase enzyme activity. The xylanase enzyme produced by Aspergillus niger, Trichoderma viride, and Bacillus subtilis. Besides that, to knowing immobilization xylanase enzyme with the sol-gel method. This study is doing by lab work and study literature. Lab work is for knowing fiber amount by van Soest method with amount of %hemyseulosa 4,8% 7,33%, 9,1% for media 0 months, two months, and four-month. The study literature doing with compare xylanase amount by Aspergillus niger, Trichoderma viride, and Bacillus subtilis the highest enzyme activity by Trichoderma viride with optimum condition temperature 25oC, pH five and incubation time 36 hours with enzyme activity 26,67 U/mL. The study literature obtained xylanase activity of 28.88 U / mL has obtained from cultures immobilized in sol-gel with a matrix composition of TEOS, 5% xylan, and 5% calcium alginate during fermentation for 168 hours. This value is higher than the fermentation process without immobilization carried out for 72 hours with an activity value of 22.04 U / mL

Keywords: Aspergillus niger, Bacillus subtilis, sol-gel, Trichoderma viride, Xylanase

Keywords: Xylanase, Aspergillus niger, Trichoderma viride, Bacillus subtilis, sol-gel

Topic: Chemical Engineering
Hydrothermal Synthesis and Characterization of Nano Particles g-Al2O3

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Abstract

Keywords: Hydrothermal treatment, Shifted peaks, Nano catalysts, & g-alumina.

Topic: Chemical Engineering
Abstract

Styrofoam is widely used for food packaging because it has good weight, stability, and stiffness but it cannot be decomposed naturally by microorganisms. D-Limonene, one of the monoterpene derivatives, is an environmentally friendly styrofoam solvent. This monoterpeno is the main component of essential oil that can be extracted from orange peel. The aim of this study is to destruct styrofoam waste (food packaging, electronics packaging, foam board and cup noodles) using d-limonene from orange (Citrus Maxima) peel extraction by water distillation process. The orange peel after size reduction is extracted by water distillation process at 94 C for 7 hours to produce essential oils. It was used to destruct styrofoam waste at the different volume ratio (1:0:3; 1:1:2; 1:2:1) of the essential oil mixture (essential oil: ethanol: water). The result of this study shows that the fastest destruction time of styrofoam waste occurs at electronic packaging with essential oil mixture by volume ratio of 1:1:2.

Keywords: destruction, styrofoam, d-limonene, orange peel

Topic: Chemical Engineering
MODELING AND SIMULATION OF CO2 GAS DESORPTION PROCESS IN PROMOTED MDEA SOLUTION USING PACKED COLUMN

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Abstract

Carbon dioxide (CO2) gas at atmospheric pressure will tend to freeze, because of low temperature (~78°C), this results in frequent blockages in the piping section.

In the process of synthesis of ammonia in the presence of a catalyst, CO2 gas will be toxic because it can cover the active-side of the catalyst. The process of CO2 gas absorption that is often used is reactive absorption using promoted solvent. The most commonly used solvent is a tertiary amine alkanol solution, one of which is a solution of Methyldiethanolamin (MDEA) using a piperazine catalyst. The output solution from the absorption of CO2 gas is processed by desorption to regenerate the solvent. CO2 gas desorption process is needed to save the use of solvents and catalysts.

The purpose of this research is to do modeling and simulation on the process of desorption of CO2 gas from promoted MDEA solution using a packed column. Modeling assisted software media with a rate-based model approach using numerical equations with the completion of Ordinary Differential Equation (ODE) - 45.

The data obtained was simulated and validated by comparing experimental data. The research parameters are the temperature of the input solution desorber, type and concentration of catalyst. Increasing the temperature of the solution and the concentration of the catalyst will increase the percent removal of CO2. This is caused by the effect of the temperature of the solution on the value of the reaction rate constant, and the type of catalyst influences the catalyst reactivity level of CO2 gas. The results of simulation data validation with experimental data show the average deviation of 22.05%, 14.24% and 7.85%.

Keywords: modeling, desorption, CO2 gas, simulation, MDEA

Topic: Chemical Engineering
[ABS-36]
ANALYSIS THE NEEDS OF THE ROAD FACILITIES IN JALAN SOEKARNO HATTA MALANG CITY

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Abstract
Pedestrians are an element of urban transportation. Pedestrian movement which includes down the road, crossing both on the road and at the intersection. The existence of adequate pedestrian facilities is needed, including crossing facilities. The number of pedestrians on the Soekarno Hatta road is very high while gaps vehicle are short so that it is difficult for pedestrians to cross. The purpose of this study was to determine the need for crossing facilities on the Soekarno Hatta street in Malang. Primary data collection was carried out on March 9-11, 2020. Analysis results obtained by the number of pedestrians crossing 41 people / hour, PV2 = 59.207. 108, so that appropriate pedestrian facilities are crossing not a level.

Keywords: Pedestrians, gap, facilities, urban roads

Topic: Civil Engineering
[ABS-63]

FAILURE BEHAVIOR OF BIAXIALLY LOADED BETWEEN REINFORCED CONCRETE COLUMN AND ENCASED COMPOSITE C CHANNEL STEEL COLUMNS

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Abstract

Due to the separation of conventional structural steel design and construction of reinforced concrete, composite-steel concrete columns encased in concrete have not received the same criteria of attention as steel columns or reinforced concrete columns. This is proven by the incomplete and sometimes contradictory provisions for concrete composite columns in the current code and design standards. The use of composite construction is becoming more widespread as a result of combining the advantages of steel and concrete materials. Composite columns can be steel encased in concrete or steel sections filled with concrete. This research investigates the behavior of steel composite columns encased in eccentric load and pin supports. This research consisted of structural design, comparative studies, experimental tests, and numerical analysis on C channel-profile composite steel columns. It focuses on determining and verifying load carrying capacity with respect to design principles provided by various code specifications for the design of steel and concrete composite columns. Structural design includes proposed interaction equations for axial relationships and moments and proposed interactions between flexural, axial and moment rigidity. The experimental program consisted of columns tested with uniaxial compression loads and columns tested with uniaxial compression loads combined with bending moments under three parameters, slenderness ratio, load eccentricity effect in two directions and bending axes. Fifteen specimens have been tested experimentally until collapse. The failure characteristics of the column are investigated by considering the ultimate load capacity, failure mode and location of the failure zone, load mid-displacement relationship, and the effect of load eccentricity. The finite element model was developed. It takes into account material and geometric non-linearity.

The following conclusions can be drawn based on the study results: (a) The proposed equation enables easy hand calculation instead of interpolation used Axial load-Moment interaction diagram. (b) The mean value and coefficient of variation of test strength to finite element strength ratio (Ptest/PFEM) is 1.052 and 0.136, respectively. This means that Finite Element Method give a good agreement with test results.
Keywords: encased composite, c channel steel profile, concrete columns, failure, axial-moment interaction diagram

Topic: Civil Engineering

[ABS-66]
THE EFFECT OF TRANSDUCER DISTANCE ON THE CONCRETE CRACK DEPTH MEASUREMENT USING PUNDIT

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Abstract

The depth and width of cracks in concrete structural elements can be measured using ultrasonic waves. One tool that can be used is PUNDIT. The study was conducted by testing the depth of cracks made on concrete beam specimens measuring length about 60 cm width 15 cm and height 15 cm. The purpose of this study is to determine the distance of the transducer at the measurement of crack depth with an accuracy level close to the actual crack depth. Based on the research, it is known that the distance of the transducer about 2/3 the thickness of the test specimen gives results that are relatively close to the actual crack depth.

Keywords: crack depth, tranducer, PUNDIT

Topic: Civil Engineering
Building Information Modelling for Clean Water and Wastewater System in the Medium Rise School Building

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Politeknik Negeri Malang

Abstract

Human activities in a building is closely related to the use of clean water. At this time, the concept of a water installation is demanded to be as effective as possible by minimizing the possibility of water waste caused by leakage problems, broken pipes, blocked pipes and others. However, some concepts still use traditional techniques by depicting 2D models and manual calculations. The method used is a hydraulic analysis with SNI 03-7065-2005 as standard and using Autodesk Revit as modelling and calculating tools. Necessary data are technical specifications, design drawings, and designed plumbing facilities. The system comprises of Domestic Cold Water, Sanitary Grey Water, Sanitary Black Water, and Vent.

Building Information Modelling using Autodesk Revit version 2019 is applied to evaluate the effectiveness of the existing design and design its modification as well as to provide the working drawing. The analysis includes analysis of piping system completeness, system crash, flow, velocity, pressure loss. Based on the report, it can be concluded the flow velocity of Domestic Cold Water is 0.7-6.4 m/s which is out the range of standard value. For the pressure, a manual calculation is performed to validate the report results using the Darcy Weisbach equation have the same value as the report by Autodesk Revit. The cost of the design conditions has a difference of Rp 8.364.000 or eight million three hundred sixty four thousand rupiah or 0.4% more efficient.

Keywords: plumbing installation; pipe hydraulic; pipe control; cost analysis

Topic: Civil Engineering
The Performance of Beam-Column Connection using Dry Joint Precast Concrete

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Abstract

The moment resisting frames with plastic hinges that occur at the column beam connections usually use to analysis the performance of precast concrete structures. Experimental investigations evaluate the performance of beam column connection with two models constructed using two and four bolds with diameter 16 mm and 12 mm, respectively. The structural components such as beam and column units are separately made and fixed with each other using diverse techniques. For comparison purposes, monolithic joints, and joints with steel bold precast concretes were also tested. The performance data of various connections under static and cyclic loading have been gathered and critically analyzed. Various parameters such as connections mechanism, different concrete grade used, and resistance to static and cyclic loading, connection procedure and implementation techniques are discussed. The results of experimental tests concerning the cyclic behaviour of a particular beam-column dry connection for precast concrete elements, show that in particular the performance monolithic joint precast concrete better compare to beam column dry joint precast concrete during severe cyclic loading. The experimental results show a good performance of the joint, in term of resistance, ductility and energy dissipation, with little damage observed in the connected members. A shear failure mechanism of sequential failure for dry joint precast concrete is presented to explain the differences between the test results and the formula used. Based on the new explanation and test results, a reduced coefficient of 0.75 is recommended for the strength of dry joint precast concrete.

Keywords: Precast Concrete, Beam-Column Dry Joints, Monolithic joint

Topic: Civil Engineering
Performance Evaluation of Soil Water Content Observation from Satellite Images in Sediment Disaster-Prone Area

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Abstract

Keywords: soil water content, remote sensing, sediment disaster

Topic: Civil Engineering
Inundation Analysis of Buntung River and the Flood Structural Measures in Sidoarjo Regency

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Politeknik Negeri Malang

Abstract

Sidoarjo Regency as one of the downstream areas of the Brantas River Basin is prone to flooding. This study aims to simulate the flood discharge and inundation in Buntung River, a river passes through Sidoarjo City area with several time return periods and to discuss its physical flood mitigation. Data needed in this study are Rainfall Data for 3 Rain Stations, topography map, cross section of river stream, and land use map. Based on these data, a flood flow analysis plan is then performed using the Nakayasu synthetic unit hydrographs method. The inundation is simulated using Hec-RAS with 10, 25, and 50 years return periods.

Based on the calculation, Buntung River flood discharge with return period of 10, 25, and 50 years return periods is 151,342, 196,923, and 233,981 m³/s respectively. The inundation extend of 25 years return period is reaching 0.53 m height above the bank along Sta. P0 to P1. The study reveals that the existing cross section cannot accommodate the design flood for at least 25 years return period. Therefore, normalization is essential for river improvement. The channel is design with river cross-sectional shape of double trapezoidal. The size of the earth dike is 0.60 m above the flood water level with 3.0 m width and 1:2 channel slope. The designed river channel improvent increase the channel dept from -3.56 m to -4.07 m in Sta. P1. The normalized channel could accommodate the design flood and would be beneficial for increasing the urban area safety from flood disaster.

Keywords: Flood Control; Normalization; Earth Dike; Buntung River; Nakayasu Hydrograph; Hec-Ras

Topic: Civil Engineering
STUDY OF MOTORCYCLE PARKING IN CAMPUS STATE POLYTECHNIC OF MALANG

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Abstract

Parking problems also occur on campus. Polinema, the number of students and employees increasingly requires infrastructure for parking needs while the available land is very limited to overcome these problems, a study is needed so that the potential of existing resources can optimize its usefulness. Field Research Method is a direct observation on the location to see the physical condition of the movement of vehicles entering and leaving the location during rush hour, the number of vehicles in the parking lot and the parking lot used. This research was conducted by calculating the number of vehicles entering and leaving. As for the area of parking research, the research is carried out by means of a digital map measurement research method by measuring based on the measurement results of the digital map.

The pattern of movement of vehicles both in and out gives a more dominant picture of activities in Polinema in the morning. The number of motorcycles that entered was 5716 vehicles while 1373 vehicles came out with an accumulation of 4546 parking vehicles. Parking area for Motorbikes 7,480.44 m² with parking area of 5,217.67 m² and circulation area of 2,262.77 m² or 34% of the Motorcycle Parking area.

The total number of parking lots is 11,140 m², when calculated with the area of Malang State Polytechnic Campus 13.8 Ha (138,000 m²), 8.07% is used for parking lots.

Keywords: Field Research Method, Digital Map Measurement Research Method, Parking Area

Topic: Civil Engineering
Optimization of Heavy Equipment for Earthwork in the Construction of Mainroad Section X of Pandaan-Malang Toll Road

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POLINEMA

Abstract

The construction of Mainroad Section X of Pandaan-Malang Toll Road requires of heavy equipment for excavation and embankment works. The type and number of the heavy equipment can be varied depending upon the construction volume, equipment capacity, and the budget. Therefore, the combination of heavy equipment must be chosen carefully to minimize the cost. This study aims to determine the optimum number of heavy equipment combinations with constraints of work volume, schedule, and resources availability to minimize the construction cost. The data needed is site lay-out plan, cross section of the road, project time schedule, specifications of the heavy equipment, and the resources unit price. The method for optimization is Linear Programming using Simplex Method. The results shows that the optimum combination of heavy equipment for excavation work are 14 units of bulldozer type Zoomlion ZD160-3, 5 unit excavator type Komatsu PC200-8MO, and 19 units dump trucks type Mitsubishi Fuso-FN627 at Rp14,839,362,044.00. As for the embankment work, the optimum equipment are 5 units excavators type Komatsu PC200-8MO, 19 units of dump truck type Mitsubishi Fuso-FN627, 19 units of motor grader type Caterpillar 120K, 18 units of sheep foot roller type Ammann ASC-200, and 23 units of water tank truck type Mitsubishi-125HD at Rp22,979,058,760.00.

Keywords: optimization, linear programming, heavy equipment, excavation, embankment

Topic: Civil Engineering
THE DEVELOPMENT OF AN IMPROVED INTERLOCKING MODELS OF LIGHTWEIGHT BRICKS AND SHEAR FAILURE ASSESSMENT OF ITS WALL STRUCTURES

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Abstract

Wall is a brittle filling structures and is quiet vulnerable to collapse compared among all building components when a strong earthquake occurs. An interlocking system approach is such a simple method that is proposed to make sure the wall behave keep strong and stiff during during seismic load. This research was performed to improve the shear capability and modeling of lightweight brick as well, which is interlocked each other. The data from the specific gravity testing results and its compressive strength then inputted as one of the modeling parameters. An experiment was carried out utilizing the Taguchi method to find out the optimum mixture used in shear testing in medium scale of walls. The compressive strength and shear strength testing methods follow the Indonesian code of SNI 03-1974-1990 and ASTM E2126-2011. The cube specimens of 15x15x15cm were used for compressive experiments, while a set of wall structures of 100x100 cm that was surrounded by reinforced concrete practical frame of columns and beams of 13x13 cm was used as shear test specimens. From shear testing results that using cyclic loads, it was found that the system can resist a maximum load of 45 kN by a lateral deflection of 45 mm. The results also obtained elastic stiffness of 2.55 kN / mm, the yielding behaviour occurs at the load, lateral deflection, ductility factor Δf/Δy and shear strength of 38.25 kN, 14,961 mm, 2.61 and 35,714 kN / mm respectively, which means that each width of 1 mm wall can be resist a shear load of 35,714 kN. It can be simply concluded that in cyclic shear loads, the more the wall is getting damaged or cracked, the structural stiffness will decreased as shown in a hysteresis behaviour.

Keywords: lightweight materials, an improved interlocking brick model, compressive strength, shear strength, cyclic loads

Topic: Civil Engineering
Analysis of Volatility and Value at Risk of Franklin Global Sukuk Luxembourg Using GARCH Model and KF-GARCH

Latifatul Mannunah, Endah R.M. Putri, Erna Apriliani, Nuri Wahyuningsih
Institute Technology Sepuluh November, Surabaya

Abstract

Sukuk is a sharia-based capital market instrument. Problems arise when the global financial crisis from 2007 to 2008 increases the uncertainty of the economic system throughout the world that has touched the sukuk market which causes high volatility in sukuk returns. Volatility is defined as a measure of uncertainty in the return of asset prices when investing. This study aims to analyze the volatility of the Franklin Global Luxembourg sukuk using the GARCH and Kalman Filter-GARCH (KF-GARCH) models. The GARCH model is a method that can be used to model financial time series data in a very high volatility. And the use of Kalman Filter which is an optimal estimation method will provide better estimation results. So that later the Kalman Filter method can be applied to the estimated parameters in the GARCH model to improve the results of the prediction of sukuk return volatility. In addition to the return sukuk volatility analysis, this study also aims to analyze the risk estimation of the Franklin Global Luxembourg sukuk. The method used to estimate risk is to use Value at Risk (VaR). VaR is the maximum amount of loss received by investors, so the calculation of Value at Risk (VaR) will provide input and help investors to minimize losses in investing.

The suitable GARCH model for the Franklin Global Luxembourg sukuk from the data return analysis conducted was GARCH (1.0), then the GARCH (1.0) is estimated with the Kalman Filter (KF-GARCH). The MAPE value predicted by the KF-GARCH model is smaller than the predicted GARCH model (1.0) which is estimated using MLE. This shows that the estimation method using the Kalman Filter results in a better (accurate) simulation. Calculation of risk estimation with Monte Carlo simulation on Franklin Global Luxembourg sukuk using the GARCH model yields a risk of Rp.485,693,6259 while using the KF-GARCH model is Rp.466,341,7142.

Keywords: Sukuk, Volatility, Value at Risk, GARCH, Kalman Filter

Topic: Computer Science and Engineering
Natural disasters are unpredictable events in both the location and the time of occurrence. Natural disasters can cause property loss and can even be claimed by life. To reduce the amount of losses, the handling of rapid evacuation should be conducted by the SAR team to help victims of natural disasters. But in fact, there are a lot of obstacles in the evacuation process. Starting from the difficulty of searching the victims body, the difficulty of the terrain reached until limited equipment needed. In this study designed the body detection system of natural disaster victims using image processing where the shooting of victims was carried out using drones aiming to help find victims in a difficult or prone location when reached directly by humans. Background of the problem, in this research proposed a development method for the detection of victims of natural disaster that aims to help the SAR team as well as natural disaster volunteers in the search for victims who are in a difficult to reach place. The method used by You Only Look Once (YOLO) uses the Python programming language associated with image processing. From the research has been obtained accuracy detection object disaster victims with good accuracy.

**Keywords:** Natural disasters, victim detection, object detection, image processing, You Only Look Once (YOLO).

**Topic:** Computer Science and Engineering
**Abstract**

This research aims to perform image segmentation analysis on facial skin. The skin part of the face taken is affected by Acne Vulgaris. The segmentation technique used is Otsu Threshold by taking a grayscale value separating it from the red, Green blue channel value. The research uses features such as depth, color and texture. The image segmentation results are presented in a grey level and then produce six classes of acne depth lesions. The class of acne depth lesions is a closed comedos, open comedos, papules, pustules, cysts and scars. The trial was conducted using datasets derived from two private clinics in Malang and Nganjuk. From the simulated test results shows Otsu Thresholding with shadows performance can capture good image segmentation so that the result segmentation can be achieved maximum and can conclude the value of different thresholds in Otsu-Threshold.

**Keywords:** Image Processing, Skin Lesions, Segmentation

**Topic:** Computer Science and Engineering
Title: Authenticity of money using the method KNN (K-Nearest Neighbor) and CNN (Convolutional Neural Network)

Authors: Dr. Eng. Cahya, ST, Mkom, Erfan Rohadi, ST, M.Eng, Phd

Institute: POLINEMA

Abstract:

Nowadays, the circulation of counterfeit money is significantly increased, encouraging to conduct research related to genuine real money detection or counterfeit money based on digital imagery. Technological sophistication one of the quality of printers whose ink is very good and can print money like the original makes the layman should be more wary of money ownership. In this study conducted the authenticity of money using the method KNN (K-Nearest Neighbor) and CNN (Convolutional Neural Network). The accuracy gained by the KNN method is 80%. While the detection accuracy used by CNN is 87%. The results obtained from these 2 methods can still be improved with advanced research namely with preproduction on the set and the image used. The data Set used has the same exposure level, image capture angle and image size,

Keywords: banknotes, KNN (K-Nearest Neighbor), CNN (Convolutional Neural Network)

Topic: Computer Science and Engineering
Abstract

The development of the Information and Computer Technology (ICT) sector, three-dimensional (3D) technology is also growing rapidly. Currently, the need to visualize 3D objects is widely used in animation and graphic applications, architecture, education, cultural recognition and Virtual Reality. 3D modeling of historic buildings has become a concern in recent years. 3D reconstruction is an attempt to document reconstruction or restoration if the building is destroyed. By using the 3D model reconstruction using Structure from Motion (SFM) and Multi View Stereo (MVS) algorithm based on Computer Vision, it is hoped that the results of this 3D modeling can be utilized as an effort to preserve 3D objects in the Penataran Temple cultural heritage area. This research was conducted by taking as many as 61 images of objects in the Blitar Penataran Temple area. The photos obtained were reconstructed into a 3D model using the Structure From Motion algorithm in the meshroom. This research a trial of the original image with a compressed image for reconstruction is used to compare the 3D reconstruction process from the two input data. From 61 images processed using the Structure Form Motion algorithm, 33 poses of camera pose and 3D points were improved, both original and compressed images. The number of iterations compresses 1.4% less than the original image and takes 43.53% faster than the original image.

Keywords: Structure from Motion, Multi View Stereo, 3D reconstruction, Computer Vision, Meshroom

Topic: Computer Science and Engineering
Abstract

Medical records are crucial in health services in Indonesia. This is due to the very dynamic mobility of the community so that when it is necessary to seek treatment at a health facility, the patient's history can be known by the health worker who is treating the patient. Therefore, the electronic medical record has become mandatory to be implemented. Another thing that requires attention is that the patient has the right to know the contents of the medical record, especially when obtaining health services at a different hospital or another health service. Medical Record is also a compilation of facts about a patient's health condition and illness which includes documented data about the present and past illness and treatment that will be carried out by health workers in writing. The contribution of this research is to make the implementation of encryption algorithms that will be used on Secure Electronic Medical Record (SEMR) systems using secure and fast encryption techniques.

Keywords: medical records, encryption

Topic: Computer Science and Engineering
Enhancing student interest in learning mathematics through the development of applied games

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Abstract

Learning mathematics in Indonesia today has not given the expected results, it is not better when compared to other countries. If a student is active and able to count quickly and carefully in mathematics, then the student will indirectly be easier to solve problems either in mathematics itself or applied in everyday life. The average educator has not used interesting media to improve childrens numeracy skills, there are often difficulties in students mathematics learning. Many research contributions are directed at taking advantage of the success of video games and using them to benefit from the education domain. The concept of learning in this research is carried out by utilizing the development of information and communication technology through interesting mathematical game applications through web-based learning. The game is developed using scratch by MIT so that the development process is less time consuming and easier. The game is in the form of quiz game that makes students utilize their mathematical skills to win the quiz and get the rewards. In that way, the competitiveness of the students also increases at the same time with their numeric ability. This learning has an appropriate value to be a breakthrough to balance current technological developments and improve students numerical ability because of the exercises in the form of interesting computer games.

Keywords: games, mathematic, education

Topic: Education, Vocational Engineering and Technology
Abstract

Competencies that must be learned by vocational graduates should be following the purpose of vocational education, which is to prepare a skilled workforce in specific areas of expertise according to the needs in the industry. 21st Century Learning is characterized by a learning process that optimizes on brain function more. In the 21st century, business and industrial world tend to require workforce that has skills in digital literacy, technological literacy, and human literacy. So that vocational education must be able to innovate and create in answering the challenges and opportunities of implications in the 21st century by revitalizing the vocational education system which includes: Learning System, Education Unit, learners, educators, and education personnel. One of the suitable learning systems used in the 21st century is a life-based learning model. Life-Based learning in vocational schools can be done through the study of industrial working practice, learning through industrial class, and learning at teaching factory activities. These three learning approaches aim to bring the learning to being with the direct practice of the field by working on the actual work at the workplace. With life-based learning, students are familiarized to having a disciplined attitude, responsibility, teamwork, and have a working culture as provision later after completing education at a vocational school.

Keywords: Vocational education, life-Based Learning, 21st century learning

Topic: Education, Vocational Engineering and Technology
Software testing on E-Learning Madrasah using Blackbox Testing

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Abstract

The development of the 4.0 Industrial Revolution eLearning is experiencing rapid growth. The BlackBox approach has been introduced as an attempt to test flexible software engineering and efficiency. This research is a case study research, with the case of Software Testing at Madrasah Elearning. Testing is done by checking software functionality. It can be concluded that a software test on E-Learning Madrasah resulted in a recommendation from E-Learning Madrasah on software testing. Functional testing can be done by system users and can have a level of efficiency and effectiveness in software testing.

Keywords: BlackBox; Development; Elearning; Functional; Software

Topic: Education, Vocational Engineering and Technology
Abstract

Educational media of private body parts for Down Syndrome children is an educational media in the form of audio-video animation containing information about private body parts. This application developed as part of the supportive learning for Down Syndrome children who have entered puberty so that they can avoid sexual abuse. An evaluation is carried out to determine whether the educational media created are according to the needs. The evaluation process is carried out by interviewing the respondent after conducting a trial on the educational media. The selected respondents were teachers, parents and students. Testing is done at SLB Tk. National Bag. C Malang. The interview questions based on several criteria for assessing multimedia applications, including 1) Ease of use of navigation, 2) Cognition content, 3) Presentation of information, 4) Media integration, 5) Artistic and aesthetics, 6) Learning function.

The results of evaluations show that the educational media developed have met the criteria of multimedia assessment. Application of private body parts can provide understanding to Down Syndrome children about personal body changes and social contact.

Keywords: Learning Media, Educational Media, Down Syndrome, Private Body Parts

Topic: Education, Vocational Engineering and Technology
Solar Panels Output Optimization using PCM and Heatsink Applied in Open-pit Mining

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Abstract

Solar energy can be utilize to power a system located far from the electricity sources such as a mobile tower applied in open-pit mining in PT Bukit Asam Tbk. However, the tropical weather in an open-pit mining can increase the surface temperature of a PV panel, lead to overheating and the reduction of the efficiency and the reduced electricity power. This condition requires a cooling system to reduce the temperature. This paper presents the application of PCM and heatsink as the cooling system for a PV panels. The PCM installed are in two sizes aluminum hollows, a 0.0025 m³ and 0.00625 m³. The experiment was conducted in 2 batches, 14-29 February 2020 for the installed 0.0025 m³ aluminum hollow, and 1-14 March 2020 for 0.00625 m³. The application of a 0.00625 m³ can reduce the PV panels surface temperature up to 3-5oC. The generated current using PCM 0.00625 m³ is 0.034 A for Isc and 0.014 A Iload higher than without cooling system. The application of a aluminum hallow with the size of 0.00625 m³ gives 9-20% efficiency, and the efficiency gives 8-15%. The experimental results show that the use of a hollow aluminum with a size of 0.00625 m³ can reduce the surface temperature of the PV panel and increase the power and efficiency of the PV panels.

Keywords: Phase change materials (PCM), heatsink, mobile tower, photovoltaic, renewable energy

Topic: Electrical Power Systems Engineering
Design and Analysis of a Portable Web-Based Monitoring System for Electrical Parameters Measurement

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Abstract

Currently, to monitor the parameters of an electrical system, including current, voltage, power, and frequency can be done remotely by using either computers, laptops, or android mobile phones, as long as those gadgets are connected to the internet. Generally, the equipment of this monitoring system is installed in a module at a fixed position.

As a measurement tool, it is required that the measurement values are valid. For this reason, to ensure that the measurements shown by the remote monitoring system that has been installed are valid, another monitoring system is needed as a comparison.

Based on the problems mentioned above, this research aims to design and analyze a portable web-based monitoring system for electrical parameters measurement. This equipment has a web-based monitoring system, which can remotely monitor the measurement of electrical parameters through the web. In addition, the equipment is light and portable, which can be easily moved from one place to another. Due to its advantages, this equipment can be used as a comparative tool to get valid values for electrical parameters measurement.

Keywords: Portable; Web-Based Monitoring System; Electrical Parameters; Measurement

Topic: Electrical Power Systems Engineering
Application of the Cascade System to Increase the Capacity of a Pico-hydro Power Generation

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Abstract

The Pico-hydro power generation is a power plant with a scale below 5 kW. This type of power generation is suitable for areas with streams or rivers with low water levels. One area that has natural conditions like this is the Javan Langur Center (JLC), a rehabilitation facility for one of the endangered primate species, the langur.

To support the operation of JLC, a pico-hydro power plant has been built, which has a capacity of 300 watts. With a water turbine efficiency of 60%, the total output power from the pico-hydro generator is 180 watts. While the electrical energy requirements in JLC are more than 300 watts.

To meet the shortage of electricity supply, it is necessary to increase the power generated by the existing pico-hydro power plant, i.e. by applying a cascade system. This system utilizes water from the existing pico-hydro power plant drainage channel as the intake flow for the new pico-hydro power plant. This system also utilizes differences in elevation or water level to make the terraces. With the application of the cascade pico-hydro system, the electrical power requirements at JLC can be met.

Keywords: Pico-hydro; Power Generation; Low Water Levels; Cascade System

Topic: Electrical Power Systems Engineering
Small Scale Hybrid Power Generation for Remote Area Electrification

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Abstract

Javan Langur Center (JLC) is a facility dedicated to the treatment of langur, an endangered primate species. To support the maintenance and rehabilitation activities, the need for electrical energy is a vital. In this facility, electrical energy is needed for lighting, incubators, electronic loads and communication facilities with a total power of around 450 watts.

There is no electricity grid included in this area and the supply of electrical energy is still very dependent on the gen-set owned by the residents which is located approximately 2 km from JLC, making it less efficient.

In terms of natural energy resources, JLC has the availability of water sources that originate from small streams making it possible to develop pico-hydro technology. The potential electric power that can be generated from the pico-hydro power generation is approximately 600 watts. With a turbine efficiency of around 60%, the total potential power that can be produced is around 360 watts. So as to meet the electrical power needs at JLC, another electrical energy source is needed. One alternative is to install solar cells or photo voltaic (PV) with a capacity of 400 Wp.

The output power of these two energy sources can be combined and regulated by applying Hybrid Power Generation technology. With the application of this technology, the need for electrical energy in the JLC area can be met.

Keywords: Hybrid Power Generation, Pico-hydro, Photo Voltaic, Electrification

Topic: Electrical Power Systems Engineering
A Development of an Arduino Pure Sine Wave Inverter for a Small Scale Off-grid Solar PV System

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Abstract

This paper presents the implementation of Arduino Nano microcontroller for a single-phase pure sine wave Inverter. The designed inverter is used to convert DC voltage into AC voltage for a 200 W off-grid solar PV system. This Arduino based pure sine wave inverter uses sinusoidal pulse width modulation technique and a simple circuit, consisting of only 2 MOSFET switches and 1 MOSFET driver. The output of the H-bridge inverter is applied to a step up transformer that has a dual coil input and a single coil output and hence we can create positive and negative sides of the wave. To mitigate a voltage noise, a capacitor is parallel installed at the secondary side of the transformer. Several simulations are performed to verify the effectiveness of the designed inverter using Proteus software and continued with a hardware implementation. Based on some experiments we have done, the designed inverter produce a pure sine wave from pulsating output wave. For normal load condition, the inverter efficiency is around 80 until 90 % depending on the load type.

Keywords: Pure Sine Wave Inverter; Microcontroller; Solar PV System

Topic: Electrical Power Systems Engineering
CONTROL OF ROTATION SPEED ON WIND TURBINES USING ANGLE CHANGE OR EFFECTIVE CROSS-SECTIONAL AREA OF BLADES ON WIND TURBINES

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Abstract

Wind speed affects the rotating speed of a wind turbines. At low wind speeds the turbine rotational speed is too low, and vice versa at high wind speeds the turbine rotation is too high. To overcome this wind change in order to obtain optimal rotational speed, the turbine needs to be equipped with speed control. To control the turbine rotational speed can be done by changing the variable angle or the cross-sectional area of the blades of the wind turbines. Changes in the angle of the blades will automatically be followed by changes in the effective cross-sectional area of the blades. To get a more stable rotating speed, it is necessary to change inversely between the wind speed variable and the cross-sectional area. An experiment was carried out to obtain the effective cross-sectional area of the blades, by manually testing to obtain the angle of the blades at optimal power. In order to obtain the curve characteristic changes in angle or effective cross-sectional area when changing wind speed. Based on the results of this test, a prototype wind turbine was designed using 3 blades with a maximum support area of 2000 cm² each. Changes in the angle are done by adding a centrifugal pendulum to adjust the position of the center of gravity of the blades. Controlling rotational speed using centrifugal pendulum is quite effective and efficient as a regulator of wind turbine rotational speed. Although the rotation speed is not really constant, it shows better stability.

Keywords: Control, rotational speed, wind turbine, angle, cross-sectional area, blades

Topic: Electrical Power Systems Engineering
Design and Optimization of Digitalization Device of Temperature Control System Using PID Ziegler-Nichols Control In Chemical Engineering Laboratory


Politeknik Negeri Malang

Abstract

Temperature Control Module is a device that functions to control the temperature of a liquid as desired. The module uses the Heat Exchanger as a place to combine temperature, where the process that occurs is that two liquid substances that have different temperatures will meet in the device so that the temperature of the liquid in the Heat Exchanger can affect others.

From the prototype of the temperature control practicum module in the chemical laboratory, it can be seen that when testing the open loop with hot water input temperatures above 90 Celsius and cold water input temperatures 28 Celsius, an output value of 69 Celsius is obtained. This value is stable but slowly decreases. By giving feedback and the controller in the form of a sensor, the value according to the set value is obtained that is close to 60 Celsius, but the output temperature cannot be stable because the output graph is still up and down with unstable conditions. Based on experimental calculations and PID calculations using the Ziegler Nichols method, values of Kp=30, Ti=77.95, and Td=19.489 were obtained.

By applying the results of the calculation of the PID algorithm Ziegler Nichols method, the temperature control module can improve the output temperature to 58 Celsius. This is because by adding a stronger PID, the system becomes more stable.

Keywords: module control temperature, PID, water heater,

Topic: Electrical Power Systems Engineering
Modification of the induction motor into a permanent magnet synchronous generator is to put a permanent magnet on the squirrel cages stator to generate the magnetic pole as a replacement for the electromagnet pole produced at a separately excitation of the conventional synchronous generator called the Permanent Magnet Synchronous Generator (PMSG). The purpose of this research is to design PMSG by modification of induction motors into permanent magnet synchronous generator with 24 slots 16 pole by using radial flux and utilizing stator. This research is a software-based FEM (Finite Element Method) for design and the magnetic Material used for permanent magnet synchronous generators is Neodymium Iron Boron (NdFeB).

The PMSG modelling is done to have a specification of 24 slots 16 poles, a slot with a diameter of 0.5 mm copper wire and the each winding of 60 coil, pole with a total of 16 permanent magnets. The neodymium type N35, as well as the materials of the stator and rotors use M800-50a steel with the thickness of rotor and stator material of 90 mm. The PMSG on this design obtains the back EMF constant for its half-cycle of 4.902 rad/s and gets a voltage of 191.455 Vdc at 375 rpm speed and when given the loading of 100 Ω &8486; at 375 rpm speed produces a voltage of 176.73 Vdc, the current of 1.77 A and the output power is 313.24 Watt with efficiency reaching 85%.

**Keywords:** Permanent Magnet Synchronous Generator, Neodymium Iron Boron, Electromagnetic Performance.

**Topic:** Electrical Power Systems Engineering
Abstract

State Polytechnic of Malang (POLINEMA) has taken a part of a joint action to energy savings. The load profile of POLINEMA has specificity in the intensity of electricity energy consumption due to its characteristic as a vocational higher education. This specificity has caused POLINEMA to have many laboratories and workshops in each building. Energy savings can be done if it is supported by an energy consumption data audit system. The data will be calculated and compared to IKE standard. For that purpose, this research is aimed to design and implement an Energy consumption monitoring device based on Energy Database Management System (EDBMS). In this research, the energy audits were carried out on the lighting and cooling systems of seven buildings in POLINEMA, namely AB, AC, AD, AE, AF, AG, and AH buildings. After auditing of each building is as follows, the IKE value in the AB building is 30.5 kWh/m²/Year, the AC building is 7.5 kWh/m²/Year, the AD building is 15.2 kWh/m²/Year, the AE building is 24.3 kWh/m²/Year, AF building at 71 kWh/m²/Year, AG building at 79.5 kWh/m²/Year, and AH building at 22.6 kWh/m²/Year. In conclusion is Energy consumption in POLINEMA is classified as efficient where the standard of a building for Commercial/Education is 240 kWh/m²/Year.

Keywords: Energy savings, Energy consumption, IKE Standard, EDBMS

Topic: Electrical Power Systems Engineering
Analysis and Comparison of Nonlinear control for DC/DC Buck Converter in PV System

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Abstract

The use of DC power systems is increasingly widely used, such as PV system. In DC systems need a device to convert DC power level, one of which is a DC/DC buck converter. DC/DC buck converter system requires a controller in order to generate desired output voltage if any disturbance occurred when it is operating. This study examines improvements in DC/DC buck converter performance using backstepping controller and the proposed controller based on sliding mode controller (SMC). Backstepping controller and SMC are able to maintain stability where it can be shown by investigating at the output voltage of DC/DC buck converter. These controllers verifications are conducted by using simulation. The results of a comparison of the backstepping controller and SMC show that the recovery time of the SMC is faster than backstepping controller. It is also seen that the voltage deviation of SMC is smaller than backstepping. In voltage regulation, the proposed method indicates best performance.

Keywords: buck converter, backstepping controller, sliding mode controller, PV System

Topic: Electronics and Microelectronics Engineering
Development of Smart Energy Meter to Measure Energy Saving of Dimmable LED Panel Light

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Abstract

Conserving energy is important now more than ever. Dimming lamps to the required illuminance is one way to reduce the energy usage. Technological advancement in the form of new materials, sensors, and apparatus allows us to reduce the energy usage of an equipment. To obtain a clear understanding of consumer energy usage, a smart meter which is able to monitor and store energy usage characteristics can be a useful tool to have. This paper discusses the development of multi-points smart energy meter using Arduino Nano, ZMPT101B voltage sensor, and SCT-013 current sensor. The measurements result of the meter developed has been validated using commercial power analyzer. A 35 W dimmable LED panel light benefitting dimming function in QH7938 chip has also been constructed. The dimming characteristics were obtained, with the output luminous flux of 5644 to 950 lumen, and power input of 35 to 5.32 watt. Subsequently, the energy saving case scenario in 2.5 x 2.8 x 3 meters home office with various natural lighting condition were also presented.

Keywords: Smart Energy Meter; Dimmable LED Lighting; Energy Saving

Topic: Electronics and Microelectronics Engineering
In Indonesia the source of sun energy and wind energy sources is quite potential. The average wind speed based on WindSat satellite data from 2004 to 2014. Most Indonesian sea have wind speeds above 8m/second. In addition, the energy potential of the sun is around 4.8 kWh/m2. A mechanical model ship with a catamaran type and on the deck of the ship will be mounted with PV and wind turbine generator, which are equipped with microprocessor to control the angle of the wind turbine blades. The energy generated by the PV and wind turbine generator will be regulated by the dual input buck boost converter using the PID method to regulated voltage to 14 Volt used to charge the battery. The power stored in the battery will be used to drive the ship model propulsion system. This paper discusses about pv performance, generator performance, dual input buck boost calculation, and simulation. The results of the simulation obtained a minimum output voltage of 0.7 volt and a maximum output voltage of 28.4 volt. Energy from the sun and wind can be combined into one with a dual input buck boost converter so that the energy can be absorbed is more optimal.

**Keywords:** Renewable Energy, Dual Input Buck Boost, PV, Wind Turbine Generator

**Topic:** Electronics and Microelectronics Engineering
Abstract

Currently, energy diversification is needed to overcome the limitations of fossil energy as a fuel for electricity generation. In Indonesia, one source of renewable energy that has great potential is wind energy. Wind energy conversion system is an environmentally friendly electricity generator with unlimited availability. However, the electrical energy produced depends on the fluctuating wind speed so that it produces a fluctuating voltage. Variable speed wind turbine is one of the most widely used wind turbine types because it has better efficiency but requires control to overcome the fluctuations in the voltage generated. This paper presents voltage control on a prototype variable speed wind turbine with a permanent magnet synchronous generator (PMSG) and buck converter. The output voltage generated by the PMSG will be rectified by a three-phase uncontrolled rectifier. Voltage control is done through the duty cycle settings on the buck converter that is connected to the battery for energy storage. PID controller is used to set the duty cycle of PWM pulses with a switching frequency of 31.5 kHz. The PID controller is embedded in the microcontroller. Based on the test results, the resulting output voltage can be held constant at 14V by providing variations in wind speed changes which are simulated through PMSG speed changes. Transient responses with the fastest settling time of 0.87s were obtained with the PID controller parameter values $K_p = 0.6$, $K_i = 2.5$ and $K_d = 0.6$.

Keywords: Wind turbine, PMSG, Voltage control, renewable energy

Topic: Electronics and Microelectronics Engineering
Combination of Biodiesel, Glycerol, and Methanol as Fuel

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State Polytechnic of Malang - Indonesia

Abstract

Waste frying oil is a harmful liquid to human body and environment. However, it can be utilized as fuel. Transesterification of waste frying oil with methanol is presence of potassium hydroxide as catalyst produces fatty acid methyl ester (FAME) known as biodiesel as main product and glycerol as byproduct. Previously, several researches have been carried out concerning about utilization of both substances as renewable liquid fuel. In this research, three materials biodiesel, glycerol, and methanol which involved in transesterification process are combined in order to determine another renewable liquid fuel. Combination with composition 1:1:1 to 1:1:4 is burned in an external combustion engine. Viscosity of glycerol is the main problem to form fuel for the engine. The result shows that the higher percentage of the methanol, the easier is the combustion.

Keywords: Waste frying Oil, Transesterification, Biodiesel, Glycerol, Methanol

Topic: Environmental Science and Engineering
Cassava starch wastewater contains organic materials (BOD, COD) with high concentrations so that it can be used as raw material for biogas through an anaerobic biodecomposition process. The purpose of this study was to examine the effect of organic loading on the biogas produced as well as several parameters (BOD, MLSS) in cassava starch wastewater using the Anaerobic Fixed Film Biofilter (AF2B) reactor. The AF2B reactor has three parts of space with a total volume of 50 L, where each space contains biofilter (wasp nest form) which is useful for the growth of microorganisms (bacterial consortium). The experiments carried out by passing wastewater into the AF2B reactor continuously with an organic load of 2 g, 3 g, 4 g and 5 g COD. The decomposition time are 1-10 days. The temperature in the reactor was maintained at 29 - 31°C. The results of the research indicate that the production of biogas increased along with the increasing amount of organic loading. The maximum of organic loading was 5 g COD and decomposition time of 3 days to produce biogas is 5.899 L. The biogas produced contains methane (85%), CO2 (14.5%), and CO (0.5%).

Keywords: AF2B Reactor, Biogas, Cassava starch, Decomposition time, Organic loading

Topic: Environmental Science and Engineering
Design and analysis of the effectiveness of automated control systems at home using the Internet of Things based on Raspberry Pi

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State Polytechnic of Malang

Abstract

Smart homes are a set of interconnected electrical appliances to become intelligent service systems aimed at reducing human workloads, saving electricity, and improving home security. Wireless Smart Home system enhances popularity due to flexibility, portability, and low installation cost. With the availability of technology and the Internet of Things (IoT), devices can collect information from the environment according to the surrounding conditions. In this work, the proposed prototype smart home with humidity sensor, temperature sensor, movement sensor is analyzed. The results show that the proposed system which using the fuzzy logic method can be embedded in the property business plan. The main features of the smart home are real-time, remote control, security from intruders who may use the proposed system.

Keywords: Internet of things, smart home, raspberry Pi, fuzzy logic, python

Topic: Environmental Science and Engineering
Android Based Wireless Sensor Network (WSN) Mobile Application on Humidity and Temperature Environmental Monitor Using CC2650 Sensor Tag

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Abstract

Abstract - This research proposed environmental sensing humidity and temperature ambient or object with CC2650 texas instruments sensor tag device. This device will be implemented on a mobile app to detect surrounding humidity and temperature environment, hoping that it will be used to monitor the users daily activity. The sensor will transmit raw data to a central data collector mobile app using Bluetooth Low Energy (BLE) communication and configured with the other same device CC2650 sensor tag in a field with Wireless Sensor Network (WSN). The function of the application platform in a mobile phone as a data sensor humidity and temperature from the user and will forward to the cloud or server to inform socially valuable data. In a mobile application, the sensor data and its location can be accessed automatically by combining them with Bluetooth and GPS sensors. Address, longitude and latitude, country, and localize area information like district can be updated automatically on the application.

Keywords: Bluetooth Low Energy, Sensor Tag CC2650, humidity, temperature

Topic: Environmental Science and Engineering
Smart Ecosystem for Hydroponic Land in the Hydroponic Farmers Group guided by CSR PT. Otsuka Indonesia As an Improved Quality and Quantity of Harvest Results

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Abstract

Corporate Social Responsibility (CSR) is a community development program managed by PT. Otsuka Indonesia, one of which is to foster the Community Environment program by forming one community of hydroponic farmers in the Kalirejo Village, Lawang District, East Java, as many as 7 RT. In the activities of fostering hydroponic farmers there are several problems, namely the process of plant nursery, seeding, and harvesting which are still carried out conventionally so that it requires a lot of time in monitoring the hydroponic land, while the guided farmers do not have much time in supervising due to having core work. In addition, the CSR PT. Otsuka Indonesia also cannot oversee every hydroponic land because the CSR team is an employee of PT. Otsuka Indonesia, which also has other main tasks burdened with CSR tasks. Based on these problems, this research will focus on solving the problem of monitoring hydroponic plants that can be known directly by farmers and also from the CSR of PT. Otsuka Indonesia. In completing the research, the steps taken are based on the CRISP-DM (Cross Industry Standard Process for Data Mining) methodology. The factors used in solving the problem are the type of hydroponic plants, the level of acidity of the soil, the intensity of sunlight, the ambient temperature of the hydroponic plants, the height of the water and reporting to the CSR within a certain period in accordance with the needs in the form of Smart Ecosystems. For this reason, it is necessary to build a device from an arduino microcontroller based on IoT so that supervision in the plant nursery, seeding and harvesting process can not be done in hydroponic land and obtain reports every period of the development of the hydroponic plants in Android-based applications. By using an arduino microcontroller which is cheaper than using Raspberry Pi as a smart ecosystem device on hydroponic plants, it is expected that many hydroponic farmers are interested in using it so that during the production process of hydroponic vegetables can be in accordance with the old plant nursery standards up to the sale...
and CSR PT. Otsuka Indonesia can continue to monitor and determine what steps should be taken if there are hydroponic land that is not in accordance with standards.

**Keywords:** Corporate Social Responsibility (CSR); hydroponic; smart ecosystem; arduino microcontroller

**Topic:** Environmental Science and Engineering

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**[ABS-1]**

**OPTIMIZATION OF PRINTED CIRCUIT BOARD COMPONENTS PLACEMENT**

*R Edy Purwanto, Eka Mandayatma, Sulistyono*

State Polytechnic of Malang

**Abstract**

In order to optimize the throughput rate of these automatic systems, the time taken for the pick and place electronic components for each board has to be minimized. This study focused on optimization problems faced in automated assembly of electronic component in Printed Circuit Board (PCB). Components are placed on PCB where the process of pick-up and placement occurs starting from the machines to pick up the components from the feeder magazine. The number of components to be picked and placed maximum four components, depending on its contribution to minimize tour distance. Increased complexity of PCB assemblies, components and shorter product obsolescence timescales implies machines utilization must be maximized in order to achieve cost efficiencies. The difference in size and shape of components is handled by the head, which brings the optimization problem closer to real machine situation. The paper suggests adhesive techniques as a better alternative to give solution approaches such as soldering methods. As PCB plates have multi layers and different types of components, they require machines with a variety of feeders and head positions which enable assembly to take place faster and accurate.

**Keywords:** PCB, Multi Layers, Electronic Component, Soldering, Automatic Systems

**Topic:** Industrial and Manufacturing Engineering
QUALITY BY DESIGN OF OPTIMUM PARAMETER TO MINIMIZE THE WEIGHT OF PLASTIC PRODUCTS

Moh. Hartono, Gumono, Wirawan, Nanang Qosim, Hangga Wicaksono

MECHANICAL ENGINEERING, STATE POLYTECHNIC OF MALANG

Abstract

The research aims to control product quality off-line (quality by design) in producing lightweight plastic products for food packaging. The lightweight product is very profitable for the producers due to the efficient production costs. Quality by design was done by designing controlled parameters in the plastic moulding process which includes clamping force, holding time, injection pressure, injection speed and injection temperature and their interactions. The plastic material that is made observable is Polypropylene (PP). The response parameter in this study is the weight of the product. The parameter design method used was Factorial Experiment Design with 5 independent variables with different levels of variation. The results showed that the combination of injection temperature and holding time had a significant effect on product weight. To produce heavier products that are in the area above the holding time of 0.4 seconds at any injection temperature. Meanwhile, to produce a lightweight product (under 43 grams) is at a combination of injection temperature below 263 C and holding time of about 0.3 seconds. The standard weight of the product on the plain bucket food packaging for this yogurt container is 42.5 gram.

Keywords: design parameters, injection moulding, lightweight products, plain bucket.

Topic: Industrial and Manufacturing Engineering
MICROCONTROLLER-BASED CONTROL SYSTEM DESIGN USING STEP COUNTER METHOD IN DRILLING FIXTURE

Akhmad Faizin, Hangga Wicaksono, Nurlia Pramita Sari

State Polytechnic of Malang

Abstract

Automation in the manufacturing process in the industry today is absolutely needed. Advances in technology has changed the characteristics of the manufacturing industry. The development of robotics, visualization technology and collaborative automation has increased the development of the manufacturing industry, enabling automation to be applied not only in the mass production process but also in low volume production. This is done in order to pursue the benefits of investing in industrial automation machines: productivity, accuracy, safety, cost savings, quality improvement, and repeatability. Industrial automation is the main key in following the development of technology into industry 4.0. In the case of the process of making 2 (two) holes in a workpiece using a drilling machine, a drilling fixture driven by a pneumatic system is needed. The pneumatic system uses 3 (three) double acting cylinders (DAC). To control the work of pneumatic systems, a microcontroller-based control system is used. In the principle of arranging the control circuit and writing the program the step counter (shift register) method is commonly used in the preparation of the pneumatic control circuit. Through the application of this method, the preparation of microcontroller-based control circuits can be done in a structured and easier way, both the steps of preparation, control, and troubleshooting. The type and specifications of the control system used depend on the amount of output available. In this research, it is used to control a drilling fixture that has 3 (three) DACs, it takes 1 unit of Arduino type Mega 2560 control system which has 10 inputs and 10 outputs for the 5/2 directional control valve (5/2 directional control valve - DCV).

Keywords: drilling fixture, control system, microcontroller, step counter, arduino

Topic: Industrial and Manufacturing Engineering
DESIGN OF CONTROL BASED ON PLC ARMFIELD PRESSURE CONTROL
MODULE IN CHEMICAL ENGINEERING LABORATORY

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Abstract

The control system in industry plays an important role to increase the effectiveness and efficiency in production process. Malang State Polytechnic as a vocational tertiary institution continues to prepare its graduates being able to face technological developments in industry, including in field of control systems. Laboratory of Chemical Engineering Department has several tools to develop competence in the automation process control system, one of which is the pressure control module. This module aims to control the rate of compressed air flow coming out from the compressor. The module has been used as a learning module since 1988. The control system which used is still analog. In an effort to improve the performance of the module, rejuvenation is done with a PLC system that is optimized by the PID control method. PLC is chosen based on the ease of programming. This rejuvenation process is carried out in several stages, such as designing PLC hardware and software then testing and analyzing the system. In testing and analysis the system, there are four stages, which testing and analyzing the open loop system without tank and with tank, PID close loop with tank and without tank. Based on the results of this study indicate that the close loop system with PID has a better response than the open loop system, which is able to improve the errors and transient responses so that the system becomes stable and fit with the given set point value. The PID parameter that produces a good response when used in the pressure control module is Kp = 100, Ki = 1 and Kd = 0. This parameter is able to produce a system measurement value of 80% with an error of 0%.

Keywords: Control, PID, PLC

Topic: Industrial and Manufacturing Engineering
The increasing quality and quantity of cyber attacks and the demand for the information security revolution are also followed by the threat in developing Smart City of Bogor. In assuring these problems, it is crucial for the City Government of Bogor to develop and information security strategy which is capable to protect public privacy data and critical information of Smart City Bogor. The research was conducted with a qualitative method by using a grounded theory approach at the critical infrastructure of Smart City Bogor, which is the Department of Transportation, Department of Health, Department of Fire Rescue and Department of Communication and Information. The result showed that the information security as a core strategy which only created by the readiness of the legal ware as a causal factor in forming the knowledge and information security awareness in the preparation of priority program and development of the command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) systems of Smart City Bogor which became the basis of the formulation of Bogor Smart City information security theory.

Keywords: Cyber attacks; information security

Topic: Information Systems Technology
Public Service Innovation Through The Application Of Mobile-Based Smart City Concepts In Sukun Sub-District, Malang City

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Abstract

Public service is an activity of providing services to the public carried out by the government whose services can be in the form of goods, services, or administration. The sub-district is a public service provider from the application stage to the publication phase of the document. Where people need not go to several agencies to take care of licensing documents, but enough to come to the district in their respective regions. Districts as the spearhead of government administrators must be able to carry out their functions as the embodiment of excellent public service. However, in reality, public services at the sub-district level are of poor quality. Less responsive, less informative, and convoluted bureaucracy is often a major problem in service. Even though in the current technological era, the sub-districts should adopt technology for their activities. Innovation in using smart city concept technology in sub-districts is the key to solving existing problems because integrating entities in the smart city concept can facilitate the exchange of information, speed of data exchange and lead to rapid decision making by service officers and the public. So that the public services organized by the sub-district become more quality.

Keywords: Public Services, Smart City, Technology

Topic: Information Systems Technology
Web Application Implementation of Android Programming Learning Assistance System and Its Evaluations

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Abstract

Currently, Android has been installed on more than 70 percent of the smartphone devices in the world as the most popular mobile operating system. Then, the need for Android-based application developers has increased significantly. As a result, many IT departments in universities and professional schools have regarded Android-based programming as one of the main subjects. To improve Android programming educations, we have developed Android Programming Learning Assistance System (APLAS), a platform to accommodate many students learning Android programming independently. APLAS adopts the test-driven development method to actualize automatic validations of students answers to Android programming assignments. Previously, APLAS has been implemented as the desktop offline application. In this paper, we present a Web application implementation to manage learning activities online. This implementation consists of three main parts, namely, Validator, Web Interface, and Database System. To evaluate the effectiveness, we embedded three learning topics, Basic UI, Basic Activity, and Advanced Widgets, into this Web application, and tested the learning activities of more than 100 students on it. The results showed that the Web application has been accessed and utilized by the students smoothly, and confirmed the reliability of the validator program that has executed more than 400 submissions.

Keywords: APLAS; Web application; Android; Android programming learning; test-driven development method; validation

Topic: Information Systems Technology
Automatic irrigation monitoring system based on photovoltaic solar energy with fuzzy logic

Yuri Ariyanto, Rokhimatul Wakhidah, Hanifah Fanidya Utari, Budi Harijanto
State Polytechnic of Malang

Abstract

Indonesia's food self-sufficiency program requires the use of paddy fields with rice as the main food. That irrigation infrastructure problem also needs efficiency mitigation of cost impact using fuel oil in operation manually of engine irrigation. An automatic photovoltaic irrigation system can solve the problem of deficiency irrigation infrastructure, especially in the dry season as a more efficient power supply for irrigation infrastructure. In this research, implemented the automatic photovoltaic irrigation system is combined with the sunlight tracking system to get power supply, according to the direction of the sun. The irrigation pattern requires the suitability of soil moisture, water level, and power supply voltage as variables for the application of an automatic photovoltaic irrigation system. Automatic photovoltaic irrigation system equipped with a website to monitor the irrigation variables. The Irrigation variables data is obtained from sensor readings then sent by NodeMCU to the website and calculates the suitability of irrigation variables as parameters using fuzzy logic to control automatic irrigation. The conclusion from this study was obtained after testing the system with system running well, fuzzy logic parameters run with variables value of voltage > 9.9 Volt, water level < 2cm, and soil moisture < 69%.

Keywords: Irrigation, IoT, Solar Energy, Fuzzy, Monitoring System

Topic: Information Systems Technology
[ABS-39]
Designing Real-time Research Data Portal of JTI POLINEMA

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State Polytechnic of Malang (POLINEMA)

Abstract

Research culture in Department of Information Technology Polinema is always developed continuously every time. In addition, many research titles that are critical of environmental problems are beginning to be seen. The Information Technology Department has an outstanding focus on issues, namely smart systems which include smart education, smart living, smart healthy, smart city and smart tourism. Research resources in the Information Technology Department Polinema are competing to realize that research focus. For this reason, efforts are needed to increase the availability of facilities that are not only material. But facilities are also needed to easily obtain data or analyse data, as a quick response to the current situation and conditions in order to be able to compete as a vocational college that responds quickly to national problems. The fast response can be solved by providing Real-Time Research Data Portal. This paper discusses the design of middle ware on web portals that have high scalability capabilities for providing large data facilities and fast access. Real-time big data processing is the path that will be described in the architecture that will be created and adapted to the needs of the Department of Information Technology Polinema.

Keywords: real time, middleware, big data, architecture, designing

Topic: Information Systems Technology
The Development and Analysis of An Information Systems for Incentives Publication of Reputable Indexed International Journal and National Journal (Case Study Polytechnic of Malang State)

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Abstract

The research activities in The State Polytechnic of Malang addressed to achieve the output as articles, intellectual properties, and product innovations. The incentives are given to the researchers who publish articles in reputable publishers due to increasing the articles in both numbers and quality. In this work, an information management system of publications is developed and analyzed. The system is integrated into the staff database in order to relate with yearly staff performances. In the system, articles are categorized according to classification as International and National publications. Furthermore, both the International and National Categories are classified as a reputable and accredited publisher, respectively. The proposed system has tested by administrators in each unit and randomly staffs as respondents to fill the questioner. The result shows that the management system can be operated by an administrator in each unit and the staffs do not have difficulty to use the proposed system. It means the proposed system can be applied in The State Polytechnic of Malang.

Keywords: Information Systems; Management systems; Classify articles; Reputable articles; Integrated system

Topic: Information Systems Technology
Micro-expression Recognition Based on Motion Detection Method

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Politeknik Negeri Malang

Abstract

Micro-expressions are emotional representations that occur spontaneously and cannot be controlled by humans. Micro-expression motion are transient with fast duration and have subtle motion with small intensity. This is difficult to detect with the human eye. Previous studies have suggested that movements in micro-expressions occur in several areas of the face. This study aims to determine subtle motion in some areas of the face using motion detection methods. We compared the Phase Only Corellation (POC) and Kanade-Lucas Tomasi (KLT) method to detect subtle motion in the face. Experiments were carried out using a dataset from CASME II with emotional classes disgust, happiness, surprise, and sadness. The classification accuracy of the POC method is higher by 94% compared to the KLT method by 92.6% using SVM classification.

Keywords: Micro Expression, POC, KLT, Motion Detection, SVM

Topic: Information Systems Technology
Usability Ratings for Sistem Proyek Akhir Manajemen Rekayasa Konstruksi (SIPROK-MRK) measured with the System Usability Scale

Wahiddin, Arie Rachmad Syulistyo, Milyun Nima Shoumi
Politeknik Negeri Malang

Abstract

During the corona virus pandemic, the thesis examination in the Construction Engineering Management study program was conducted online. This is in accordance with the rules of the leaders in State polytechnic of Malang. Based on this background, a thesis examination system was developed to enable the tests to be conducted online. The main features of this application are the guidance assessment, exam evaluation and revision can be done online. To evaluate the system that has been developed, the usability level of the application is measured using the System Usability Scale. System usability scale is a technique used to measure system quality, the information presented and the system interface.

Keywords: thesis examination system, System Usability Scale

Topic: Information Systems Technology
THE EFFECT OF HARDENING PROCESS ON THE HARDNESS OF MANUALLY FORGER KNIFE BY TRADITIONAL BLACKSMITH

R Edy Purwanto, Sulistyono, Bambang Hertomo, Aang Afandi
State Polytechnic of Malang

Abstract

Knives are usually made by the process of forging using either a machine or a traditional method of hammering. This work was carried out to study the effects of steel raw materials and the hardening process on the hardness of manually forged knives. Knife samples are made by a traditional process of forging (forging) carried out by a local blacksmith. The equipment that supports production process and the knowledge used is still in the traditional category of decline from the family so that production is less than optimal. The production process uses kitchen heating support equipment, support process equipment and forging processes, wood lathes for machining the handle. It is hoped that the products produced will also be of better quality and aesthetics. After that, the sample is heated with two different hardening procedures, the first based on the blacksmith procedure and the second is systematically carried out by jig and tool for the cooling process. The results showed that knives made of spring steel and heat treatment by using jigs and tools obtained a higher level of toughness, knives treated with traditional quenching processes had lower levels of toughness. Therefore, we conclude that the quality of traditional knives in terms of hardness can be improved by optimizing the cooling process.

Keywords: quenching, heat treatment, hardening, blacksmith, jig and tool

Topic: Mechanical Engineering
The role of the blades number and pitch angles to the capability of self-start the Darrieus wind turbine

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State Polytechnic of Malang

Abstract

Darrieus is classified as a vertical axis wind turbine that has a simple construction. It is widely used for small-scale domestic needs in rural or aquaculture areas. As with other types of vertical axis wind turbines, Darrieus have low efficiency. There is resistance on one side of the blade which aggravates the shaft rotation. Another problem is the low ability to self-starting. Some even need help from an external source to start. This is certainly detrimental in terms of energy conversion. The purpose of this study is to obtain information on the wind speed needed for a Darrieus to self-starting on variations in the number of blades and pitch angles. The blade profile used is NACA 6412. Variations in the number of blades are 2, 3, 4 and 5 and pitch angles of -10 deg, -5 deg, 0 deg, 5 deg, and 10 deg. Data retrieval was carried out experimentally using the wind tunnel. It is shown that the self-start wind speed was strongly influenced by the number of turbine blades. The number of blades 5 requires the lowest average self-start wind speed. The pitch angle has a different effect on the wind self-starting speed depending on the number of blades.

Keywords: Darrieus wind turbine; NACA 6412; blade number; pitch angle; self-start

Topic: Mechanical Engineering
Abstract

The problem lies in the colour resistance of the black chromium electroplating results that are not yet known for its effective test methods. The purpose of this research is to find an effective method for testing colour resistance. The methods used include preparing the specimen from motorcycle rim, black Chromium electroplating, heating the specimens in Muffle furnace for different temperatures, cooling the specimen to room temperature, measure and calculate the colour state in order to decide the fading level, corroding the specimen in several acidity solutions from Chloric acid, calculate the corrosion rate and analysis of the results. The results of the study in the form of (1) measurements with Colourflex showed that heating the low carbon steel rim for 2 hours at 200°C the colour remained dark black, at 250, 300, 350, and 400°C the colours faded 20, 40, 45, and 60% respectively. (2) corrosion test shows that at pH 3, 4, 5, and 6 the corrosion rate is 0.166; 0.136; 0.122 and 0.107 mm/year which the colour begins to fade at pH 4 and more acid.

Keywords: color resistance, electroplating, low carbon steel, heating test, corrosion test, hardness test, compressive test

Topic: Mechanical Engineering
Experimental Analysis of Temperature, Light Intensity and Humidity on Rooftop Standalone Solar Power Plant

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Abstract

Rooftop standalone solar technology is a new renewable power generation solution worldwide and can reduce carbon dioxide levels in the environment. However, several factors affect the performance of the power plant, it is highly influenced by weather parameters. This paper shows the design of the rooftop standalone solar power plant and the influence of temperature, light intensity, and environmental humidity on it. The designed system consists of a 200WP photovoltaic, 480Wh LiFePO4 battery, and an MPPT solar charge controller 40A. This standalone power plant was applied to supply the energy of the home lighting, with 20Watt the total of power. The result shows the design of the rooftop standalone solar power plant. Furthermore, there is an influence of temperature, light intensity, and environmental humidity on the LiFePO4 battery input power.

Keywords: standalone solar power plant, temperature, light intensity, humidity

Topic: Mechanical Engineering
THE EFFECT OF VARIATION OF CONDENSOR EXTRA FAN AND ENGINE SPEED TOWARDS COP MOBILE AIR CONDITIONERS

Nurhadi, Listiyono, Maskuri, Bayu Rizki Prasetyo

Department of Mechanical Engineering, POLINEMA

Abstract

Efforts to increase COP (coefficient of performance) mobile air conditioners (MAC) still continue to be done, including by increasing the speed of the condenser extra fan. The problem is whether it can improve the COP, it needs to be tested and further proven. The research purpose to examine the effect of variations in the condenser extra fan and engine speed towards COP of MAC. The research was conducted on a modified engine stand of MAC and was able to display the results of measurements of the pressure and temperature of the MAC system. Data is collected by measuring the pressure and temperature before the compressor (P1, T1), after the compressor (P2, T2), after the expansion valve (P3, T3), and after the evaporator (P4, T4), at engine speed of 1,000, 1,500, 2,000, 2,500 and 3,000 RPM, respectively with variations in the condenser extra fan speed of 0.15; 1.74; and 2.22 m/sec. The data obtained is then plotted on the p-h diagram to obtain the enthalpy value at each point of pressure and temperature, so that the COP value can be calculated. The overall data is then poured into the chart to make it easier to analyze the relationship between the condenser extra fan and engine speed towards COP. The research results showed that variations of the condenser extra fan and engine speed had an effect on the COP of MAC. The higher condenser extra fan speed, causes the increasing COP. The higher extra fan speed causes the better of cooling process at the condenser, so the cooling effect on the evaporator also increases. The highest COP of 9.06 was achieved at an engine speed of 2,000 RPM with condenser extra fan speed of 2.22 m/sec. At that engine rotation, the compressor is able to flow the refrigerant as needed, so that the performance of other MAC components is also optimal and the COP increases.

Keywords: extra fan speed, condenser, engine speed, COP, mobile air conditioner

Topic: Mechanical Engineering
Analysis of Factors that Influence the Smoking Process on Tuna Fish

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Abstract

Indonesia is rich in biological resources, one of which is the fish as source of animal protein. Smoking is one of the ways to preserve fish that can be done with smoked fish machine that is simple and easily made. The aims of this research were to analyze the heating value needed, the productivity of smoke, the flow in the smoking cabinet, and the water content in tuna fish. The weight of the smoked tuna fish in this study was 50 kg. Gas stove LPG was used as fuel for smoking tuna fish, where its fuel easily procured and produces thick smoke with a good enough aroma for smoked fish. Based on the results of analysis, the amount of heat needed in one cycle of tuna fish smoking process is 37,000 kcal. Reynolds number from the smoking process is 12,450 or greater than 4000. Therefore, the type of smoke flow that flows in the smoking cabinet is a turbulent type. The remaining water content in the product is 13.4%. This is still below the threshold required by SNI, which is a maximum of 60%.

Keywords: smoked-fish, aroma, moisture content, flavor, sensory

Topic: Mechanical Engineering
The effect of strain hardening on the limit forming ratio on the single-step incremental hole flanging process on aluminium plates

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Abstract

Hole-flanging is the process of forming a plate to produce a collar around the hole. This formed collar has several important functions to increase the bonding surface area, as a supporting medium for other components, as a guide, increase construction rigidity, etc. This collar is generally formed through conventional hole flanging which involves making the initial hole in the plate, then punch with a certain profile and a larger diameter pressing the plate in one step of the forming process. This forming process will cause the deformation of the plate so that a collar is formed around the hole. In recent studies, it can be found that the collar can be formed not only with one stage of the conventional hole flanging process, but can also be achieved by a multi-stage incremental hole flanging process using a punch with a multi-purpose general profile. In this research, an experimental study was carried out on the effect of strain hardening on the limit forming ratio (LFR) in the single-step incremental hole flanging process on aluminium plates using conical punch. The research hypothesis shows the influence of strain hardening on the limit forming ratio (LFR) in the single-step incremental hole flanging process.

Keywords: hole-flanging, incremental, strain-hardening

Topic: Mechanical Engineering
Design Generator of Magnetic Power

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Politeknik Negeri Malang

Abstract

The paper discusses the design of magnetic power generators, if a conductor moves across the magnetic field, a voltage difference will occur at the ends of the conductors. The voltage rises as it approaches the area and vice versa, so electricity arises in cycles: positive - zero - negative - zero. In this study utilizing the rotation of a magnetic motor caused by the unbalance repulsive force between magnets. The design of the tool starts with designing a generator model that will be made. The design of generators based on calculations obtained through the reference of generator design. The generator design uses magnets instead of anchor coils on the rotor (source of magnetic flux) and copper wire coils as anchor coils on the stator. This design takes into account rotor and stator parameters including the distance between magnets, rotor diameter, rotor plate thickness, area of a magnetic area, number of stator coils, number of stator windings, stator coil dimensions, and calculate generator output power. Tool testing is done to obtain data from tools that have been made. In testing the comparison of the results obtained from the study of the target to be achieved, if the results have not yet reached the target, then improvements are made to the results obtained as expected. Tests carried out with no load and burden. The results showed that the rotor speed in the generator design could be achieved by determining the number of rotor poles, the generator voltage is influenced by the flux density produced by permanent magnets and the number of stator windings.

Keywords: generator, magnet motor, rotor, stator, voltage, permanent magnets.

Topic: Mechanical Engineering
Abstract

One of the fossil fuels is petroleum fuel. Petroleum is a non-renewable natural resource. Various aspects of life have felt its effects, where petroleum fuels have begun to experience scarcity. The higher price of fuel oil should be able to make us realize that the amount of oil reserves has started to run low. The aim of the research is efforts should be made, such as finding and developing alternative energy sources. One alternative energy is the use of hydrogen which is environmentally friendly. The research aims to examine the effects of electrodes and electric current of gas production in HHO generators. The purpose of this study was to determine the effect of electrodes, current strength, and concentration of NaHCO3 on HHO generator gas output. The HHO electrode generator material is made of aluminium and brass. The shape of the electrode is rectangular with a size of 250 mm x 400 mm, with a gasket seal. The test begins with the HHO gas pressure test. The independent variables used are aluminium and brass electrode variations. The electric current given is 20A, 30A, 40A, and the amount of 5-25% NaHCO3 catalyst. Then proceed to analyze the pressure obtained to the HHO gas flow rate. To test the HHO gas flow rate is carried out with a duration of 1 to 3 minutes in each treatment, discharge measurement using a gas regulator to determine the flow rate of H2 and O2 gas produced. The results showed that the lowest gas discharge value was at the aluminium electrode with a current of 20A, which was 0.00033554 m3/s, while the highest discharge value was on the brass electrode with a current of 50A, which was 0.001657 m3/s. This shows that the better the metal element contained in the electrodes and the higher the current given, the greater the flow of H2 and O2 gas flow.

Keywords: Electrodes, Current, NaHCO3, HHO Generator

Topic: Mechanical Engineering
Analysis of Fuel Pressure on The Performance of Motorcycle Engine With Ethanol Fuel

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Abstract

Gasoline engines fuel cannot be directly replaced with pure ethanol, moreover ethanol contains a lot of water. The purpose of the study was to analyze the effect of variations in fuel pump pressure on performance on a 115 cc 4-stroke engine powered by ethanol fuel. The independent variable is the pressure from the fuel pump which is controlled using an external regulator (3 to 5 bars) with the engine speed (2000 to 9000 rpm). The dependent variable is the performance of the engine being tested including power, torque, and fuel consumption. The power and torque test in this study uses inertia dynamometer. The results showed the addition of fuel pump pressure at three point five bar pressure can produce higher power at each engine speed with a maximum power of 6.26 hp at 8000 rpm. As for the best results torque obtained at a pressure of 3.5 bar which is 7.51 Nm at 5500 rpm, besides that the lowest fuel consumption at a pressure of 3 bar is 3.34 ml/s, an increase of 1.90 ml/s when compared to the conditions standard.

Keywords: ethanol, fuel consumption, fuel pump, power, torque

Topic: Mechanical Engineering
WEB INNOVATION IN HORIZONTAL WIND PIPE TURBINE PROPELLER

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POLITEKNIK NEGERI MALANG

Abstract

The efficiency limitations of wind turbines provided by Betz's Theorem prompted researchers to develop new geometric shapes of wind turbines propeller that split pipe spiral slice by placing the web between turbine blades. The idea of developing the shape of the turbine was inspired by the shape of a ducks or swans leg which has a web between its fingers that functions to obtain the thrust when swimming in water. The purpose of this study is to obtain optimal geometry and aerodynamic parameters in producing wind turbine efficiency. The method of obtaining research data is using solid work software for design, Ansys software for CFD simulations and Wind Tunnel laboratory equipment for experiments and using Minitab 19 software for data processing. The results of the CFD simulation and experiment based research show that the turbine propeller turbine with using the web has higher efficiency than without the web.

Keywords: Horizontal Wind Turbine, Propeller, Pipe, Web, CFD, Experimental.

Topic: Mechanical Engineering
Abstract

The type of universal Cartesian 3D Printing is the most widely used is not fast enough. However, by applying double nozzles, the process can be done in half of the time for making symmetric bilateral product. The symmetric bilateral product is an object that has the same size on the right and left sides. So, the method can be implemented by having double actuators, that are mounted by a nozzle for each of the side. Both nozzles move on the same time and distance but in different direction, mention as Y and -Y nozzle. Besides that, an appropriate mechanical support needs to be prepared, so that the motors can move in different direction at the same time. Therefore, a design simulation for two Y actuators has to be held. Simulation and taking data are using actuator simulation software. The simulation results of this study are the G-code can control two Y actuators 99.64% accuracy with average error 0.216% for angular speed, and 100% accuracy with average error 0% for distance. The nozzles can move in different directions with the same type of screw.

Keywords: 3D Printing Symmetric Bilateral; Double Nozzles Y Axis; G-Code

Topic: Mechatronics and Robotics Technologies
HDPE Plastic Extruder Design and Control for 3D Printing with Plastic Pellet Feeding Method

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Abstract

3D Printing Technology (3-dimensional Printer) has become the Standard Acceleration Tool for Industry 4.0. Until now, 3D Printing system material melting technology using Fused deposition Modelling (FDM) method. FDM is the melting of plastic materials through extruding temperatures and the formation of 3D objects in layer by layer. Meanwhile, feeding for melting material is in the form of rolling filament. Currently, on this research FDM uses plastic pellete feeding method. Its extruder, is plastic pellete processed through heater zone and pushed out by screw to the nozzle, where the nozzle is the CNC drive 3DOF, applying cartesian axes. In this study, using high density polyethylene plastic pellete (high density polyethylene, HDPE). Temperature control in melting heater using PID method, controlled by microcontroller and programmed through marlin firmware. The design and implementation result showed, the extruder capable of melting HDPE at a diameter of 2mm with a speed of 96mm/s. Heat response control for melting temperature HDPE on 200°C, with 300watt power can reach settling time 175second.

Keywords: HDPE, Extruder, 3D Printing

Topic: Mechatronics and Robotics Technologies
Design Locomotion for Automatic Guided Vehicles using Double Ackerman Inverted method (2WD-4WS-1A)

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Abstract

This paper introduces a robot vehicle designed for the same forward or reverse maneuver specifications with small turning radius. The vehicle has two-wheel drive with a Double Inverted Ackermann steering method (2WD-4WS-1A) for an Automatic Guide Vehicle (AGV). In batch processing systems for industrial, AGV is used for transportation in the component warehouse area. In the steering system, Ackermann mechanics are described as optimizing the AGV maximum radius maneuver capability, based on the turning center point. The AGV drive is designed with four-wheel steering mechanics, two wheel drives, and one steering actuator. The vehicles mechanical steering system is designed with a geometry analysis system to control the turning radius of the vehicle. The Ackermann AGV steering method that has been implemented will be tested for maneuvering results. The research results are measured empirically to determine the efficiency and optimization of the system in the AGV design. Numerical simulations and prototype experiments show that AGV scanning moves along straight and curved guide lines with high accuracy. The efficiency of the steering control and small optimal radius will increase maneuverability of the surge motion with a specified vehicle payload capacity.

Keywords: Automatic Guide Vehicle, Ackermann, 2WD-4WS-1A

Topic: Mechatronics and Robotics Technologies
PLASTIC CONTROL PELLETS FEEDING DOUBLE EXTRUDERS & NOZZLES FOR BILATERAL SYMMETRICAL 3D PRINTING

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3D printing (3DP) is one of the technology, that supports industry 4.0. One of the common 3DP technology is FFF (fused filament Fabrication), the technology is also known Fused Deposition Modelling (FDM). For this case, extrusion thermoplastic through a hot nozzle in the melting temperature, layer by layer to create an object. The extrusion machine (extruder) will melt the plastic pellet and will be processed through a heating zone that has a different temperature and pushed out by screw conveyor to nozzle to printed into objects. This Research aims, to make a control innovation plastic pellet feeding double extruders & nozzles for the bilateral 3DP symmetrically to print an object with a size of 2000x2000x2000mm using FDM method. The research simulation results showed that the extruder melt the plastic pellets with temperature of melting 200oC with plastic pellets debit is 100mm/s, temperature controlled by PID. In this research using 4mm plastic pellets diameter polyethylene high density (HDPE). Double extruder are controlled by two stepper motors Y- and Y+ axis with speed in between 10-60mm/s, on 2mm nozzle diameter. The extruder can be producing 10mm liquid filament every 440 steps.

Keywords: 3D Printing Symmetric Bilateral, Double Extruder, HDPE

Topic: Mechatronics and Robotics Technologies
Abstract

Fully autonomous robot is an ideal solution for performing tasks in dangerous environments. However, since there is no general-purpose autonomous algorithm, different situations or tasks require some non-trivial and time-consuming algorithm adjustments. A considered approach to realize autonomous robotic system is to use human teleoperated robotic system method. By inducing a human experience, the system takes the benefit of their intelligence that capable to adapt arbitrary situations and tasks. An effective teleoperation requires a proper feedback system such as a vision system using camera. In this case, the operator observes the video streaming to perform the tele operation. Despite its effectiveness of using camera, the limited field of view (FoV) become one of the main burdens of the operation. While other researches using wider view or multiple cameras, this research proposed to achieve a better teleoperation by eliminating FoV limit by using 360 camera and improving the immersive experience utilizing virtual reality (VR) headset. The proposed framework has been developed using a Raspberry Pi which connected to 360 camera. The framework utilises a WebRTC protocol for fast video streaming. The proposed method was evaluated by a remotely controlled robot on a predefined mission with numerous trials. The robot trajectory was tracked by a ceiling mounted camera. An Aruco marker was used to identify and track the robot in its environment. The obtained trajectories were measured by using a standard performance matrix, which demonstrated that the proposed method achieved 34.4% lower collision area, 28.9% closer to desired ideal path and 27.4% smoother than using a standard camera. However, as the 360-video induced higher latency, the proposed approach was 20.5% slower. Those quantitative measurements justified that the proposed approach achieved a better teleoperation.

Keywords: Autonomous, teleoperated robot, 360 camera, VR

Topic: Mechatronics and Robotics Technologies
Low-Cost Transverse Electromagnetic (TEM) Cell Design for Radiated Emission Measurement

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Abstract

The increasing use of electronic and electrical equipment that continuously emits radiated emissions in the industrial, military, communications, household, and medical fields has increased dramatically over the past few decades. Radiated emission can interfere performance of other electronic devices around it. There is a demand that electronic devices must comply with electromagnetic compatibility (EMC) standards before being marketed, requiring manufacturers to carry out EMC testing before devices enter the market. Transverse Electromagnetic (TEM) cells are usually used by designers to ensure that electronic devices comply with EMC standards. TEM cells for radiated emission measurement are widely used because they are cheap and time-saving before full compliance testing is carried out, which expensive for one-time testing. In this study, low-cost TEM cells were designed that could be used to test radiated emission generated by electronic devices. TEM Cells are designed from aluminum plates with a thickness of 2 mm. From the VSWR test, the design cell TEM cell can measure EMI in the frequency range 170-270 MHz, 400-510 MHz, 630-740 MHz, and 870-960 MHz. TEM cells designed can measure the radiated emission generated by an EMI source and mobile phone.

Keywords: radiated emission, TEM Cell, EMC

Topic: Telecommunication Engineering
Energy Harvesting Using Microstrip Rectenna Circular Patch On GSM 1800MHz Frequency

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Abstract

This research discusses the design of rectenna with microstrip antenna with frequency BTS work frequency in Malang city by using a rectifier to convert electromagnetic power into DC output on GSM1800 working frequency and use the energy storage design to be stored. Harvesting this energy is alternative energy conversion. The produced electrical power can be used by low-powered-devices. Since the obtained power is small, additional circuits will be used so that the obtained power can be stored in energy storage. The power obtained from this research is around 1 to 16 mV. It is obtained from BTS around the Malang city.

Keywords: Rectenna, Output DC, Harvesting

Topic: Telecommunication Engineering

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Abstract

The electricity supply used in State Polytechnic of Malang (Polinema) is still fully supported by PLN by utilizing the electricity source of the Electric Steam Power Plant (PLTU) with coal as a fuel. As the use of electricity in Polinemas environment is very large, this has an impact on the expensive cost that must be incurred every month. The use of solar power as a new source of electricity that utilizes the nature of renewable energy can be used as alternative electricity in Polinema. Supported by the use of solar panels with relatively affordable price and can be used as a long term investment, it is expected that the use of electricity from PLN can be replaced by this solar power plant (PLTS). In this research, a prototype of electrical energy monitoring device produced by solar panel using several sensors connected in one network or commonly called Wireless Sensor Network (WSN) was designed and made. WSN was built using ESP32 microcontroller which is assembled with a voltage and current sensor which then the readings from the sensors will be sent wirelessly to the router to proceed to the server with internet facilities. Information from the sensors is being continuously stored and monitored, so users can see the result of WSN readings from any location connected to the internet (real-time).

Keywords: Solar Panel; Wireless Sensor Network; ESP32; Renewable Energy; Monitoring; Performance

Topic: Telecommunication Engineering
Many of students who can't complete the study in a timely manner is a problem that needs to be faced with a fast and effective way. In the students education system is an important asset to note the graduation rate of students in a timely manner. Predicting graduation is very important for the institution to determine the strategic policies for the institution. The scope of the study is limited in performing an accurate comparison between studies that only use Genetic Algorithm method and the research-based Genetic Algorithm using forward selection. Here we can draw the conclusion that the value of the highest accuracy is there in the Genetic Algorithm-based method Forward selection.

Thus the Genetic Algorithm method with the selection of attribute based Forward Selection is the best method for solving a problem in the prediction accuracy of graduation.

**Keywords:** Genetic Algorithm, forward selection, prediction of graduation, Entropy, gain

**Topic:** Telecommunication Engineering
DESIGN ADJUSTMENT SYSTEM USING IMPEDANCE NON UNIFORM TRANSMISSION CHANNEL IN 2.4 GHz WLAN ANTENNA SYSTEM

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Abstract

Impedance adjustment design method using Non Uniform channel (N.U.T.L.) is a design method that offers a better advantage than the 1 / 4λ transformer method, the 1 / 4λ multisection method and the stub method. If in the conventional method the channel characteristic impedance is made constant, then in the Non Uniform method the physical length of the channel is made constant while the channel characteristic impedance is made to change gradually.

In this study, the channel characteristic impedance value or Zo is designed to be distributed parabolically (Parabolic Taper) and is used to match the load of the WLAN antenna complex with a 50 Ohm channel impedance at a 2.4GHz frequency.

From the test results it was found that the value of a parabolic constant in the Non Uniform channel characteristic Impedance distribution model affects the bandwidth of the designed impedance adjusters. Between the simulation results with the measurement results obtained an error deviation of 8%. Although the error deviation is still relatively large, the frequency response pattern of the two tests shows the consistency between the methods presented and the practical implementation.

Keywords: Impedance Adjusters, Non-Formalized Transmission Channels, Parabolic Distribution

Topic: Telecommunication Engineering
Feedback Remover on The Sound System Using Inverse Phase Method

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Abstract
Currently, almost all activities carried out by all parties are inseparable from the sound system. With the sound system, it is not necessary to speak loudly. There are several types of sound systems or models, ranging from the cheapest to the most expensive, with the usual quality up to good. However, there is a problem that can be obtained by a sound system that is of good quality or the usual quality, namely feedback from the speaker to the mic. Feedback will be very annoying because of the entry of sound from the speaker to the mic, which should be avoided. By using the inverse phase method and narrow bandpass filter, the simulation results can eliminate the feedback signal that is 100%. However, there are side effects on the band that occurs feedback, which is the reduction in the sound signal by the feedback power level that occurs between 30% - 100% that are in the frequency band range.

Keywords: Digital Signal Processing, Sound System, Audio, Inverse Phase, Feedback

Topic: Telecommunication Engineering
Abstract

Motorbikes and cars are the most widely used means of transportation by students, lecturers, and employees at Polinema. 14 motorcycle parking locations are available with a total capacity of approximately 6605 motorcycles and 18 car park locations with a capacity of around 330 vehicles. With a total of 12,226 students and 530 permanent lecturers and assuming 50% of them bring vehicles to campus at the same time, it can be estimated that the real need for parking and the difficulty in finding a parking space that is currently empty. The purpose of this study is to provide information to parking users about the location that can be occupied by the vehicle. The method used is to install 2 infrared sensors in 8 parking locations. Every 2 minutes the sensor sends data to the server, and then the server processes and provides information about the parking space vacancy. Information is displayed through displays displayed at each parking location. Where is displayed on the display has also been integrated between parking lots to facilitate parking location information in POLINEMA which is built in a locally designed network. The system created will be tested for performance in several conditions. It is hoped that from the results of the test, it will be concluded whether this system is feasible or not.

Keywords: Mini PC; Topology Network; Infrared Sensor

Topic: Telecommunication Engineering